FOOD WE WANT

Booklet

oikos
Co-operation and Development

FOOD WE WANT

Sustainable - Local - Justice

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Introduction

Welcome to the Food We Want Booklet.

This booklet forms part of the Educational Kit for the Food We Want Campaign.

Food We Want is a campaign to raise knowledge about, awareness of and to lobby to promote small-scale family farming and sustainable agri-food systems as a key solution to tackling hunger, as well as addressing poverty and climate change issues.

The Food We Want Campaign is a joint effort between several European and African organisations. It was born out of the realisation that, despite scientific advances and the fact that the eradication of hunger is one of the priorities for the new millennium, today around one billion people on this planet still do not have enough food to eat.

At the same time, according to the UN Food and Agriculture Organisation (FAO), we are already producing one and a half times the amount of food needed to provide everyone in the world with an adequate and nutritious diet. Yet one in seven people is suffering from hunger.

Why?

- Despite the fact that modern agricultural methods have resulted in spectacular increases in food production over the last 40 years, global forces have given priority to industrial agriculture that, rather than growing food to meet the needs of local communities, produces crops primarily to sell on world markets.
- The lack of knowledge and short-sightedness of people in developed countries means that they do not realise the impact their consumer choices have on people living on distant continents.
- Consumerism has won over global consciousness and solidarity.

The Food We Want Campaign decided to tackle this situation and draw attention to the need to rethink agricultural practices, placing agriculture at the service of the people and not to be simply subject to market forces. Our goal is to reach citizens North and South of the globe, hopefully changing mindsets in the process. This Educational Kit is our contribution to providing schools, teachers, parents and students who are interested in improving the world with tools that facilitate this change. The Kit has a lot of up-to-date technical information but, above all, it has several entertaining and educational tools that, in a fun way, will enable whoever uses it to gain the skills and knowledge that will allow them to question their own reality and role in an increasingly globalised world.

This booklet is arranged in 12 sections, all with the user in mind. Topics range from classic globalisation issues, already widely discussed and explored in other educational tools (e.g. Population, Pollution or Production Systems), to themes that have emerged in recent years which do not yet appear in school textbooks (e.g. the impact of subsidies and market access).

This booklet covers questions and concepts that have entered the consciousness of the general public (such as climate change or food consumption and waste patterns), along with others that are not so fashionable and which many people will not have heard sufficient to form an opinion (such as biofuels, "land grabbing" and financial speculation).

Each section contains text, graphics and relevant information about the topic. In addition, each section has four boxes with information that will help you explore and understand the subject matter. These are:

- To see and discuss - Nothing more than a recommendation to watch a short film (usually a talk by a specialist) with information relevant to the topic and what can and should be discussed as a group. This will help to introduce or develop concepts around the topic.
- Additional activities - Proposals for activities that may be used to introduce or develop the topic further. These range from the use of games that accompany this Kit throughout, to organising events, discussions or small intervention projects at school.
- VIPs - People who have had a significant contribution to the subject. These may be celebrities, scientists, authors, or even ordinary citizens whose efforts should be known and serve as an example to us all.
- To find out more/Further Information - Suggested further sources of information for those wishing to further their knowledge or capacity to take action. These may be technical documents, informational campaigns or movies.

Throughout this document we will make several suggestions for the use of the material provided. However, we are certain that teachers, students and educators will develop new ways of using this material, ways that will be far more effective than the ones suggested. Therefore, we leave you with an open invitation to visit the the Food We Want Campaign website where you can share your discoveries and uses of this material.

Visit us at www.foodwewant.org

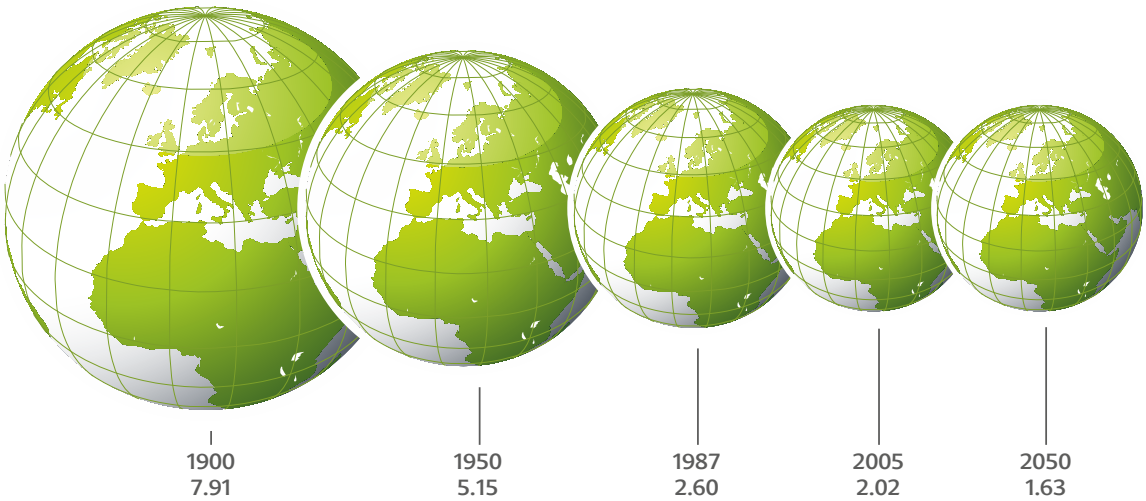
1 - Population and Food Production - a global view

A game of football lasts for 90 minutes. In the time it takes to play a game of football, 22,680 babies are born and 9,270 people die. In other words, while two teams are playing a football match the world population, on average, increases by around 13,000 people (and this is not including half-time or extra time).

It will come as no surprise that the world's human population is growing. However, the rate and speed of this increase may surprise many. Two centuries ago, Thomas Malthus, a British economist (sometimes regarded as the founding father of modern demography), wrote that increases in the human population would eventually put so much pressure on the Earth's resources that large famines would become inevitable. Seems logical, but is it necessarily so?

In an attempt to quantify the relationship between population and food production, Malthus determined that the population increases according to a geometric progression (2, 4, 8, 16, 32 ...), while food production increases by an arithmetic progression (2, 3, 4, 5…). This should mean the world is rapidly heading towards inevitable disaster. Despite the fact that Thomas Malthus wrote at a time when the human population was only at around 1 billion, and that we have already reached population figures hardly imaginable in the 18th century, his ideas continue to be accepted by many. When famine occurs, the claim of overpopulation is often used as an explanation. While this view is highly misleading and reductive, it is true that population growth puts pressure on natural resources. However, it is wrong and dangerous to focus only on that one aspect. It is wrong because the problem is multifaceted and dangerous because it diverts attention away from the social and political causes of hunger.

FIGURE 1 INCREASE IN WORLD POPULATION
Hectares available per person



Source: rising population - UNEP -

Population Evolution

Before the development of agriculture (around 12,000 years ago), the world human population probably never exceeded 15 Million[1]. Agriculture allowed for the abandonment of the hunter- gatherer way of life, thereby reducing the exclusive dependence on what the local environment could directly offer. This led to the establishment of communities based around the predictable availability of food.

In the year AD 1 it is estimated that the global human population was 230 million, and it will come as no surprise that the most populated areas of the planet were around the basins of major rivers (primarily the Ganges, Tigris, Yangzi, Nile and Po). Besides access to food, another major factor in population control was health. Limited medical knowledge meant that the average life expectancy was very low and any epidemic could eliminate large segments of the population. For example, the impact of the Black Death[2], as it became known, a bubonic plague pandemic that devastated Europe in the 14th century, was so great that the continent took almost 200 years to recover its prior population level.

Until the 18th century the human population remained fairly stable and the population growth rate relatively low. However, the industrial and agricultural revolutions led to an improvement in agricultural productivity and a reduction in hunger's part in limiting population numbers. Both revolutions are associated with significant improvements in medicine and sanitation, which led to a significant reduction in infant mortality rates. This allowed for a considerable acceleration in the world population growth rate which resulted in a population explosion. Thus, in the early 19th century, the human population reached its first 1 billion, and little over a century later it reached the 2 billion mark, and even then the population growth rate continued to rise but no catastrophe along the lines predicted by Malthus materialised.

From Table 1 we can see that, although the world population continues to increase, from the 1970s onwards the growth rate begins to slow. It is expected that the world population will stabilise at around 9 billion. What is happening globally is similar to what is happening in our own country. That is, the same developments that provide food and health services, increase life expectancy and reduce infant mortality rates, also provide education and access to family planning, greatly reducing the fertility rates of the population.

TO SEE AND DISCUSS
Hans Rosling – O crescimento da população
http://www.ted.com/talks/hans_rosling_on_global_population_growth.html

ADDITIONAL ACTIVITIES
Organise a game of musical chairs (also included in the Educational Kit).

[1] Luc-Normand Tellier (2009). "Urban world history: an economic and geographical perspective". PUQ. p.26. ISBN 2-7605-1588-5
[2] A Distant Mirror". TIME Eur ope. July 17, 2000, VOL. 156 NO. 3

Year	Population	Annual % growth Rate
1	231.000.000	
1500	500.000.000	0,08%
1600	545.000.000	0,09%
1700	610.000.000	0,12%
1804	1.000.000.000	0,61%
1927	2.000.000.000	0,81%
1960	3.000.000.000	1,52%
1974	4.000.000.000	2,38%
1987	5.000.000.000	1,92%
1999	6.000.000.000	1,67%
2012	7.000.000.000	1,28%
2027*	8.000.000.000	0,95%
2046*	9.000.000.000	0,66%

Table 1 History of World Population
Source: U.S. Census Bureau - World Population Clock

Agriculture through the ages

The act of "planting, nurturing and harvesting" food is not exclusive to the human species (e.g. ants and termites cultivate fungi). Nevertheless, the scale on which the human species is involved in this practice has allowed it to conquer and change the world itself.

Archaeological findings put the first farming and animal domesticity initiatives at approximately 7,000 BC (some put the first attempts to domesticate wheat at around the year 9,800 BC in what is now Kurdistan). We have no way of knowing with absolute certainty how it all started, however we can easily see its evolution and its impact over the past few millennia.

Agriculture allowed populations to settle in fixed locations and to create communities based around the predictability and abundance of crops, a result of the domestication of plants. This allowed the population to grow to unprecedented levels. The settlement of populations, and by direct implication, agriculture, enabled the development of more complex societies (freeing up time to pursue other activities, such as culture and science) and allowed for an improvement in living conditions.

There were several centuries of relative calm, when agriculture had evolved separately in various parts of the world. This was an evolution based on improvements in technology and farming practices, and also on the selection and improvement of existing seed and plant varieties. This was followed by the revolution that the era of European exploration and

colonisation brought to the world which also had an important impact on agriculture.

After the 15th century, with the first wave of globalisation that united all the different continents in an effective and regular manner, the global agricultural and food landscape underwent radical changes. New crops, varieties and species criss-crossed the oceans to produce a scenario which is much closer to the one we know today. For example, maize and cassava, which today form the staple diet of many African countries, were only introduced to the continent by the Portuguese in the 16th century. See Table 2 for where a number of vegetables originated.

Old World	New World
Rice	Maize
Spinach	Potato
Wheat	Cassava
Turnip	Sweet Potato
Pear	Tomato

TABLE 2 Origins of world vegetables

In the 20th century after the Second World War, the so-called Green Revolution got under way, and agriculture reached the dimensions and status that we know today. Between the late 1940s and late 1970s, a number of research, development and technology transfer initiatives led to an increase in global agricultural production (particularly noticeable in developing countries). These initiatives, led by the work of Norman Borlaug, involved the development of high yielding crop varieties of various cereals and an improvement in access to technology. This was an expansion in irrigation infrastructure, distribution of improved seeds, synthetic fertilizers and pesticides. However, this increase in productivity led to an agriculture that is heavily dependent on fossil fuels, chemical fertilisers, pesticides and herbicides, and is extremely aggressive towards the environment. For example agriculture accounts for one third of global greenhouse gas emissions.

The last century was marked by the intensification of agriculture through the use of agricultural chemicals (pesticides, fertilisers etc.) and heavy machinery, improving crop varieties (including transgenics - when genetic material from a different species is mixed) and exploiting the soil to its limit in order to produce *more*. The present century will surely be marked by a move towards sustainability in agriculture, integrating ideas of social and environmental justice and focusing on producing *better*. Increasingly, people are betting on new ideas and testing new agricultural methods that seek to counter the weaknesses of a revolution that, in reality, had very little to do with anything "green". Organic farming, urban gardens, permaculture, integrated production or agricultural diversification are the way forward towards a future that is needed today.

Yet the big question that hangs in the air remains the same: could it be that Malthus was right?

TO LEARN MORE
http://www.un.org/en/development/desa/population/
Report - World Population to 2300 — United Nations 2004.
Tunza — Acting for a better world (GEO 5 for youth).

VIPs
Thomas Malthus
Norman Borlaug
Rachel Carlson

2 - Agricultural Production Systems

With over 40% of the global workforce, agriculture is the world's largest provider of jobs[1]. However, not all of these 1.4 billion people produce food in the same way. There are many differences in terms of practices, results and direct effects between, for example, a traditional farmer in Mozambique and a large U.S. food producer.

The official FAO definition of an agricultural system: "is an assemblage of components which are united by some form of interaction and interdependence and which operate within a prescribed boundary to achieve a specified agricultural objective on behalf of the beneficiaries of the system[2]."

Merely by analysing this definition it is readily apparent that these classification systems can be devised according to many different parameters. For example: the main purpose of the farm, type of farm, size of farm, primary beneficiaries of the system, etc. Throughout the world there are innumerable ways of classifying agro-systems, but we will focus primarily on four characteristics: size of farm, farm density, production objectives, and methods used in cultivating the land.

Large commercial estates versus Small farms

Farm size is a fundamental criterion in classifying agricultural systems as it heavily influences the type of approaches to farming that a farmer can take. It is customary to recognise two or three main farm sizes:

- Large commercial estates - these are in the legal possession and control of a single entity (this can be a company, a cooperative, an individual farmer, etc.) that takes the decisions with regards to resource management, etc.
- Small farms or Smallholdings - these make the agricultural landscape more fragmented, with each entity only managing and cultivating small areas of land.

An intermediate category is often used, that of medium-sized farms. However, it is impossible to precisely define what exactly constitutes a large, small or medium sized farm, since this classification is highly conditioned by national, and sometimes even local, realities. For example, in a large and diverse country like Brazil, a farm with 25 acres is considered medium-sized in the South, while in the Amazon region this farm would still be classified as a small farm.

TO VIEW AND DISCUSS ADDITIONAL ACTIVITIES
Anna Lappé & Food MythBusters -- Do we really need industrial agriculture to feed the world?
http://www.youtube.com/watch?feature=pl

ADDITIONAL ACTIVITIES
Invite an expert on "Organic Farming" to your school to talk about sustainable agriculture. If you don't have an organisation that promotes organic farming in your country please contact IFOAM – International Federation of Organic Agriculture Movements (www.ifoam.org).

[1] Manifesto Food we Want - http://issuu.com/aepdf/docs/fwwmanifestopt/5?e=0
[2] Douglas J. McConnell e John L. Dillon (1997) "Farm Management for Asia: a Systems Approach". FAO ISBN 92-5-104077

Intensive vs Extensive

Intensive agricultural production systems place the emphasis on increased productivity, and are characterised by high crop density (animal density in the case of livestock), less crop rotation and reduced use of fallow. They have a high use of inputs (goods or services from outside the system), such as labour, capital, chemical fertilisers and pesticides, in relation to the area of cultivated land. These systems offer increased productivity (per area of cultivated land per farmer), increases the availability of low cost food and can reduce the amount of land used for food production. At the same time, they also have negative social and environmental impacts which may compromise the ability of future generations to meet their food needs. A reduction in biodiversity, depletion in soil fertility, depletion of water resources and a large contribution to climate change are the major negative impacts.

Conversely, extensive production systems are characterised by lower crop density and less use of inputs. “The cattle ranches of central Australia are a good example of extensive agriculture, where often only a few farm workers are responsible for thousands of acres of farmland. The hill farms of Wales and Scotland could be described as extensive”. Extensive systems are widely used all over the world, either by choice (since they have a much lower impact on the environment) or by necessity (the low productivity of some lands and reduced capital input requirements mean that, in many developing countries, traditional systems are extensive by default). In addition to lower requirements of inputs, extensive agricultural systems have several other positive characteristics: lower environmental impacts, the ability to restore soil fertility, animal well-being, ease of using basic machinery efficiently, etc. However, they do not have a big limiting factor: lower productivity per unit of land, which in turn leads to a greater need to convert natural areas into agricultural land in order to meet the food needs of the population.

Subsistence vs. Commercial

Farming systems can also be evaluated according to productivity. It can be said that there are farmers who practice subsistence agriculture (producing to directly meet the needs of their family or social group), while others practice commercial agriculture (producing products specifically for sale and using the profits to supplement their needs). These two systems may coexist within the same holding, particularly in terms of small family farms, in which part of the land is used to produce food to feed the family while another part is used to produce goods to sell.

Gone are the days when one could say that subsistence farming was unique to developing countries. In Europe, it is increasingly possible to find people who have "returned to the earth" whether it be for financial reasons, or by choice. For example, the economic crisis of recent years has forced many people into this situation or because other communities who choose to "withdraw" from the system by deciding to rely only on themselves are increasingly popular, whether that be for political, social or environmental reasons.

On the other hand, in Southern countries, there is strong and unequal competition between subsistence family farming and large commercial farms. An increased dependence on "cash crops" (agricultural products grown exclusively for sale to return a profit), with huge profit margins (for those who control the system), has led to ever more land and resources being diverted towards the production of these cash crops. This has caused farmers to abandon traditional forms of agriculture which had previously ensured their survival (see sections 5, 11, and 12). The increasing economic dependency of developing countries on a small number of crops (sometimes only one, e.g. in Burkina Faso 85% of the population depends on cotton production for their livelihood) and, their consequent increased vulnerability to market fluctuations, has been a topic of great concern to international bodies. The FAO, for example, has worked with the issue of crop diversification in developing countries at the same time as it moves forward with the development of food labelling systems. The FAO is a great advocate of farmers simultaneously producing food to sell and engaging in food subsistence. At the same time as it moves forward with the development of food labelling systems[3].

TO KNOW MORE ...

Organic Farming Europe – http://ec.europa.eu/agriculture/organic/splash_en
Relatório "Who Will Feed the World?" -

Case Study: Cashews in Guinea Bissau

Guinea-Bissau is one of the poorest countries in the world (ranked 176th according to HDI -Human Development Index - 2012), that decided to bet on cashew for its main source of income. In 2003, the annual production of cashew was 84,500 tonnes. Within ten years production more than doubled (in 2012 the country expected to export 170,000 tonnes)[4]. Cashew came to represent 90% of export earnings and employed 80% of the active population. Nevertheless, from 2011, changes in the global market led to a fall in demand and a price reduction of more than 60%, leaving many tonnes of cashew rotting in warehouses. This has led to a further impoverishment of the population and a progressive degradation in the diets of most people. The country hovers on the brink of tragedy since, without the money it used to receive from exporting cashew; there isn't enough money to import basic foods like rice.[5]

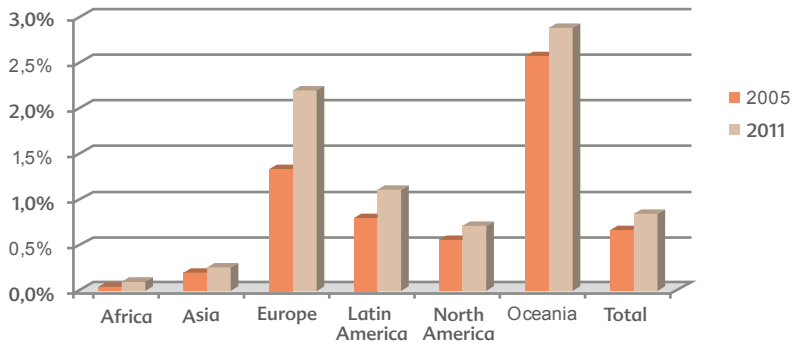
[3] Cora Dankers (2003), "Environmental and social standards, certification and labeling for Cash Crops" FAO - ISBN 92-5-105068-6
[4] Steven Kyle (2009), "Cashew Production in Guinea Bissau" Cornell University
[5] UN – IRIN (2013), Hunger warning for Guinea-Bissau as cashew price dips

Traditional vs Modern vs Alternative

Another factor commonly used to classify agricultural systems is the degree of modernity of the technology used in the production processes. For a long time agricultural systems were divided into only two types:

- **Traditional** - systems characterised by a greater use of human labour in relation to the use of technology. These farming systems predominate in developing countries, although they also exist in some of the more traditional rural areas in developed countries. They are quite heterogeneous in their methods and objectives (they can be either intensive or extensive, subsistence or commercial). This category includes plantations, itinerant agriculture, nomadic herding, Mediterranean agriculture, etc.
- **Modern** - system characterised by less use of manual labour and a greater reliance on machinery, fertilisers and technologically advanced equipment. The type of technology used in these systems does not stop evolving. It can be said that the farming revolution (see section 1) has never stopped. Cutting edge technology continues to be developed and used in agriculture. This can range from genetically modified seeds that resist specific pesticides, to “precision agriculture", which is totally dependent on computers, sensors and GIS to monitor, in real time, the specific needs of each patch of soil.
- It can be said that agricultural systems where the emphasis is placed on reducing negative social and environmental impacts constitute a third class, the **alternative** system (also called ecological or organic). Although these systems are very varied, the placing of greater emphasis on the impact, rather than on productivity, has the potential to change the world agricultural outlook. By preferring organic fertilisers to chemicals, in promoting biological control instead of pesticides, dismissing the use of transgenics, promoting polycultures rather than monocultures, and by taking an interest in the livelihood of farmers, farmers that use these alternative systems consciously sacrifice productivity and, potentially, their income. Therefore, in order to be economically competitive, alternative farming systems depend on conscious, responsible and committed consumers.

VIPs
Frances Moore Lappé
Will Allen



CHANGE IN THE PERCENTAGE OF LAND USED FOR ORGANIC FARMING
Source: Research Institute of Organic Agriculture (FiBL) - http://www.organic-world.net/statistics.html

3 - Origin of Food

Human societies are constantly changing and evolving. This is reflected in the most simple and mundane activities, for example the eating habits of a population. The diet of a population is affected by factors such as environment (e.g. climate or proximity to the sea), social (such as religion), economic (financial resources, business networks), and history. If in the past what we ate was largely a direct result of what we ourselves produced, but today globalisation means that our consumption patterns are almost exclusively conditioned by our desires and our economic power.

Prior to the age of European Exploration

During the early days of Humanity, the diet of a population was merely a result of what people could hunt or gather in and around the territories where they lived. The development of agriculture, domestication of various animal species, and the emergence of trade and transport improvements all allowed humans to have some control over their diet.

Yet, even when technological advances allowed us to access different types of food, diets were still conditioned by economic factors. For example, in ancient Greece, the staple food for ordinary citizens was cereal (such as barley or wheat), fish and nuts (such as pine), only eating meat on rare occasions, while members of the upper classes had a much more varied diet that included meat from various animals. In other areas of the world, despite a wide variation in specific foods, diet composition was very similar to that of Greece. In China, for example, the diet of the average citizen was based on cereal (wheat or millet in the North and rice in the South), vegetables (fresh or cooked) and various sources of protein (soy and other beans, sometimes eggs, fish or meat). Wealthier citizens had a more varied diet that included more animal protein.

Up until the 15th century, no major changes in diet were registered. This was despite the already existing trade routes connecting (with considerable difficulty) Europe to Africa and Asia, with commercial products, seeds and new agricultural practices flowing along these routes. In Europe the average person's diet was based on cereal (in the form of bread or porridge), vegetable, honey and occasionally meat (particularly pork or poultry). The consumption of exotic foods (such as spices) and foods with higher production costs (such as beef) was the reserve of wealthier social classes.

The geographical discoveries by the Portuguese and Spanish caused the first wave of globalisation and unleashed for a profound change in global eating habits.

The World Today

The establishment of regular trade routes between the Old and New World meant that, for the first time in history, foods and crops, regardless of their origins, could be consumed all over the world. This fact changed eating habits globally. This change was largely associated with the considerable economic interests of colonial powers and constant improvements in transport and cultivation technologies. Some foods "jumped" oceans to become "staple foods" for people living on distant continents (e.g. maize, originating from North America, became the world's widely-cultivated crop and essential in the diet of nearly all Sub-Saharan Africa; potatoes, domesticated in what is now Peru, became the food on which vast segments of the European population depended).

Modern diets are heavily conditioned by the various processes of globalisation. This process

ADDITIONAL ACTIVITIES

Promote an exhibition and debate around the film "Darwin's Nightmare" (original title "Le Cauchemar Darwin" by Hubert Sauper)

Show the photo slides of "what's on family dinner tables around the globe?" by Peter Menzel
http://world.time.com/2013/09/20/hungry-planet-what-the--world-eats/photo/ger_130614_331_x/ e
to discuss the differences and similarities of diets of families from various countries of the world.

includes the growth and dominance of international agro-industrial food companies, the development of international supermarkets, trade liberalisation, foreign direct investment; global food marketing, successive technological developments and cultural influences are all driving forces behind major changes to the food offered for sale and to the availability of financial resources. All these factors have a huge influence on the diets of billions of human beings[1].

In Tables 1 and 2 it is possible to observe that currently there is no direct geographical relationship between the origins of a food, its production and its importance in the diet of a particular country. It is easily seen that global food production is concentrated in economically strong countries (like the United States, China or Brazil) which export to other countries (even if these were once producers). Globalisation has led us to a situation where purely economic criteria has more influence on what a country produces and consumes than more rational criteria, such as sustainability or the common good.

Table -1: Livestock origins

	Origin	Principal Producer Country	Principal Consumer Country	
			Total	Per Capita
Cattle	Europe, North Africa and Asia - domesticated variants of the European Bison	United States of Amderica[1]	United States of Amderica	Argentina
Goat	Eastern Europe and Western Asia	China	India	Mongolia
Chicken	South East Asia	United States of Amderica	China	United Arab Emirates
Duck	Southeast Asia (for the mallard, but other species were domesticated simultaneously in the Americas)	China	China	Françe
Pig	Europe, North Africa and Asia	China	China	Austria
Turkey	Mexico region	United States of Amderica	United States of Amderica	United States of Amderica

ORIGIN, PRODUCTION AND CONSUMPTION OF MEAT
Source - FAOSTAT. http://faostat.fao.org/

[1] USDA – Livestock and Poultry: World Market and trades - http://www.fas.usda.gov/psdonline/circulars/livestock_poultry.pdf

	Crop	Origin	Principal Producer	Principal Consumer	
				In quantity	Per Capita
1	Corn	North America	United States of America	United States of America	Lesotho
2	Wheat	Turkey	China	China	Kyrgyzstan
3	Rice	China	China	China	Brunei
4	Potato	Peru	China	China	Belarus
5	Cassava	Brazil	Nigeria	R D Congo	-
6	Soy	China	United States of America	China	-
7	Sweet Potato	South America	China	-	Papua Nova Guinea

A Sustainable Future

For most people living in developed countries the present time is not bad at all. In any medium-sized city in Europe one can easily find the ingredients to make any recipe that comes to mind, regardless of the time of year. In fact, often by the time we have had breakfast and even before leaving the house, we will have consumed foods from various countries, and even different continents, and have left a large ecological footprint! On the other hand, for many millions of people in developing countries, the nutrients recommended for a healthy diet are just not available, even if your own country exports some of the products that any average European will consume for breakfast. This is not a desirable or sustainable situation.

The future lies in having less of a reliance on long distance trading routes, in reducing the number of steps a product takes in order to get from the producer to the final consumer, and, above all profound change in attitudes and consumption patterns among the planet's ihanbitants. In the future, nutritional, cultural and sustainability criteria should take precedence over purely economic reasoning. In the end a lot will depend on the conscience of each individual and their willingness to make simple decisions, such as not eating peaches in December.

Local impact

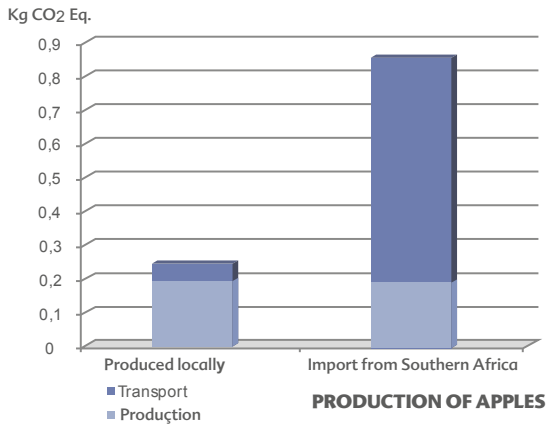
Why should we eat peaches in summer and apples in winter?

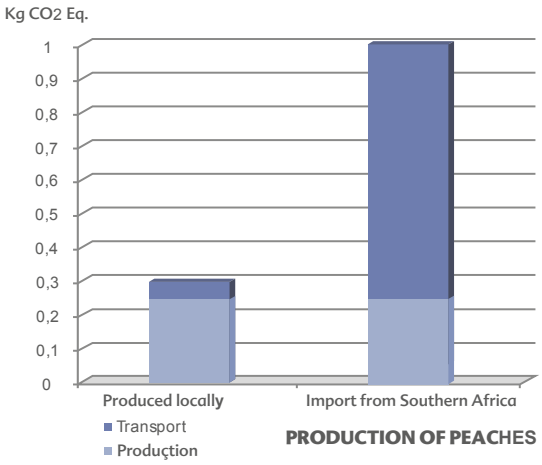
30 years ago the fruit than any average U.K. family consumed depended on the calendar and season. Therefore, everyone ate apples in winter while looking forward with relish to eating juicy peaches in summer. Currently there are all kinds of fruits for sale throughout the year, with a seasonal change in the price of fruit being more noticeable than seasonal availability. This apparent bonanza is the product of complex production and distribution networks that can place peaches from Chile and apples from South Africa in U.K. supermarkets at competitive prices. Even if we do not take into account the economic, social, cultural and culinary impacts such as reduced imports, improving the local economy, it is easier to monitor processes that take place within the country than a thousand miles away and the taste and flavour of fruit picked just when it has ripened is incomparable to that of a green harvest, when fruit is harvested weeks before it is ripe and then transported from one side of the world to the other. In addition, we cannot ignore the environmental impact of emissions associated with the transportation of these foods.

TO VIEW AND DISCUSS.
Pam Warhurst: How we can eat our landscapes
http://www.ted.com/talks/pam_warhurst_how_we_can_eat_our_landscapes.html?quote=1817

TO LEARN MORE
A Taste of History: Food through the Ages! - http://library.thinkquest.org/C005446/
Relatório - World Population to 2300 – United Nations 2004.
Hungry Planet: what the world eats. – Peter Menzel

VIPs
Marco Polo





CARBON EMISSIONS PER Kg OF APPLE AND PEACH PRODUCTION
Source - Food carbon emission calculator. http://www.foodemissions.com

4- Food Consumption and Waste Patterns

Important Definitions on nutritional requirements and food security

Hunger - The uneasy or painful sensation caused by a lack of food; the recurrent and involuntary lack of food.
Food Insecurity - Limited or uncertain access to sufficient, nutritionally adequate food for a healthy diet. Difficulties in having access to food can be due to economic, physical or social barriers.
Malnutrition - Insufficient consumption of macronutrients, particularly proteins and energy, results in an adverse impact on health.
Micronutrient Malnutrition - Also known as "Hidden Hunger". Caused by a diet which, while having sufficient protein and energy, is lacking in specific nutrients (vitamins, iron, folic acid, etc.). May occur simultaneously with overnutrition.
Over nutrition - Consumption exceeding the actual caloric energy needs of the individual.
Overweight and Obesity - Abnormal or excessive fat accumulation that poses a risk to health. A person with a Body Mass Index (BMI) greater than or equal to 25 is considered "overweight", while a person with a BMI greater than or equal to 30 is considered “obese”. BMI is calculated by dividing weight (in kilo grammes) with height (in metres).

In 1949, FAO (Food and Agriculture Organisation of the United Nations) convened a panel of experts in nutrition to produce the first set of recommendations on what would be the average caloric needs of a human being, as well as formulating a set of recommendations to serve as a reference guide for the organisation to act upon. The impact was so positive that the organisation continues to convene panels of experts to collate, evaluate, and interpret current scientific knowledge in order to update the recommendations that help guide the FAO as well as as well as influence research agendas and policy makers[1].

At their last meeting the panel of experts concluded that, despite the daily energy needs of a human varying significantly according to numerous factors (metabolism, age, sex, level of physical activity of the individual, etc.), an average person needs at least 1,800 calories a day in order to remain healthy.

Given these findings, and once again using FAO data (this time from the "Food Balance Sheets", with detail food supply in each country), it is easy to make a comparative evaluation of all the countries in the world. The following tables show the 5 countries with highest and lowest levels of available calories per person:

[1] Human energy requirements - Report of a Joint FAO/WHO/UNU Expert Consultation - 2001

Country	Calories per individual
USA	3,770
Austria	3,760
Greece	3,700
Belgium	3,690
Luxemburg	3,690

COUNTRIES WITH HIGHEST AVAILABILITY OF CALORIES PER HEAD 2005/2007

Country	Calories per individual
Eritrea	1,590
Congo DRC	1,590
Burundi	1,680
Haiti	1,850
Comores	1,860

COUNTRIES WITH LOWEST AVAILABILITY OF CALORIES PER HEAD 2005/2007

Fonte: http://www.fao.org/fileadmin/templates/ess/documents/food_security_statistics/FoodConsumptionNutrients_en.xls

A quick analysis of global caloric availability can lead us to conclude that:

- Apparently just a very small number of countries (2 between 2005 and 2007) did not meet the minimum recommended by FAO.
- Globally we can produce more than enough food for every person on Earth to be able to consume the maximum requirement of 2,700 calories (this is the maximum recommended for population with lifestyles that require a high caloric intake, e.g. labourers, etc.).

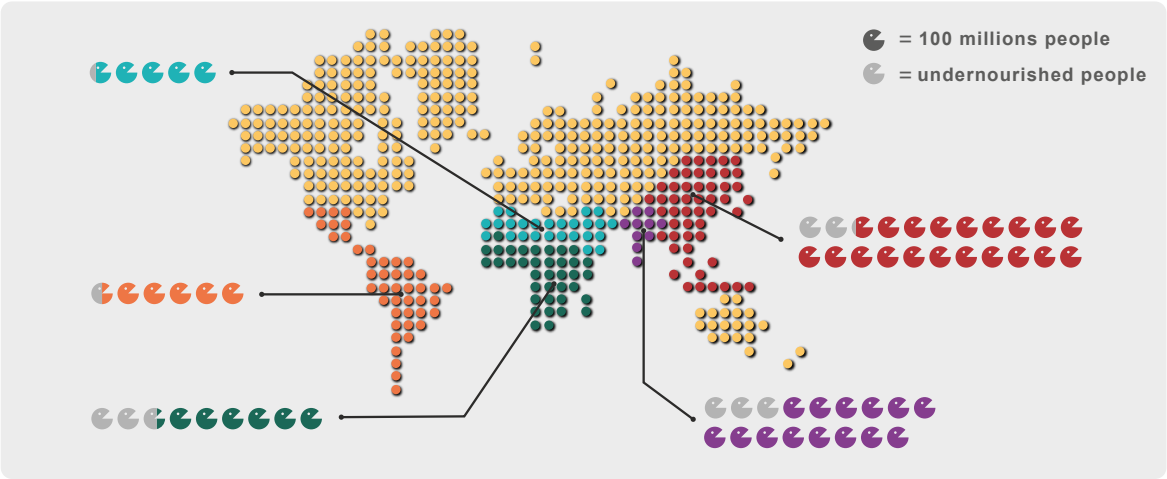
Yet, we know that the global reality is quite different. The profound inequalities that exist in modern human societies mean that the average number of calories available to citizens is only a statistical curiosity, much loved by experts, but with very little to do with the day-to-day life of the normal citizen. It is these inequalities that have led us to a situation where, for the first time in history, the number of overweight people is about the same as to, or greater than, that of undernourished people.

Food consumption in developed countries - the Global North

In most of these countries there is a wide availability of food, and it is quite easy to meet the caloric and nutritional needs of all citizens. However, such abundance has led to excess and has been the cause of many severe problems. This abundance leads to both a high intake of calories and huge waste on the part of consumers.

For example, in Canada, the United States and Europe, on average each citizen consumes 3,400 calories per day. This leads to high rates of obesity and, inevitably, to the heart problems that are now at the epidemic level in developed countries. Currently, heart disease is already the leading cause of death in many of these countries[2].

[2] World Health Organization – The top ten causes of death - Factsheet 310 - 2007



UNDER NOURISHED POPULATION BY REGION
Source: CGIAR – Research Program on Climate Change, Agriculture and Food Security

Developed - countries diets are also characterised by excessive and increasing meat consumption. According to FAO data, Europeans today consume nearly twice as much as meat as in 1960 and the average US Citizen consumes 350g of meat per day - double the recommended daily amount. This means that increasing amounts of grain is required to be used as animal feed, a process that ultimately contributes to worsening food insecurity in developing countries. In order to produce 1 kg of meat, on average 6 kg of grain is used (the numbers vary with the type of livestock and farming methods). To get an idea of the overall impact of meat consumption, it is worth considering that, for example, global cereal production in 2004 could have fed 6 billion people directly, whereas, if the same quantity of cereal were used to feed cattle for meat production the number of people it could feed falls to 2.6 billion.

Yet, even in developed countries inequality also causes large differences in consumption patterns. Populations with fewer resources end up having a diet that is made up of processed food and "fast food" (a diet rich in calories, sugars and fats) instead of fresh food, which is rich in nutrients and of high quality. Although this is partly a problem of access (in many countries it is easier to find a fast food restaurant than a grocery store in the vicinity of a housing estate), it is also a problem of education and knowledge. Although there are relatively inexpensive and healthy food options, these are less known and much less publicised than the “ready-made” foods that many supermarkets offer.

Food consumption in developing countries - the Global South

In many developing countries, especially in Sub-Saharan Africa and Southern Asia, large proportions of the population are very vulnerable to food insecurity. For example, 33% of India's population, and 44% of the inhabitants of sub-Saharan Africa, are malnourished. Paradoxically, most of those suffering from chronic malnutrition are small subsistence farmers.

In developing countries, food accounts for most of the available household budget (70% in Tanzania and 50% in Pakistan, compared with 10% in the UK) and cereals are the staple diet (see Section 3 on Origin of Food). This means that increases in global food prices have a much more significant and negative impact on the disadvantaged populations of Southern countries than Northern populations.

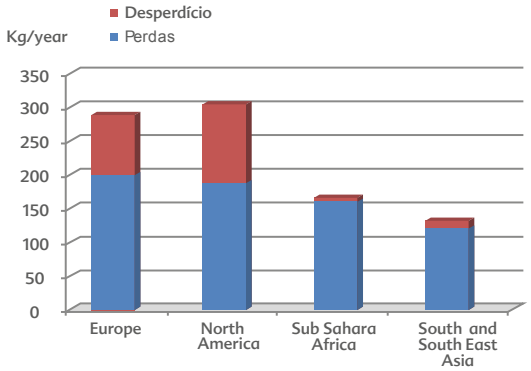
Food Loss vs Food Waste

Food Loss - Foodstuffs lost at the production, post-harvest and processing stages of the food chain.
Food Waste - Foods that are lost in the final stages of the food chain, particularly at the retail and consumer levels.

Facts about obesity in North America
- 1/3 of Americans may be considered obese (the number of people suffering from morbid obesity increased six-fold since 1960)
- The annual cost of treating obesity-related diseases (heart disease, type 2 diabetes, hypertension, arthritis, etc.). for U.S. citizens is more than € 140 billion (£ 116 billion)
- Cardiovascular disease (often associated with obesity) is the leading cause of death among North Americans.
- 40% of American children are overweight, with the obesity rate being 1.6 times higher among children from disadvantaged families.

One third of food produced annually is not consumed, getting lost somewhere along the way between the farm and the consumer's dining table.

It is not only the consumption patterns that are different in the North and South, waste patterns are also completely different. In developing countries, the lack of infrastructure and storage technology means that a lot of food deteriorates before reaching its final destination. However, losses at the consumption point are very low, with the result that these countries have a high degree of food loss but low food wastage. In developed countries the losses are very high at the marketing and sale point (unrealistically high standards of quality), and also once in the hands of the end consumer - cheap and easy access to food means that food is not cheap and easy access to food means that food is not valued by consumers.



FOOD LOSS and WASTE PER HEAD
Source: "Global Food Losses and Food Waste" FAO, 2011

TO KNOW MORE ...
"The critical role of global food consumption patterns in achieving sustainable food systems and food for all" – UNEP Discussion Paper - 2012
"The waste makers" – Vance Packard (1960)
"Waste: Uncovering the Global Food Scandal" – Tristram Stuart (2009)

TO VIEW AND DISCUSS
Tristram Stuart: The global food waste scandal
http://www.ted.com/talks/tristram_stuart_the_global_food_waste_scandal.html

ADDITIONAL ACTIVITIES
See photographs by Peter Menzel in http://world.time.com/2013/09/20/hungry-planet-what-the-world-eats/photo/ger_130614_331_x/ and discuss the differences and similarities between family diets in various countries around the world.
Organise an exhibition and a debate around the film "Super Size Me" (Morgan Spurlock, 2004)

VIPs
Tristram Stuart
Vance Packard
Jamie Oliver

5- Food Security vs Food Sovereignty

Food and Nutrition Security – the World Food Summit of 1996 defined food security as existing "when all people, at all times, have access to sufficient safe and nutritious food to meet a healthy and active life." A priority is placed on supply and access to food and not necessarily on the ability to produce food locally.

Food Sovereignty – This concept, defined by the Via Campesina movement in 1996, asserts the right of people to define their own food systems. For a people to be sovereign they must have the capacity to produce and market local foods associated with their culture and way of life, avoiding dependency on large international markets. Proponents of this concept advocate placing individuals who produce, distribute and consume food at the centre of decisions on food systems and policies, rather than the corporations and market institutions which have come to dictate the rules of global food systems.

The Human Right to Food

Food is essential for human life. This fact is indisputable and has moral and ethical implications which have been the subject of special consideration throughout the world. At this moment the right to food is a universal human right recognised and protected by international law.

Article 25 of the Universal Declaration of Human Rights states:

> Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

Article 11 of the International Covenant on Economic, Social and Cultural Rights commits states that have signed the covenant to the implementation of practical measures which guarantee the equitable production and distribution of food for the population.

Despite these two documents binding signatory states to the fight against hunger and malnutrition, they do not establish what methods are to be used. This "vacuum" allows for a range of diverse approaches to be used in eradicating hunger. The concepts of Food Security and Food Sovereignty underlie many of these different approaches.

In 1996 FAO organised a World Food Summit in Rome, a historically significant conference which produced the Rome Declaration on World Food Security and the World Food Summit Plan of Action which commits developed nations to the fight against world hunger. At this conference the 126 signatory states to the Rome Declaration pledged themselves to global food security.

Food Security has four key aspects:

- Food availability: sufficient quantities of food available for a healthy diet
- Access to food: having sufficient economic and physical resources to obtain appropriate foods for a nutritious diet.

- Food use: appropriate use of available food based on current knowledge and expertise of food nutrition and care, as well as adequate water and sanitation.

- Long-term sustainability: maintain the other three principles over the long term.

Despite this definition, which was adopted at the highest level in the United Nations, constituting an important advance in the fight against world hunger, the concept of food security is seen as one which is defined from the top down. It is a concept that is defined by experts, diplomats and politicians, and does not take into account the legitimate aspirations of people and farmers. Another criticism leveled at the concept is that it can be easily exploited by large multinational food corporations and other economic interests, since it places emphasis on the availability of vast quantities of food, regardless of where it is produced.

For example, recently the American USAid agency announced that it planned to modify its programme "Food for Peace", reducing the quantity of food sent by the United States to areas around the world in greatest need instead increasing financial aid. Several international reports consider this a more efficient use of funds. USAid itself justified the modification by stating that it could feed 2 million more people with the same budget if it purchased food produced closer to the areas in need. However, this new approach has been effectively frozen due to pressure from the Farming Lobby and Maritime Transport associations which consider that the measure would reduce their annual profits.

Food Sovereignty

The concept of Food Sovereignty is born out of practical 'on the ground' observations that the politics of Food Security can easily be taken advantage of by other interests, transforming what should be tools of liberation into more dependency with a risk of exploitation. Food Sovereignty emerges as a counterpoint, a new way of thinking which is born out of practical 'on the ground' experience which considers that, to be free, a people must be sovereign.

Sovereignty entails the ability to produce and market food locally that is associated with the local culture and way of life, thereby distancing the population from a dependency on major international markets. Thus this prevents entire populations from being held hostage to other interest groups.
Currently the concept goes even further, taking into account health and the promotion of clean production methods that are aimed at maintaining an environmental and social balance. This is something that does not occur in large industrial monocultures.
The organisation Via Campesina, an international movement which coordinates peasant organisations, has been the main promoter of Food Sovereignty. This organisation, along with many others (including the Food We Want Campaign partners), argue that food sovereignty, in promoting local production and local consumption, is the best way to fight global hunger and poverty.

TO VIEW AND DISCUSS
The missing option...Food Sovereignty
http://vimeo.com/30412996

Note: In some Latin countries, such as Portugal, the term "food security" is also used to denote standards of food production, transportation and storage that together ensure food is suitable for human consumption.

VIA CAMPESINA

La Via Campesina (LVC), literally meaning “the peasants’ way”, is an an international movement which coordinates peasant organisations from all corners of the globe. The main goal of La Via Campesina is to build an alternative model of agriculture and rural life. To reach this goal, member organizations from around the world work together to develop and implement farmer-based policies for food sovereignty, multiplication and use of local seed varieties, agrarian reform, etc.

The origins of LVC goes back to April 1992, when several peasant leaders from Central America, North America and Europe met in Nicaragua at the Congress of the National Union of Farmers and Ranchers (UNAG). It was formally constituted in April 1993 in Mons, Belgium, at the first International Conference of La Via Campesina. Currently the organisation’s headquarters are located in Jakarta (Indonesia) where it works on several issues that are pertinent to the success of rural communities. These range from Agrarian Reform to the protection of genetic resources and seeds, and also encompass the role of women and the defense of farm workers and rural migrants.

La Via Campesina comprises about 150 local and national organisations in 70 countries from Africa, Asia, Europe and the Americas. Altogether, it represents about 200 million farmers: small and medium sized farms, farm workers, peasant women and Indigenous peoples. It is an autonomous, pluralist and multicultural movement, independent from any political, economic or other type of affiliation.

The six pillars of Food Sovereignty

- **Focuses on Food for People**: The right to sufficient, healthy and culturally appropriate food is the basic legal demand underpinning food sovereignty.
- **Values Food Providers:** Food sovereignty asserts food providers’ right to live and work in dignity.
- **Localises Food Systems**: Food must be seen primarily as sustenance for the community and only secondarily as something to be traded.
- **Puts Control Locally**: Local control over local resources
- **Builds Knowledge and Skills**: Increasing the agricultural knowledge and skills of local farmers is a priority. Food providers to pass on their skills and local knowledge to future generations.
- **Works with Nature:** Seeks to work sustainably with nature. Food sovereignty requires production and distribution systems that protect natural resources and reduce greenhouse gas emissions, avoiding energy-intensive industrial methods that damage the environment and the health of those that inhabit it.

TO FIND OUT MORE
Via Campesina - http://viacampesina.org/en/
The Nyeleni Declaration - 2007

ADDITIONAL ACTIVITIES
Research work - analyse the food that is served at your nearest canteen for a whole week. Make a complete list of the food used and try to discover its origins. Find out which foods are purchased locally from small farmers. Organise a session to demonstrate your findings along with proposals to improve the situation.

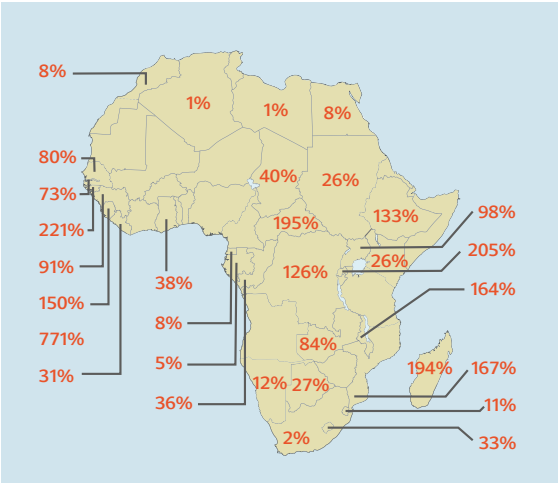
Food aid, dependency and vulnerability

As we have seen previously, food aid, when it is poorly thought through, can be used and manipulated by powerful interest groups. A classic example of the adverse impact food aid can have is the case of Ethiopia.

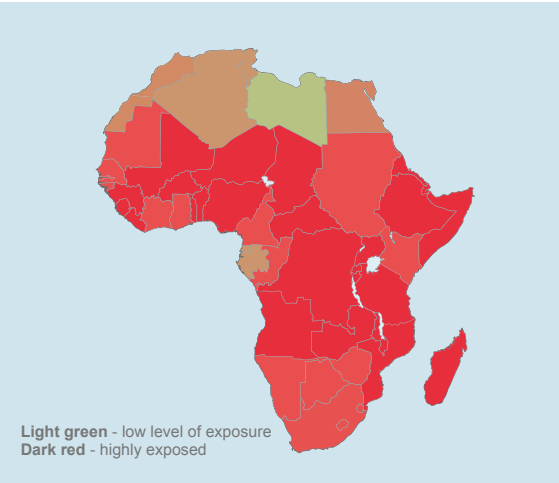
In this African country, which is plagued by periodic episodes of drought and famine, the government's attempts at establishing a food production base, alongside other initiatives, that could lead to a reduction in or elimination of food insecurity have all failed. Since at least the 1980s over 5 million people (16% of the population) are entirely dependent on external food aid. Despite the massive efforts of the international community and the provision of huge quantities of food (1.4 million tonnes in 2003), the country remains in a situation of deep food insecurity and the number of people dependent on food aid continues to rise (the latest figures show that 8 million inhabitants benefit from international food aid). Farmers complain that the government has failed to equip them with the necessary tools, seeds, etc, for them to be able to produce. Successive governments have accused the farmers of not wanting to work and to have become dependent on food supplied by international donors - while still not addressing the other factors responsible for the persistence in food insecurity, such as low soil fertility, environmental degradation, population pressures, etc. By analysing the two maps we note that Ethiopia is not a unique case in Africa. Many countries that receive large amounts of foreign aid continue to experience high levels of dependency on international markets for their food.

Could it be that investing in producing and consuming locally, as the Food Sovereignty movement advocates, would have better results?

VIPs
Nyéléni
Raj Patel
Eric Holt Giménez



AFRICA - DEPENDENCE ON EXTERNAL AID
Official aid received as a percentage of government spending (2008)
Source: International Food Policy Research Institute



VULNERABILITY TO INTERNATIONAL MARKET PRICE FLUCTUATIONS
Source: International Food Policy Research Institute

6 Water and Soil

Although agricultural production today depends on a large combination of factors, at its most basic a farmer needs only four elements to produce food: seeds, sun, water and soil. Curiously, the agricultural model that currently dominates globally jeopardises three of these key elements: water, soil and seeds (see section: “Biodiversity, Seeds and GMOs”)

Soil

In the end soil is nothing more than the "skin of the earth", a complex and variable mixture of minerals, air, water, decaying remains of life, and countless living organisms. Nevertheless, its importance is so great that in 1937, the then president of the United States, Franklin D. Roosevelt, stated that "the nation that destroys its soil destroys itself."

If soil quality determines agricultural practice, agriculture in turn has many impacts on soil. In the figure provided we can see that agriculture is directly responsible for 28%, and animal rearing 34.6%, of soil degradation caused by man. This means that over 60% of soil degradation caused by man is directly related to food production. It should be noted that, once again, the greatest impacts and losses in productivity related to soil degradation are concentrated in the global South.

Often the first impact occurs even before the first seed has been sown, and this is due to altering land use. Once we begin to meddle in the natural ecosystem that created the soil, we rapidly increase soil erosion and degradation. Other factors that contribute to soil erosion and degradation are:

- The establishment of intensive monocultures (successive ‘corrections’ to soil composition, extracting exaggerated amounts of organic material and the elimination of soil life, etc.).
- Row planting (facilitates agricultural production but also increases water erosion).
- Periodic tillage (forced turning of the soil).
- The use of herbicides (which leave the soil exposed between cultivation periods).

Harvesting (the removal of vegetation cover which magnifies the erosive actions of wind and rain, while at the same time preventing the restoration of organic matter to the soil).

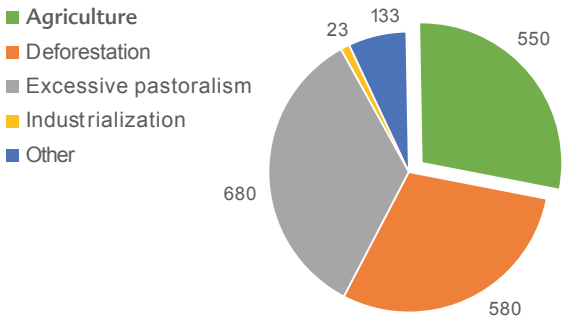


FIG 1 - AREAS OF SOIL DEGRADATION CAUSED BY HUMAN ACTIVITY

Millions of hectares

Source: Mohan K. Wali et al.,"Assessing Terrestrial Ecosystem Sustainability," Nature & Resources, vol. 35, n. 4, October-December 1999, pp. 21-33.

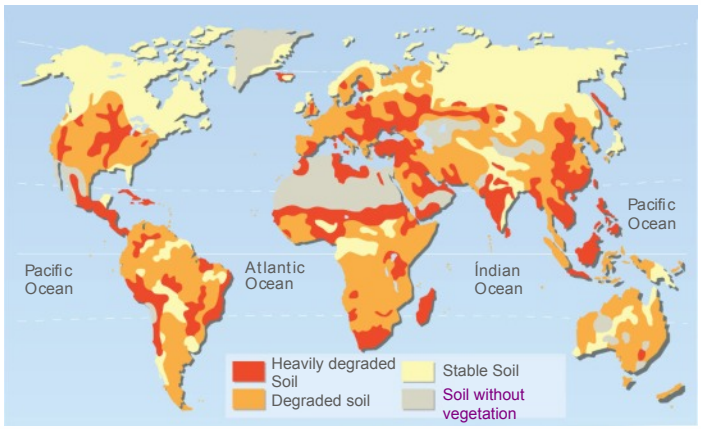
However, not all agricultural systems have the same negative impacts. Sustainable agriculture and industrial agriculture regard soil in completely different ways. Current models of industrial agriculture regard soil as just another factor to take into account when maximising production: when the soil is fertile it should be exploited to exhaustion; when it has minor fertility problems these should be fixed quickly using all available means; when it ceases to be productive it should be abandoned and production "re-located" to another area with fertile soil. For proponents of sustainable agriculture, soil is an investment. It is something that must be managed and nurtured, that way ensuring that its fertility will not be lost to future generations. As we can see, these two approaches to intervening and working with the soil are poles apart.

LETS VIEW AND DISCUSS

Let's Talk About Soil http://vimeo.com/53618201

Soil - a renewable or non-renewable resource?

The rate at which soil forms depends on several factors. In the middle latitudes, and with a mild climate, it takes between 200 and 400 years to form one centimeter (½") of soil. In warmer and wetter areas the process is quicker. However, to accumulate enough nutrients in the soil for it to be fertile may take more than 3000 years. As such, soil can be considered a non-renewable resource: once it has been destroyed it would take more than 100 human generations for it to recover.



MAP 1 - SOIL DEGRADATION
Source: UNEP World Atlas of Desertification

Additional Activities

- Organise a presentation of the movie "Dirt - the movie" by Bill Benson. Invite a member of an environmental or farming organisation for a discussion after viewing the film.
- Try to calculate the water footprint of the food you consume in a day using the tools provided by the Water Footprint organisation.

Modern agriculture relies heavily on chemicals in order to maintain the levels of essential nutrients (especially nitrogen, phosphorus and potassium) in the soil in sufficient quantities that allow for a good crop harvest. However, this is not a scenario that is likely to be maintained indefinitely. Progressively more chemicals are required in order to maintain production levels, ultimately meaning that at some point it will no longer be economically viable. Yet, over time several alternatives methods have been developed to maintain and improve soil fertility. For example:

- The use of organic fertilisers.
- Crop rotation: an ancient practice of alternating the type of crop grown in one area on a regular basis, thus allowing for the replacement of nitrogen. It mitigates the build-up of pathogens and pests and can also improve soil structure and fertility.
- Intercropping: growing two or more crops in proximity.
- Indeed, organic farming and direct seeding methods are demonstrating a greater ability to maintain soil fertility in the medium to long-term.

Indeed, organic farming and direct seeding methods are demonstrating a greater ability to maintain soil fertility in the medium to long term[1].

TO KNOW MORE
Water Footprint – http://www.waterfootprint.org/
Savory Institute - http://www.savoryinstitute.com/
UNCCD – United Nations Convention to Combat Desertification - http://www.unccd.int/

VIPs
Allan Savory
Arjen Hoekstra
Pedro Sanchez

[1] LaSalle, T. and P. Hepperly (2008). Regenerative Organic Farming: A Solution to Global Warming. Rodale Institute.

Concepts

Blue Water - Fresh surface and groundwater, in other words, the water in freshwater lakes, rivers and aquifers.

Green water - The precipitation on land that does not run off or recharge the groundwater but is stored in the soil or temporarily stays on top of the soil or vegetation. Green water can be made productive for crop growth (although not all green water can be taken up by crops, because there will always be evaporation from the soil and because not all periods of the year or areas are suitable for crop growth).

Grey water - Refers to pollution and is defined as the volume of freshwater that is required to assimilate the load of pollutants based on natural background concentrations and existing ambient water quality standards. The grey water footprint concept has grown out of the recognition that the size of water pollution can be expressed in terms of the volume of water thatis required to dilute pollutants such that they become harmless.

Water Footprint - An alternative indicator of water use introduced in 2002 by UNESCO. It is an indicator of freshwater use that looks not only at direct water use of a consumer or product, but also at the indirect water use. The water footprint of a product is defined as the total volume of fresh water that is used directly or indirectly to produce the product. It is estimated by considering water consumption and pollution in all steps of the production chain. The water footprint of a product breaks down into a green, blue and grey component. It enables us to determine the amount of water used by an individual, community, business, or nation.

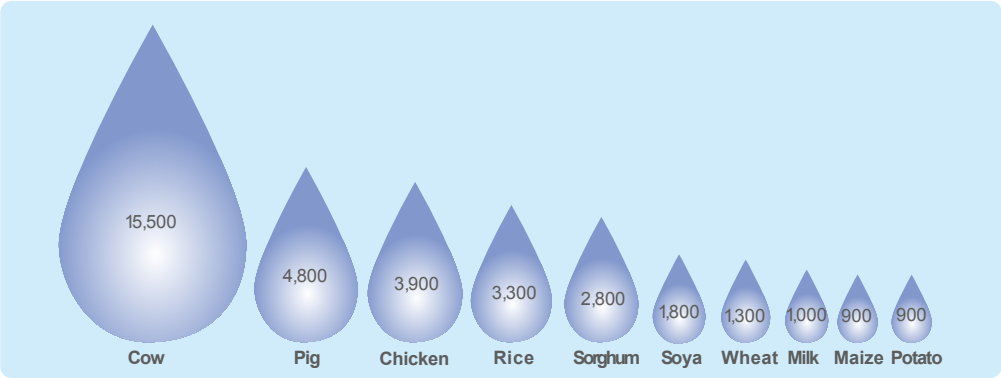
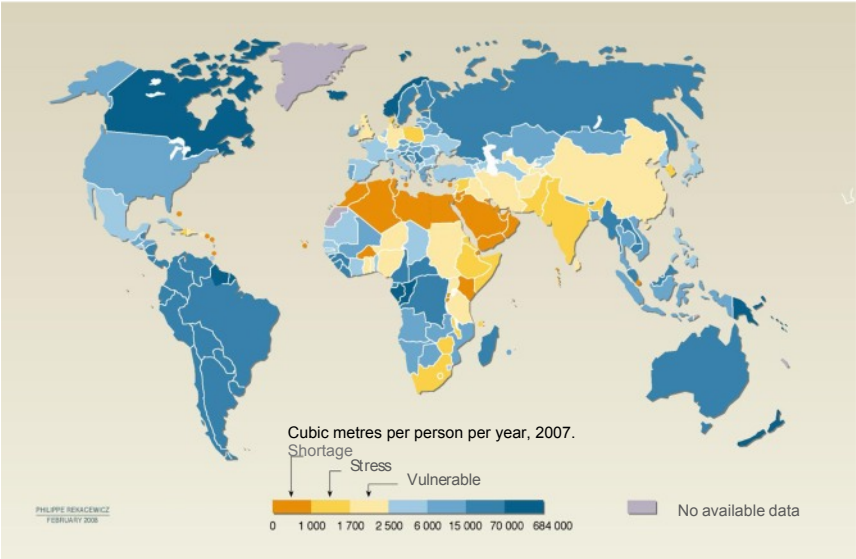


FIG 2 - LITRES OF WATER TO PRODUCE ONE KILOGRAM
Fonte: Waterfootprint (https://www.waterfootprint.org), Apud World Development Report 2010.

Agriculture depends on water. If rainfall was initially the main source of crop irrigation, man went on to develop increasingly complex and effective technologies in order to irrigate farms. Currently, agriculture accounts for about 70% of global freshwater consumption.

Excessive use of water, particularly in regions that are heavily dependent on irrigated agriculture, such as the plains of South Asia or northern China and the high plains of North America, and in areas with rapid urban and industrial growth, is a serious risk to the environment and to the sustainability of many of the world's major water basins. It is estimated that 1.4 billion people live in an area where the water basin is threatened, i.e. in areas where the use of water exceeds the minimum water replenishing levels. These situations of water scarcity are quite widespread but do not affect everyone equally. Those who have economic resources and / or knowledge are able to go on resolving their water shortages, but many millions of small farmers, agricultural workers and shepherds in poorer countries do not have this capability. For example, in Sanaa in Yemen, over the last 12 years farmers have had to deepen their wells by 50 meters, and even then the amount of water extracted fell by 66 %[2].

[2] UNEP - An Overview of the State of the World's Fresh and Marine Waters - 2008



MAP 2 - GLOBAL WATER AVAILABILITY
Source: FAO, UN and WRI

Fig 3 THREE PRODUCTS TO MAKE US THINK
Adapted from Hoekstra & Chapagain – Globalization of water: Sharing the planet's freshwater resources - 2008

As can be seen on Map 2, water stress (where there is not enough water for all uses, whether agricultural, industrial, or domestic) situations do not affect all areas of the Earth equally, being more clearly felt in developing countries.

Not all agricultural production methods and systems consume the same amount of water. In fact, 80% of the world's farmlands are rainfed and only 20% have modern irrigation systems. On almost all of these farms there exist sustainable alternatives to intensive irrigation. These include: the use of native plant varieties (more adapted to the local climate); controlled irrigation systems (from modern computer systems to the classic drop-by-drop watering system); and the enhancement of root systems. These are all ways to reduce the amount of water used in food production.

The role of the consumer

In today's market economy the most effective way of bringing about change is through consumption (increasing the consumption of sustainable products and "punitively" reducing the use of products with negative environmental and social impacts).There are several indicators that help the consumer make an informed choice. One of the most interesting being the Water Footprint. The simple fact that not only does it include water consumed directly in manufacturing the product, but also the indirect water use (thereby giving a more accurate total), means that the real values of the Water Footprint will surprise many. For example, a vegetarian diet is much more environmentally friendly. It suffices to note that the amount of water used in producing 1kg of beef is 8 times greater than that used in the production of 1 kg of soybeans.

7. Pollution

Since the dawn of civilisation agriculture has impacted on the environment. Initially this impact was limited to the degradation of local ecosystems through a change in land use. However, as people went on developing technologies and intensifying farming methods, the scope of the environmental impact of agriculture increased. Today, in the era of industrial agriculture, large monocultures and international agribusiness, the environmental impact of agriculture has a global reach and food production is a leading source of pollution in the world.

Agricultural pollution occurs when biotic and other byproducts resulting from agricultural practices contaminate or degrade the environment and surrounding ecosystems, with the potential to cause harm to humans and their economic interests. Some of the effects of agricultural pollution include contamination caused by the run-off of pesticides and fertilisers, the disposal of heavy metals, the degradation of the soil, the introduction of invasive foreign species and genetically modified organisms (GMO), and the release of greenhouse gases associated with livestock farming.

In the 1990s, the World Health Organisation (WHO) and the International Labour Organisation (ILO) Joint Committee on Occupational Health concluded that several million people were poisoned by pesticides annually of which 20 to 40 thousand were fatal. The majority of these deaths occurred in developing countries where, not only are the emergency and health services poor, but health and safety standards are also not developed or implemented. In addition, the following factors can explain the majority of deaths in developing countries:

- Farmers are often illiterate (they are not aware of the risks),
- The low cost of the most toxic products (e.g. organophosphates are extremely toxic and prohibited in many countries but, being cheap, they are easily found in countries like Sudan, India or Pakistan) and
- The fact that in some areas the entire family is involved in working the land so whole families are affected.

Environmental impacts of cotton

Globally 50% of cotton fields are irrigated (these fields account for about 75% of global cotton production). On average 8.5 litres of water (including irrigation and precipitation), and almost half a kilogram of chemical fertilisers, are needed to produce 1 kg of cotton. The textile industry as a whole annually uses 378 billion litres of water (200 liters of water are needed to process, die and finish each kilogram of textile).

Cotton production is responsible for 10 % of pesticide use (despite only occupying less than 2.5% of agricultural land). If we only take into account developing countries, cotton production is responsible for 50% of pesticides use.

There are alternative methods of producing cotton. The adoption of organic farming practices enables the elimination of chemical inputs (productivity per hectare is 20 to 30 % less, but overall production costs are cheaper and buyers are even willing to pay 20% more for organic cotton), while the the use of drop-by-drop irrigation methods reduces water consumption by 70%.

Pesticides and herbicides

In agricultural production it is common practice to attempt to control all factors that may lead to losses in productivity. For example, pesticides and herbicides are habitually used in controlling pests (whether plant or animal) that may harm agricultural production. In modern industrial agriculture this involves spraying considerable quantities of toxic chemicals over farmland (sometimes in large monocultures the areas are so vast that planes are used).

There are various unwanted effects resulting from this indiscriminate use of chemicals:

- An accumulation of chemicals in the soil which alters microbial processes in the soil and poisons soil organisms.
- An accumulation of these chemicals in living organisms: Since living organisms have a low (or non-existent) rate of internal degradation and/or excretion so they can't process these chemicals rapidly enough, these chemicals tend to accumulate in living organisms. They accumulate firstly in plants and pests and then move up the food chain where they accumulate in animals that feed on those contaminated plants and pests (see Biomagnification below).
- The elimination of useful insects: As pesticides kill fairly indiscriminately, they also kill beneficial insects, such as pollinators and the pests' natural enemies (parasites or predators of those very pests), and can in the long term end up causing even more damage than the target pests themselves.
- Leaching: Certain dissolved nutrients and pesticides can reach the groundwater by moving down through the soil (leaching), thereby contaminating the water system.

In 2001, over 2.2 million tonnes of pesticide were used worldwide. Despite the fact that only 25 % of these chemicals were used in developing countries, 99 % of deaths related to pesticide poisoning occurred in developing countries[1].

TO SEE AND DISCUSS
Stephen Palumbi: Following the mercury trail
http://www.ted.com/talks/view/id/899

Bees in danger

Bees are one of nature's main pollinators. As would be expected, over time humans have learnt to exploit this characteristic. Currently bees are used commercially to pollinate agricultural crops in many parts of the world (in the U.S. alone bees annually pollinate over 30 billion worth of crops).

Although there have been references to abrupt disappearances of bee colonies since the 19th century, in the last few years these disappearances have increased to unimaginable levels. In the last few years CCD (Colony Collapse Disorder), as the phenomenon is known, has been responsible for the disappearance of over 10 million bee colonies (with a commercial value in excess of 2 billion dollars). Initially the exact cause of this phenomenon was not known. Suspects included pesticides, disease-bearing parasites, poor nutrition, and genetically modified organisms. However, in 2013, a group of scientists published a study[2] that determined that CCD is not caused by any one single factor. The findings break new ground on why large numbers of bees are dying? They could not identify the specific cause of CCD, where an entire beehive dies at once. Those bees showed a significant decline in their ability to resist infection by a parasite called Nosema ceranae. The parasite has been implicated in Colony Collapse Disorder. However scientists took pains to point out that their findings do not directly link the pesticides to CCD.

FIG 1 - BEE

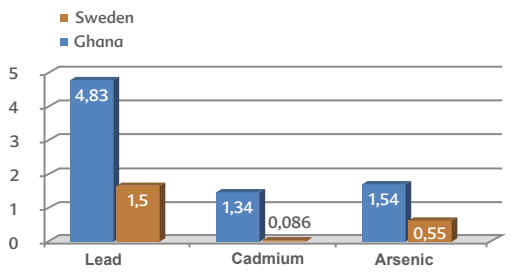
ADDITIONAL ACTIVITIES
Arrange a presentation of the movie "Bananas!" by Fredrik Gertten, and organise a discussion after viewing the film.

[1] Jeyaratnam J. Acute pesticide poisoning: a major global health problem. World Health Stat Quarterly,1990.
[2] Pettis J. et al - Crop Pollination Exposes Honey Bees to Pesticides Which Alters Their Susceptibility to the Gut Pathogen Nosema ceranae — PLOS one, 2013.

The application of nutrients (especially nitrogen and phosphorous) on agricultural land supplies plants with essential nutrients and helps guarantee a good crop. However, the excessive use of fertilisers (synthetic and natural) leads to leaching and, ultimately, to the eutrophication of large areas (see box - Dead Zones). The leached nutrients also have other negative effects. For example, where water heavily contaminated with nitrates is used for human consumption there is a higher risk of the blue baby syndrome (a potentially lethal heart defect where babies are born with a an incomplete wall in the right or left side of the heart which prevents the full flow of blood to the lungs and causes difficulties in oxygenating blood). Although this syndrome is now rare in developed countries it still occurs relatively frequently in the South (despite there not being any detailed statistics)[3].

It is not only nutrients that cause environmental damage. The excessive use of soil fertilisers on a massive scale ends up causing heavy metal pollution (e.g. lead, cadmium or mercury). Because these metals do not decay, and organisms that are exposed to higher concentration levels than usual cannot excrete them rapidly enough, they can reach toxic levels in living organisms. Even when these elements are found in low concentration levels in agricultural soil they can be dangerous to public health. Plants do not have efficient means of excreting heavy metals and, after being absorbed, these metals accumulate in the plant. These plants are then consumed by animals that, as they too cannot excrete the metal efficiently, go on accumulating all the metal present in the plants it consumes.

The phenomenon (called Biomagnification - see figure 2) goes on successively up the food chain, and the concentration of heavy metals can reach dangerous levels in the final product (e.g. breast milk). Once again, there exists a considerable difference between developed countries in the North and developing countries in the South. In the North, the imposition of strict environmental standards, and the existence of environmental and health control agencies, have led to a reduction in the problem over the last 20 or 30 years. However, among countries in the South populations continue to be under threat and it is possible to find concentration levels there that are at least three times greater than those found in developed countries (see graph 1)



GRAPH 1 - CONCENTRATION OF HEAVY METALS IN BREAST MILK (micrograms/litre)
Source: Björklund et al. Environmental Health 2012; Bentum et al. J. Chem. Pharm. Res., 2010

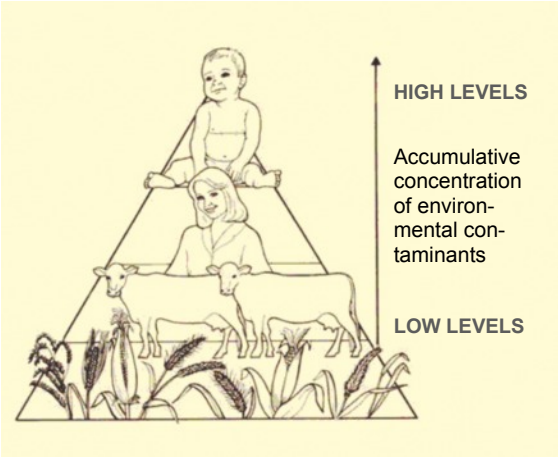


FIG 2 - BIOMAGNIFICATION

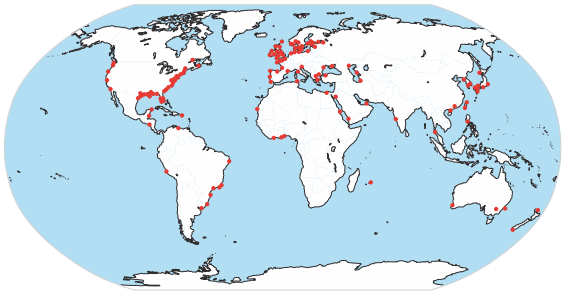
[3] World Health Organization - Water-related diseases

Dead zones

Along all ocean coastlines there exists an enormous quantity of life, while the middle portions of oceans and lakes (pelagic zones) naturally have very little life. However, from 1970, oceanographers began to notice an increase in coastal areas of low productivity where plant and animal life hardly existed. In these zones (found along the coasts of oceans and large lakes) the concentration level of oxygen is so low (hypoxia) that animals and plants simply can't survive (they must leave the area or die) and only bacteria flourishes.

This phenomenon is caused by eutrophication, meaning an increase in the concentration of nutrients (especially nitrogen and phosphorous) in water which causes an "algal bloom" (microscopic algae and plankton), which then consume most of the oxygen present in the water. The use of chemical fertilisers (which run off into waterways, and finally into oceans) in agriculture is the principal cause of eutrophication and, consequently, dead zones.

The phenomenon is expanding. In 2008 worldwide 405 areas were identified as dead zones - a sharp increase from that of 146 in 2004 (with the largest dead zone covering 70,000 km2)



MAP 1: DEAD ZONES 2008
Source: Diaz and Rosenberg

Agriculture is associated with many other types of pollution and environmental degradation: soil degradation (see section "Soil and Water"), greenhouse gas emissions that contribute to global warming (see section "Climate Change") and the loss of environmental and biological diversity (see section "Biodiversity and GMOs") are a few examples.

Environmental Justice

A very salient fact to retain is that, despite the benefits from industrial agriculture being concentrated in developed countries (be that financial gains or at the level of the consumer), once again the harmful effects of agricultural pollution are felt more severely in developing countries. The modern tendency to externalise environmental costs means that the majority of pollutant practices are concentrated in countries where the infrastructure for environmental protection is non-existent or insufficient at best. Despite the existence of a global movement that demands global environmental costs and benefits to be shared equally among all (rich and poor, North and South), at this moment is it still of vital importance for consumers to be proactive by compensating products and businesses that look to minimise their global environmental impact, and not just their environmental impact in developed countries.

VIPs
Rachel Carson
Sir Albert Howard
Satinath Sarangi

TO FIND OUT MORE
- Bananas Unpeeled! – Charbonneau & Clipsham – The Global Education Network
- Cleaner, greener cotton - Impacts and better management practices – World Wildlife Fund
- Silent Spring – Rachel Carson (1962)

8. Global Warming and Climate Change

Important concepts

Weather - the state of the atmosphere at a given time and place.

Climate - a measure of the average pattern of variation in meteorological variables (temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particles, etc.) in a given region over long periods of time. The difference between weather and climate is a measure of time. Weather is what conditions of the atmosphere (meteorological variables) are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time. (The World Meteorological Organisation recommends at least 30 years).

Greenhouse effect - a natural process by which part of the thermal radiation emitted by the Earth's surface is absorbed by some atmospheric greenhouse gases, and is re-radiated in all directions. Since part of this radiation is back to the lower atmosphere and the Earth's surface, it results in an elevation of the average surface temperature above what it would be in the absence of the gases (particularly water vapor, carbon dioxide, nitrous oxide, methane, and ozone). This process is vital to the existence of life on Earth - without this process the Earth's surface would be below freezing - an average of about 33 C° (59 F°) colder than the present average of 14 °C (57 °F).

Climate change - a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. These changes are caused by various natural factors, such as ocean processes, biotic processes, variations in solar radiation received by the Earth, plate tectonics, and volcanic eruptions. Human activities have also been identified as significant causes, particularly massive emissions of greenhouse gases (GHG) and the destruction of ecosystems, which contribute to global warming.

Global Warming - an unequivocal and continuing rise in the average temperature of the oceans and the atmosphere closest to the Earth's surface. The phenomenon has been occurring since the late 19th century but intensified in the late 20th century - since the early 1900s the average temperature of the Earth's surface has increased by about 0.8 °C (1.4 °F), with about two-thirds of the increase occurring since 1980. Despite the enormous efforts of misinformation on the part of several large lobbies (particularly the petrochemical industry), the overwhelming majority of scientists believe that increasing concentrations of greenhouse gases originated by human activity is the main cause of global warming.

The expressions "Climate Change "and" Global Warming" entered the public vocabulary after the release of the film *An Inconvenient Truth* (2006), mainly due to heavy media coverage of former vice-president of the United States, Al Gore.

However, going back as far as Ancient Greece (300 BC), Theophrastus, a student of Greek philosopher Aristotle, demonstrated that human activity can affect climate. In the middle of the nineteenth century, scientists had discovered evidence of climate variability over time and described the greenhouse effect in the atmosphere. In 1896 Arrhenius, a Swedish scientist calculated that a doubling of atmospheric CO_2 would give a total warming of 5-6°C (7-11°F). He knew that industrial emissions of CO_2 at the time, almost exclusively due to the burning of coal, were already equivalent to natural emissions, proposed that human activity would eventually cause global warming[1].

Weather systems are so complex, however, that only since the 1980s - after decades of technological development, data accumulation and the refinement of climate models has it

[1] It should be noted, however, that because of the relatively low rate of CO_2 production in 1896, Arrhenius thought the warming would take thousands of years, and he expected it would be beneficial to humanity.

been possible to identify conclusively that humans have a direct hand in climate change. Only from the middle of the 1980s was global warming recognised as a potential problem with global repercussions. This led the United Nations Environmental Programme (UNEP) and World Meteorological Organization (WMO) to establish the IPCC (Intergovernmental Panel on Climate Change) in 1988, and to initiate international efforts to reduce, prevent and mitigate climate change.

Despite all these efforts, the scenario envisaged by most atmospheric models (developed by thousands of scientists worldwide) is still alarmingly dangerous for ecosystems and human society. As you can be seen in Maps 1 and 2, the weather will become more unstable, with a significant increase in extreme weather events, such as droughts and storms of great intensity. The real impact on the lives of ordinary citizens are not entirely predictable, but one fact that is taken as given is that developed countries will have more resources and expertise to protect their populations from the worst effects of climate change than developing countries.

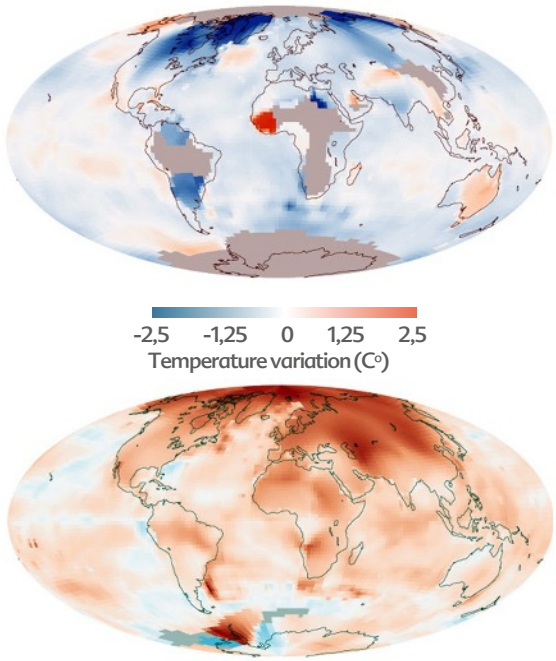


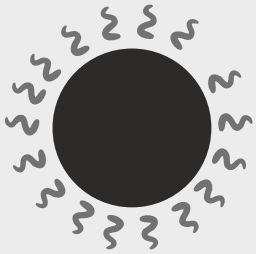
Fig 1 - GLOBAL TEMPERATURE IN THE DECADES 1880 AND 1980 COMPARE TO THE MEDIAN IN THE PERIOD 1951 TO 1980
Source - Climate Change Science Overview – EPA (2012).

The myth that there is a scientific debate on Climate Change and Global Warming

Although you can find numerous references in the media to a supposed scientific debate about the existence of climate change and global warming, the truth is that the scientific community has long reached a broad consensus on the subject. Forty years ago there were several scientific publications that had very disparate opinions, with authors advocating the absence of climate change, global cooling or global warming. This is no longer the case today.

Although just about anyone can claim they are a scientist, and even publish an article or study on the climate, this does not give their finding any more credibility than if they had been scrawled on the back of an envelope. Science is not just the expression of a personal opinion. It seeks to address a specific, measurable, and answerable question, and involves observation, proper data collection and data presentation, controlled experiment, conclusion, etc. But mainly it must be replicable and findings must be submitted for consideration and review by peers. Recently, a detailed analysis of scientific articles that were subject to review by other scientists was published on the Web of Science (an online scientific citation index of some 12,000 of the world's leading scientific journals). It showed that between 1991 and 2012, 13,950 articles were published on the subject, of which only 24 rejected Global Warming

THE SCIENTIFIC DEBATE IS OVER
Of 13,950 peer-reviewed CLIMATE CHANGE articles between 1991 NS 2012
Only 24 deny it's happening



Source: Web of Science peer-reviewed scientific articles with keyword phrases "global warming" or "global climate change" published between 1991 and 2012. Research by JL Powell. Full article at: DeSmogBlog (http://s.tt/1tBXZ)

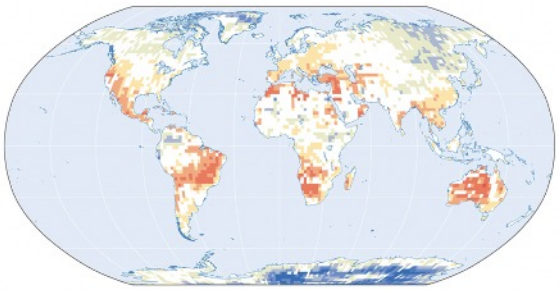
The impact of agriculture on Climate Change

Agriculture contributes significantly to climate change. It is estimated that agriculture is directly responsible for 14% of annual GHG emissions.[2] This is mainly due to the management of agricultural land, livestock, rice production, and biomass burning (wood etc.). However, the indirect contributions of agriculture are also very significant.
The contribution, as a percentage, of agricultural practices to global GHG emissions:

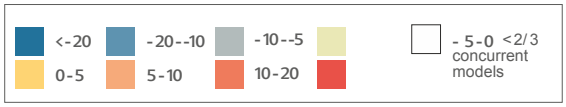
- Changes in land use (including deforestation and clearing land) contribute to 17% of global GHG emissions (mainly CO_2).
- Transportation contributes 13% (that includes shipping agricultural products over long distances).
- Energy production contributes 26% (mainly industrial agriculture processes consume large amounts of energy).
- Industrial agricultural processes (including industrial processes linked to the production of fertilisers, pesticides and herbicides, and processing agricultural products) are responsible for 19% of global GHG emissions.

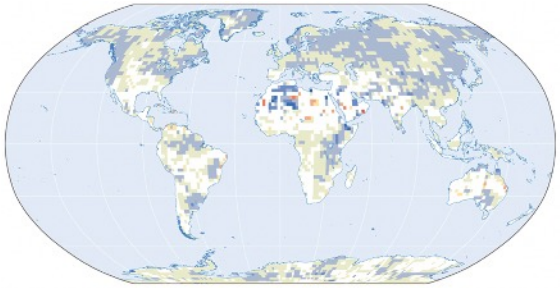
The full extent of the contribution of food production towards global warming is more visible when we focus on other greenhouse gases. Agriculture accounts for 54% of global methane emissions (mainly due to rice cultivation and livestock) and 80% of nitrous oxide emissions (due to the widespread use of fertilisers).

Clearly, a profound change in farming practices worldwide is needed if we are to reduce greenhouse gas emissions, and thereby reduce global warming.

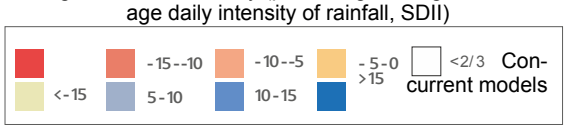


MAP 1 – CHANGE IN DRY SPELLS
A change in consecutive dry days (number of days)





MAP 2 - CHANGE IN RAINFALL INTENSITY
Change in rainfall intensity (percentage change in the average daily intensity of rainfall, SDII)



Source- The World Climate Research Program CMIP3 Multi-model Database (http://www-pcmdi.llnl.gov/ipcc/about_ipcc.php). Análise do Banco Mundial.

Note: Map shows the average changes that are predicted by 8 models and compares real values of precipitation in the period 1980-1999 with predictions for the period 2030-2048.

TO SEE AND DISCUSS
Allan Savory: How to fight desertification and reverse climate change
http://www.ted.com/talks/allan_savory_how_to_green_the_world_s_deserts_and_reverse_climate_change.html

COMPLEMENTARY ACTIVITIES
Organise and film a session of World Climate, a role-playing climate simulation game. Play the C-Learn simulation game (a simplified version of the C-Roads simulator).
To learn more about World Climate:
http://climateinteractive.org/simulations/world-climate
To access C-Learn:
http://climateinteractive.org/simulations/c-learn/simulation

TO KNOW MORE
NICE – NASA Innovations in Climate Change - http://gcce.larc.nasa.gov/node/19
Intergovernmental Panel on Climate Change(IPCC) - http://www.ipcc.ch/
Brighter Green - http://brightergreen.org
Uma verdade inconveniente (An Inconvenient Thruth), de Davis Guggenheim.

[2] IPCC (2007) - 4th Assessment Report: Climate Change

The Impact of Global Warming on Agriculture

If agriculture has been one of the driving forces behind man-made climate change, then climate change will also have profound impacts on agriculture.

Observing Map 3, we can see that in several countries in northern areas of the northern hemisphere, an increase in agricultural productivity is expected. This is due to a combination of milder weather (particularly the number of consecutive days without rain) and a greater ability (technical and financial) to adapt to change.

At the same time, it is clear that south of the 49th parallel north (just south of Paris i.e. including the global South) most countries will suffer reductions - potentially of 50% - in agricultural productivity. When we consider that most developing countries, and nearly all regions that experience hunger and food insecurity, are below this parallel, we can see just how devastating this reduction in productivity will be. Once again, it is worth stressing the profound injustices of this situation. The populations of many developing countries, through no fault of their own, will suffer the worst effects of a process that they contributed very little towards.

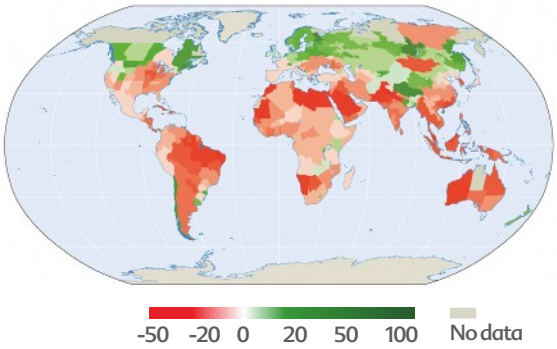
Mitigation and Adaptation

At this moment Global Warming is an unavoidable reality. It is happening and will continue to happen over the next few decades. However, human action can influence the extent and scale of the problem. For this reason global interventions with two different objectives are required:

- Mitigating Climate Change - we need to take action to reduce the amount of greenhouse gases emitted by human activity, thus limiting the speed and magnitude of Climate Change. These could involve taking relatively simple actions, such as increased carbon fixation (reforestation or the adoption of sustainable land management practices), but could also include more complex activities, such as switching to sources of low carbon energy or improving energy efficiency.
- Adapting to Climate Change - activities that aim to reduce social and biological vulnerability to the inevitable effects of climate change. These could include building levees to counterbalance the increase in sea level, the use of drought resistant plants types in areas where rainfall is expected to decrease, and an increase the responsiveness of populations to extreme weather events. This type of response is far more urgently needed in developing countries. In 2009, wealthy countries pledged 100 billion dollars per year by 2020 towards the climate Adaptation Fund. This pledge looks increasingly unlikely.

The role of the consumer

There is no magic solution to global warming. Just as it was not caused by the actions of merely a few, nor can it be solved by decree. We all contribute, consciously or unconsciously, to the problem and we all have to be part of the solution. What we choose to put on our plate can help in the fight against climate change. When we choose to eat organic food (produced locally and seasonally), reduce our consumption of meat, or penalise food companies that do not demonstrate that they use socially and environmentally sustainable practices - by not buying their products- we are part of getting the world moving towards a model of sustainable agriculture and contributing to the solution of this global problem.



Percentage change in yields between present and 2050

MAP 3 - CLIMATE CHANGE WILL DEPRESS AGRICULTURAL YIELDS IN MOST COUNTRIES BY 2050 GIVEN CURRENT AGRICULTURAL PRACTICES AND CROP VARIETIES

Source - Müller et al in World Development Report 2010

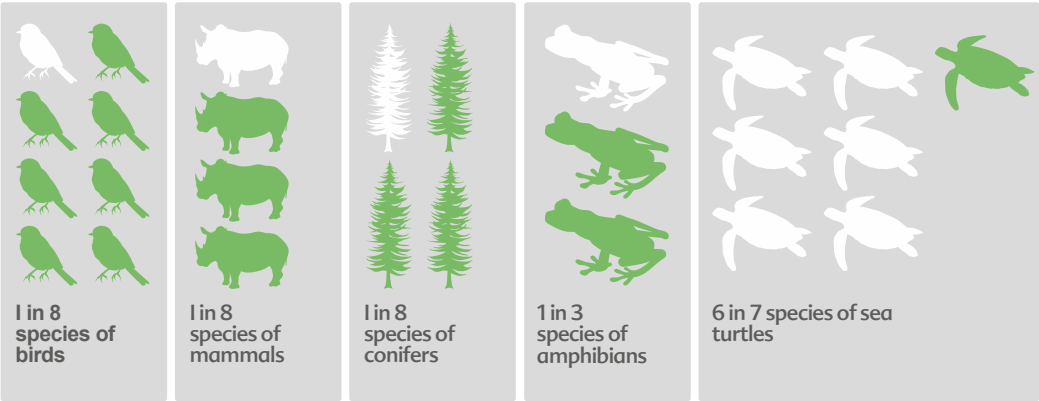
VIPs
Svante Arrhenius
Al Gore
Rajendra Pachauri
George Monbiot

9. Biodiversity, Seeds and Genetically Modified Organisms

A morning stroll along a traditional farm, beach, garden or forest is enough to remind us of the rich variety of living organisms that are all around us, the breathtaking biodiversity that exists on planet Earth. Despite the fact that it is easy to see and experience this biodiversity, it is not immediately apparent that our very survival, in fact, depends on that biodiversity. For an ecosystem to function properly it needs all its various components. Only then can it become stable enough to last for a significant period of time, yet remain flexible enough to go on adapting.

Despite the fact that ecosystems have always had an important abiotic component, living organisms in all their diversity (biodiversity) are also an essential component, without which ecosystems could not exist. Human society depends on the essential goods and services that ecosystems provide. For example:

- Natural products (fresh water, pure air, food, chemicals, wood, etc.)
- The regulation of natural processes (pollination, climate control, pest control, etc.)
- Intangible cultural benefits (religious, social, etc.)
- Supporting the production of other goods and services (nutrient cycle, soil formation, etc.)



SPECIES AT RISK OF EXTINCTION
Source: www.distance learning.com

ADDITIONAL INFORMATION

Arrange a viewing of the film "Seeds of Freedom" and invited a scientist working in genetic engineering and an activist from one of the seed protection campaigns (on the Campaign for Seed-Sovereignty's website you will find contacts throughout Europe) for a debate and discussion about the film.

TO LEARN MORE

- Sustainable diets and biodiversity - Burlingame, B. e Dernini, S. (FAO) - 2012
- Campaign for Seed-Sovereignty - http://www.seed-sovereignty.org
- SAVE (Safeguard for Agricultural Varieties in Europe) Foundation - http://www.save-foundation.net/
- IUCN (International Union for Conservation of Nature) – http://www.iucn.org/

The Impact of Agriculture on Biodiversity

An estimated 1.75 million different living species have been described and recorded on Earth, including microorganisms, plants and animals (see Table 1). It is estimated that there are anywhere between 3 and 100 million species in the world. 70% of these species are thought to live in just 12 countries: Australia, Brazil, China, Colombia, Costa Rica, Democratic Republic of the Congo, Ecuador, India, Indonesia, Madagascar, Mexico and Peru. It is worth emphasising that most of these are developing countries.

In the meantime, however, we are currently experiencing biodiversity loss of frightening proportions (it is estimated that the current rate of extinction is 100 to 1,000 times higher than the natural extinction rate, i.e. between 200 and 10,000 species become extinct every year, most of which were never known to science. Scientists believe that the Earth is experiencing an era of mass extinction (often referred to as the 6th extinction crisis), comparable to that which occurred when dinosaurs became extinct.

The main causes of global biodiversity loss are the alteration and loss of natural habitats, the introduction of alien species, pollution, climate change and the over-exploitation of resources. Industrial agriculture contributes significantly to all of these, with agriculture being the human activity that contributes most to the alteration and loss of natural habitats.

However, agriculture, especially sustainable agriculture, can also make important contributions to global biodiversity conservation, particularly in areas already heavily impacted by humans. In these areas little remains of the original habitat, where wildlife did not have time to adapt to human intervention. This is nearly the scenario in all rural areas in Europe (see Box Castro Verde).

TO SEE AND DISCUSS

Cary Fowler: One seed at a time, protecting the future of food

http://www.ted.com/talks/cary_fowler_one_seed_at_a_time_protecting_the_future_of_food.html

Group	Number
Bacteria	4,000
Protist (algae and protoza)	80,000
Animails- vertebrate	52,000
Animals - invertebrate	1,272,000
Fungi	72,000
Plants	270,000
Total	1,750,000

Table 1 - Species described by science
Source: UNEP/Global Environment Outlook

Castro Verde

In 1929, the Portuguese government, in an effort to improve food security in the country, decided to launch a “wheat campaign." The idea was to convert the great plains of the Alentejo region in southern Portugal into a massive area of wheat production, with profound influences on local ecosystems and soil fertility. Because the farming system adopted was extensive wheat production, over the decades several animal species found refuge in the plain, making it an important area for the conservation of some bird species which were disappearing in the rest of Europe, e.g. the Great Bustard (Otis tarda) and Lesser Kestrel (Falco naumanni).

When Portugal entered the EEC, however, changes introduced by CAP (Common Agricultural Policy) threatened what remained of these bird populations. However, a Portuguese organisation, LPN (League for the Protection of Nature), decided to purchase 700 hectares of farmland in Castro Verde. Twenty years on, LPN has handed over use of the land to sustainable farmers, encouraged soil recovery and the certification of local produce (in that way benefitting farmers who may have suffered potential losses in productivity), and promoted the protection of threatened species with great success. For example, the population of the Portuguese Lesser Kestrel at one point was down to less than 150 mating pairs. This number is now at over 450 with 80% of these nesting in the Castro Verde area.

Important concepts

Biodiversity - the degree of variation of life. This can refer to genetic variation, species variation, or ecosystem variation within an area, biome, continent or planet.

Interspecific Biodiversity - the number and types of different species that are to be found in an ecosystem or region. This is essential for an ecosystem to function normally. Thinking about this diversity we might note that many small vegetable farmers grow many different crops like potatoes, and also carrots, peppers, lettuce, etc.

Intraspecific biodiversity - includes the genetic variety within a single species. It is essential to the adaptability of each species.

Agricultural biodiversity - a sub-set of general biodiversity. It includes all forms of life directly relevant to agriculture: rare seed varieties and animal breeds (farm biodiversity), but also many other organisms such as soil fauna, weeds, pests, predators, and all of the native plants and animals (wild biodiversity) existing on and flowing through the farm.

Genetically Modified Organisms (GMOs) - an organism whose genetic material has been altered using genetic engineering techniques. Many living organisms have already been created in laboratories (bacteria, plants, insects, fish and mammals), with some of these having already entered into the realms of commerce, agriculture and global food supply.

Loss of Agricultural Biodiversity

Over the last 10,000 years, humans have been discovering and developing practices and technologies that have allowed them to get more out of the land. At the same time they went on selecting and improving plants varieties and farm animal breeds that were best adapted their needs. Farmers selected obvious features (such as seed size, plant height, flower colour, flavour, etc.), but also less noticeable characteristics (such as its response to heat, cold or drought, or its ability to resist disease and pests). After ten millennia, and the work of countless generations, farmers have, artificially but with natural methods of selective breeding, created an immense biodiversity within agriculture itself.

One of the effects of globalisation is a decrease in variety and an increase in uniformity and homogeneity. Even before the development of genetic engineering there was already a considerable reduction in the number of species used in agriculture (75% since 1900). This is a potential risk to global food security, as resistance to pests, disease, and climate change is significantly reduced with lessened genetic diversity. For example, between 1845 and 1852, the Great Famine (sometimes called the Irish Potato Famine) in Ireland killed approximately 1 million people, with a million more being forced to emigrate. This famine was largely due to the fact that the population having come to depend on a very limited number of varieties of potato to survive (despite there existing over 4,000 varieties) and a disease, commonly known as potato blight, caused the potato crop to fail.

VIPs
Vandana Shiva
Paul Berg
Nikolai Ivanovich Vavilov

Genetically Modified Organism (GMO)

Genetic engineering has opened up new possibilities for agriculture. In the past, a lengthy process of trial and error was used by crossing existing varieties of the same species until the desired characteristic or trait was achieved. It is now possible to identify the gene that is responsible for a specific trait and introduce it artificially into the genome of an organism, instantly creating a new variety. Using this method it is possible to create plants that resist herbicides, produce their own insecticide or specific vitamins.

Since the 1970s, genetic engineering has been promising to improve productivity and end world hunger. Although GMOs represent only 9% of global agricultural production[1], no agricultural technology generates more controversy, making it difficult to have a pragmatic discussion about GMOs. One thing is certain, however, neither the main promises of the technology nor the activists' worst fears have been realised.

GMOs promised to end world hunger as well as reduce the negative impacts of food production on the environment through a decreased reliance on chemical pesticides. However, hunger has not been reduced significantly and it has been proved that, due to the increasing number of pests and weeds that are becoming resistant to pesticides, more chemicals will be needed to combat these "superpests" in the medium to long-term[2].

On the other hand, it was feared that GMOs would have negative impacts on human health. Thus far, no study has shown any negative impacts of genetically engineered foods on humans[3].

[1] Vital Signs Update 123 — World Resource Institute
[2] Benbrook, C. - Impacts of genetically engineered crops on pesticide use in the U.S. — the first sixteen years - Environmental Sciences Europe — 2012.
[3] Nicolia et al. An overview of the last 10 years of genetically engineered crop safety research. Crit Rev Biotechnol. 2013

However, there are still many unanswered questions relating to GMOs: what will the consequences be of introducing these laboratory created genes into nature; how ethical is it to patent living organisms; faced with powerful food lobbies, how we can guarantee the independence and impartiality of scientific research, etc. This technology is being is controlled by a small number of companies who have formed a very powerful lobby, a group that dominates from production to distribution, be that of modified seeds that resist agrochemicals, agrochemicals themselves, market price, etc. This model is unjust and unsustainable. This model will have to change as it will only result in misery for many and profits for merely a few.

Seeds

Traditionally, any seed produced by a farmer was his own property and he could do with it as he saw fit: store it for later use, plant it, sell it on the open market or even swap it with his farming neighbours.

Currently, however, the multinational corporations that control the seed market are in an unprecedented campaign to change these traditions. Firstly, they have managed to get patents and intellectual property rights over genetically modified seeds they produce. These forbid farmers from keeping these seeds from one year to the next and force them to pay royalties for their use. Secondly, they are exerting enormous amounts of pressure on legislators to approve incredibly bureaucratic laws that will make the free exchange of seeds among traditional farmers impossible in practice, criminalising the use of nearly all seed varieties that have not been registered and tested. Ultimately, in the name of profit, they are removing the role of the farmer as the curator of agricultural diversity, a role the farmer has been performing for some 10,000 years.

10. Biofuels and "land grabbing"

As unequivocal evidence mounts that climate change is a serious threat to our planet, along with evidence that fossil fuels contribute to global warming[1], a global search is now on to find solutions to these problems.

The use of biofuels, fuels produced from living organisms containing energy from geologically recent carbon fixation (not fossils), is one of the solutions that has received most institutional backing to replace fossil fuels in the short term. Currently, millions of hectares of land are used throughout the world to grow these energy crops, and this will only increase over the decades. However, the diversion of agricultural land for the use of these energy crops is at the centre of a global ethical and technical debate: an increase in competition for fertile land, the "food vs fuel" discussion and the reality that the potential impacts of producing these crops on such a vast scale have not been properly studied, some of which could be worse for the environment than fossil fuels themselves.

It must be said that biofuels have been used for centuries, having first appeared in the 18th century when people started transforming agricultural waste into fuels that could be used in lamps and stoves. These "old" fuels would end up influencing, for example, the development of the internal combustion engine. The first functioning prototype was an engine runs on ethanol in 1826, and even Rudolph Diesel attempted to run his engines on peanut oil[2].

In the 20th century, the relative abundance of cheap gasoline and diesel meant biofuels were forgotten. That is, until politics (such as the Arab oil embargo of the 1970s) and environmental concerns (the need to reduce pollutant emissions and the threat of climate change) combined to renew a global interest in these biofuels.

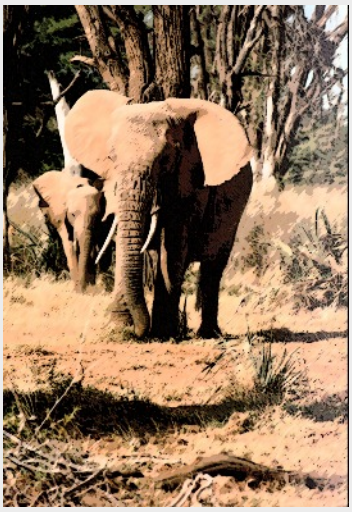
VIPs
Rob Hopkins
Chut Wutty
Madiodio Niasse

Biofuels: Bad examples - Good examples

Using *Jatropha* (Jatropha curcus is a drought-resistant small tree or bush that is wonder plant produces seeds with an oil content of 37% which can be used as fuel without refined) to produce electricity in Mali
In Mali, the Garalo project developed a model of intervention in which the natural resources of the village (in this case *Jatropha curcas* and community land) are used locally, contributing to energy access and generating added value for the community.
The supply chain was developed by integrating the Garalo Jatropha Producers' Cooperative (CPP) and an energy supply company (ACCESS). The cooperative acts at the community level,dealing with issues relating to production, transformation and commercialisation of pure Jatropha oil (while also ensuring the resulting waste is used as fertiliser). The energy company ensures rural electrification, commits to buying local produce and guarantees the community access to energy at accessible prices. The project is in the implementation stage, with 650 out of 10.000ha of Jatropha being used and 326 local families already involved in the project[3].

[1] Handbook on Biofuels and Family Agriculture in Developing Countries - 2011
[2] Dustin Driver -A brief history of biofuels, from the Civil War to today - http://blog.hemmings.com/index.php/2013/07/10/a-brief-history-of-biofuels-from-the-civil-war-to-today/
[3] Handbook on Biofuels and Family Agriculture in Developing Countries - 2011

Biofuels: Bad examples - Good examples



Elephants at risk in Ethiopia

The elephants sanctuary in Babile, Ethiopia, has one of the most important African elephant population in the world. Within a national strategy for development, the Ethiopian government prioritised an improvement in energy access and has been a strong supporter of biofuel production in the country, as a means of improving the country's balance sheet (it declared over 23 million hectares were suitable for the production of *Jatropha*, castor oil and sugar cane).

In 2007, a German biofuel company arrived at the sanctuary and initiated the clearing of 10.000ha of land to be used in the production of ricin. This had been legally authorised without even consulting or warning Ethiopia's nature conservation organisations. After some pressure the government intervened. The company has now committed to not expanding their activity within the sanctuary, and alternative areas were reserved for the elephants by means of compensation. An environmental impact survey (carried out after the fact) demonstrated that the European company had significantly reduced not only the habitat that was zoned for wild animals, but also grazing areas that were available for local livestock, forcing pastoralist to enter into protected areas[4].

Although new experimental fuels are developed almost daily, we can consider the following as the most known forms of biofuels so far:

- **biogas** (a gas produced by the breakdown of organic matter which can be produced from regionally available raw materials such as recycled waste, and is environmentally friendly - it is currently having a surge in use among developing countries),
- **bioethanol** (liquid biofuel produced by the sugar fermentation process, mainly from sugar cane), and
- **biodiesel** (a vegetable oil or animal fat-based diesel fuel) to be the most important modern biofuels.

Bioethanol and biodiesel are produced using matter that could be used for food and are regarded as first generation biofuels. Currently there are second-generation biofuels, modern alternatives that have several advantages over first-generation biofuels: they make better use of organic matter (such as BTL - Biomass to liquid, which uses the whole plant), produce better quality fuel (such as Hydrogenated Vegetable Oil (HVO) fuel), and reduce the amount of food products used (such as cellulosics, *Jatropha curcas* or algae). Despite these second generation biofuels being superior in many aspects over first generation biofuels, the persistence of some technical issues, and a higher end price for consumers, generates a lot of uncertainty as to its mass use in the future.

TO SEE AND DISCUSS
Stop land grabbing! Life, land, and justice in Uganda
https://www.youtube.com/watch?v=17QxF61PVC4

[4] Africa: up for grabs. The scale and impact of land grabbing for agrofuels", FoE- 2010.

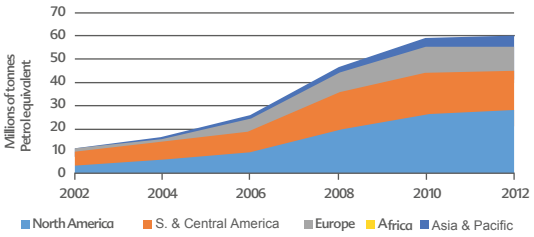
Makeni - Sierra Leone Farmers vs Swiss Corporation

Sierra Leone is a small African country that, since it became independent in the 1960s, has suffered from several coups and civil war. The country is extremely poor and food security remains a distant dream for most of its 6 million inhabitants.
In 2008, a Swiss energy company initiated the Makeni project in two districts in Sierra Leone. Local farmers signed a contract handing over rights to exploit 40,000 hectares of land for 50 years in exchange for the creation of 2,000 jobs in the conservation of wetlands (an area knownlocally as *Bolilands*), traditionally important in growing rice.

After three years, only 50 new jobs were created and the "bolis" (the swamps) were already in risk due to water being diverted and used to grow sugar cane. In 2012[5], a monitoring report published by local and European organisations that promote the right to food, warned that, despite the initial promises, the majority of fertile wetlands were now being used for sugar cane, with local farmers being expelled and forced to use marginal land. Zainab Kamara, one of the several thousands of farmers whose lands have been taken over by the Swiss company, says: "Now I don't have a farm. Starvation is killing people. We have to buy rice to survive because we don't grow our own now."

Global impacts of biofuels

To accelerate the transition to biofuels, many developed countries have set targets for incorporating biofuels into transport fuel. For example in the EU there are community directives that state that as of 2020, 10% of energy consumed in the transport sector should be renewable energy. Besides this guarantee, the sector has also become heavily subsidised, leading to an exponential increase in the production of biofuel. (see Graph 1)



Graph- 1 - GLOBAL BIOFUEL PRODUCTION
Adapted from "BP Statistical Review of World Energy June 2013"

ADDITIONAL ACTIVITIES
In your school or local town, organise a World Without Oil event, a game with a set of alternate realities in which participants live the first few weeks of a world in which oil reserves have run dry. (http://worldwithoutoil.org/).

TO LEARN MORE
Biofuelwatch
-http://www.biofuelwatch.org.uk/
International Land Coalition -
http://www.landcoalition.org/
IPFRI - International Food Policy Research Institute – www.ipfri.org
OXFAM International -
http://www.oxfam.org/en/grow/landgrabs

[5] Kennedy J. – 2013. "Sierra Leone Farmers Evicted for Sugarcane Biofuel Plantations" - http://www.corpwatch.org/

This rapid expansion in biofuels can also have considerable negative impacts. Apart from the usual problems associated with intensive agriculture and industrial production, biofuels have two particular issues:

- Competition with the food industry (Fuel vs Food) - see section "Speculation and food prices".
- Greenhouse gas emissions that are associated with its production.

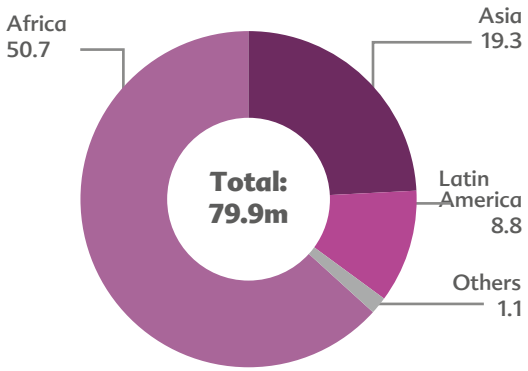
The main reason why there is an accelerated transition towards the use of biofuels is to reduce carbon emissions from fossil fuels. There have been several life cycle analysis (a study of all emissions from seed to end product) where it has been determined which are the most sustainable biofuels. In addition, experts and environmental groups have stated that emissions that are associated with indirect land use change should be considered (ILUC - Indirect Land Use Changes). That is, as agricultural land is transferred to produce the raw materials that are needed for bioethanol and biodiesel, new virgin land is being cleared to produce food, releasing carbon and storing it in the atmosphere. This value could be significant, e.g. if Europe implemented its targets for 2020, the ILUC associated with the transition[6] would be the equivalent of an increase from 313 to 646 million tonnes of carbon (the equivalent putting an extra 20 million cars on European roads)[6].

Land grabbing

History is full of cases where people are expelled from the land they live on to make way for other people to exploit the resources that exist there.

Current political support for biofuels has made the sector a very attractive business (the EU subsidised the industry by over 2 billion euros in 2011[7]). This contributes to an increase in the value of land, transforming agricultural land in developing countries (some of which has been traditionally farmed for generations) into attractive target for multinationals operating in the agroindustrial and energy sectors. This phenomenon, currently known as "land grabbing", has turned sinister in the beginning of the 21st century. As fertile land becomes progressively more valuable, traditional farmers are expelled to make way for international investors.

Despite this being a global phenomenon, it is in Africa where in is most noticeable ("land-grabbing" accounted for 70% of land sold between 2001 and 2011). This continent has large areas of underdeveloped land and great poverty. Land grabbing has definitely contributed to food insecurity in Southern countries: it robs the local population of land (especially by taking advantage of weaknesses in the traditional systems of land ownership), does not adequately compensate local populations (for example a Saudi investment fund pays about one dollar per hectare annually, over 25 years, for the use of 10.500ha of land in southern Sudan to produce food to export to the Gulf States, despite southern Sudan being an area with one of the highest incidence of hunger in the world. Additionally it promised the local population fantastic job offers that never materialised. The local people are being forced to emigrate in order to escape famine[8].



TOTAL AREA OF LAND USED NEGOTIATED 2001-2011 MILLIONS OF HECTARES
Source - International Land Coalition

[6] http://www.stopbadbiofuels.org/
[7] Stop Land Grabbing Now!. FIAN, LRAN, GRAIN - 2011
[8] Kennedy J. – 2013. "Sierra Leone Farmers Evicted for Sugarcane Biofuel Plantations" - tp://www.stopbadbiofuels.org/

11. Speculation and food prices

We all know that food prices are not constant. Fluctuation in food prices used to be essentially seasonal, and linked to supply and demand. However, as agriculture gradually became a global business, with a more stable supply of food for sale (it is always harvest time somewhere in the world), less immediate factors started to affect price fluctuations. Even then, food markets were generally quite stable.

The Food Crisis of 2007-2008

However, in 2007 and the first quarters of 2008, global food prices increased dramatically (see Graphic 1), creating a global crisis and causing political, social and economic instability in many developing countries[1]. It was only when the media began to focus its attention on the visible face of this price increase (particularly disturbances in poor countries) that the world decided to wake up. Yet, this crisis in food security had been building for several years.

GRAPH 1 - FOOD PRICE INDEX
Source – www.fao.org
1990-2013

Important Concepts

Speculation - the practice of engaging in risky financial transactions in an attempt to profit from short or medium term fluctuations in the market value of a tradable good (commodity). Many speculators pay little attention to the fundamental value of a good and instead focus purely on price movements.

Commodities - a marketable item produced to satisfy wants or needs. Economic commodities comprise goods and services. It is used to describe a class of goods for which there is demand, but which is supplied without qualitative differentiation across a market, with little or no regard to who produced them. Commodities include agricultural products, minerals, financial products, energy resources, and chemicals products, etc.

The FAO Food Price Index - a measure of the monthly change in international prices of a basket of food commodities. It consists of the average of five commodity (meat, dairy, cereal, vegetable oil and sugar) group price indices, weighted with the average export shares of each of the groups.

Futures contract (or simply Futures) - standardised contract between two parties to buy or sell a specified asset of standardised quantity and quality for a price agreed upon today (the *futures price*) with delivery and payment occurring at a specified future date, the *delivery date*. The contracts are negotiated at a futures exchange, which acts as an intermediary between the two parties.

[1] The State of Food Insecurity in the World 2009 – FAO - 2009.

The systematic causes of the global price increase in food continue to be the subject of heated debate. The price increases that occurred in 2006 could be explained by climatic factors (such as drought in the main cereal producing countries) and with an increase in the price of petrol. But starting out from that point, other factors exacerbated the phenomenon. For example, when petrol becomes more expensive it has a cascading effect over other goods and services, such as fertilisers and food transportation, which impact heavily on the agricultural industry. Other factors, such as the general increase in the use of biofuels in developed countries (see section "Biofuels and 'land grabbing'") or an alteration in the diet of the middle classes in Asia (with an increase in the consumption of meat and processed foods) also affect food prices.

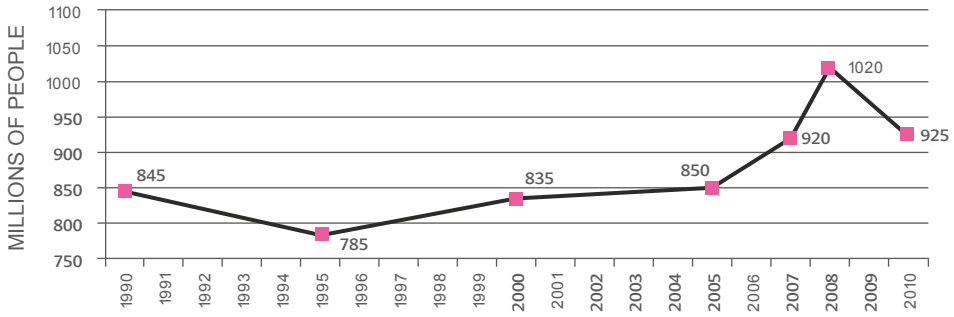
Yet, these factors alone are not sufficient to explain why, between 2006-08, the world's markets were "lit up" with the median price of rice going up by 217%, wheat 136%, corn 125%, and soya 107%.

Many other causes were advanced to explain these price rises (e.g. an increase in the world population, market liberalisation, stock reserves, biofuel subsidies in Europe and America). However, one fact that obviously did have an effect on the increase in prices, and in causing millions of people to suffer from hunger, was the entrance into the market of large investment funds, such as the Goldman Sachs Commodity Index[2]. Buying large quantities of futures in some products (such as wheat) is one of major factors that disturb food prices. These funds have caused a profound disturbance in the relationship between supply and demand, and have caused prices to shoot upwards and contaminate other markets.

The practical results of this combination of negative factors is more easily seen by observing Graph 2, which shows the evolution of populations suffering from hunger and malnutrition between 1990 and 2010.

After reaching a peak in the second quarter of 2008, prices fell drastically with the recessions that followed the fall of large global financial institutions. Prices increased again in 2009 and 2010. At the beginning of 2011 food prices even surpassed the record levels achieved in 2008.

TO SEE AND DISCUSS
Speculation and Manipulation of Food and Commodities https://www.youtube.com/watch?v=XVeFimzJg8s



GRAPH 2 - MALNOURISHED POPULATION - 1990-2010
Source – FWW Manifesto

[2] The Food Bubble: How Wall Street Starved Millions and got away with it, - Frederick Kaufman, Harper's, 2010

Social instability caused by the food crisis

The increase in food prices caused social instability in various parts of the world. In 2008, various countries experienced real populist revolutions which were centred around the fact that ordinary people were suddenly faced with not having the means to feed their families. Confrontations occurred in Bangladesh, Mozambique, Burkina Faso (where the military had to intervene to prevent disturbances reaching the capital, Ouagadougou), Cameroon, Haiti (where disturbances led to the fall of the government), Yemen, Indonesia, and Somalia (where 5 people died). Other countries had to take drastic measures to prevent an escalation in hunger within their borders. For example, some prohibited food exports (Brazil and India), while others imposed a price freeze on essential foods (Russia and Mexico) or created emergency programmes for the most disadvantaged (Panama created a programme to buy rice at high prices which would then be sold to the more disadvantaged at lower prices).

Speculation and food prices

In the 19th century, the United States developed the "futures" market that we know today, initially as a mechanism that allowed farmers to cope with uncertainties in harvesting, and agricultural processes overall (such as unpredictable meteorological conditions). These contracts allowed farmers to set with buyers the price at which they would sell future harvests. Despite always involving an intermediary, and causing slight increases in price, farmers were able to know with greater certainty which crops to plant, while buyers had assured the purchase of products that they would need in the future. The intermediary profited by selling his services and by potential increases in prices in the "real" market, when the goods actually came to be sold. For a while this speculation increased the predictability of the market and had a stabilising effect on food prices.

However, as intermediaries went on developing new futures derivatives, multiplying their profits and business opportunities, and as the legislation that had protected agricultural markets since the Great Depression of the 1930s was relaxed, more and more investors intervened in the agricultural futures market. When the bubble burst in the real estate market, large investment funds and international financial institutions have started to look at agricultural "commodities" as a potential substitute for the easy profits of old[3]. There then began an era of frenetic speculative investment in food prices, which unfortunately continues to this day. New legislation that will regulate the market within the EU has been in discussion since 2011, but the final draft will only be approved in April 2014.

TO KNOW MORE
World Development Movement - http://www.wdm.org.uk/food-speculation
Relatório "The State of Food Insecurity in the World 2013" - FAO Manifesto "Food We Want" - http://www.foodwewant.org/por/Noticias/Food-We-Want-o-manifesto
Relator Especial das Nações Unidas para o Direito à Alimentação - http://www.srfood.org/en

3 Lagi et al. - The Food Crises: A quantitative model of food prices including speculators and ethanol conversion – NECSI 2011.

Impacts on farmers

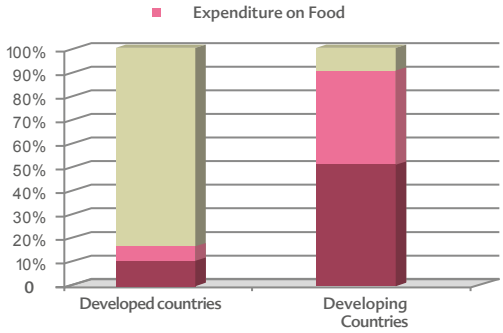
By this stage, the question many will be asking will be something along the lines of: an increase in the price of agricultural products should mean an increase in profits for farmers?

For the vast majority of farmers around the world the answer to this question is a resounding NO. High food prices affect both urban populations and poorer farmers (and we should not forget that the majority of farmers in the world find it very difficult to make a living). In most of the world few small farmers manage to produce enough to sell in significant quantities. In countries such as Kenya, Mozambique, and Zambia, the majority of rural families are buyers of essential foods. For example, in Zambia, 80% of family farms grow wheat, but less than 30% of those farms produce enough to sell. It is only large farmers, especially large multinationals that are capable of benefiting from elevated prices.

Impacts: Rich vs Poor

It is important to realise that poor families in developing countries spend between 50 and 90% of their earnings on food, while in developed countries the average expenditure on food for each family varies between 10 and 15% (Graph 3). An increase of 50 to 75% on the price of some foods can cause a small dent in the family budget of the average European middle class family. A poor family in Sub Saharan Africa, however, will not only have less to eat, but may be forced into a less varied diet (eliminating meat, milk, or fruit, causing even more nutritional deficiencies), may have to borrow just to survive, sell essential goods that will be needed in the future (such as livestock or land) or eliminate expenditure on health, education and family planning.

Increases in food prices also affect populations in developed countries. In the United Kingdom, food prices rose by 6,9% in 2011, mostly affecting families with tighter budgets, while in Portugal, which experienced a deeper financial crisis, today there are 300,000 people who are unable to meet their food needs. However, that is nothing when we compared the impact felt in developing countries - the rise in food prices for the last quarter of 2010 alone sent more than 44 million people into extreme poverty.



GRAPH 3 FOOD EXPENDITURE AS A PERCENTAGE OF FAMILY BUDGET
Source: Food we Want

ADDITIONAL ACTIVITIES
Organise a Simple Food Speculation Activity, as proposed by the World Development Movement
http://www.wdm.org.uk/sites/default/files/Simple%20Ping%20Pong%20Ball%20Hunger%20Activity%20Instructions_0.pdf).

VIPs
Frederick Kaufman
Michel Barnier
Olivier de Schutter

12. Subsidies and Market Access

For anyone living in a developed country it is so common to hear people talk about subsidies that we almost regard it as a universal right. However, for the majority of the world's population (especially those living in developing countries) a subsidy is something rather distant and ethereal. Examples of subsidies include:

- *Production subsidies*: partially offsetting the production costs or losses.
- *Consumption subsidies*: directly or indirectly subsidises consumers, often with the aim of enabling the most disadvantaged to access essential goods or to promote the consumption of organic products.
- *Export subsidies*: support from the government for products that are exported, as a means of assisting the country's balance of payments of balance of trade.
- *Employment subsidies*: incentive to businesses to provide more job opportunities to reduce the level of unemployment in the country (income subsidies) or to encourage research and development
- *Tax Benefits*: selective tax breaks for businesses and citizens.

Some also consider that not accounting for pollutant emissions, and other environmental damages, caused by a company or products are also good examples of hidden subsidies. These are one of the many supports that, although they cannot be classified as a conventional subsidy, are an implicit intervention that affects how many companies operate.

Despite the fact that subsidies would, on the face of it, appear to benefit all - by making production cheaper, the sale price to the public may be reduced, improving accessibility to products that otherwise would be out of reach for many people, etc. - they negatively distort global markets by suppressing prices below sustainable levels for small farmers, and promote the over-exploitation of natural resources. Subsidies are also used as weapons in many commercial battles that characterise the global economy. They can be used as a defensive measure - there are innumerable cases in which subsidies end up being very effective forms of protectionism - or as an "aggressive weapon" for exports[1]. One of the best examples of the latter is the Chinese government's policy of supporting the national steel, glass, paper, car parts manufacture and solar energy industries, where over 350 billion dollars has been invested in these industries over 20 years, enabling China to become one of the main global exporters of these goods[2].

Important Concepts

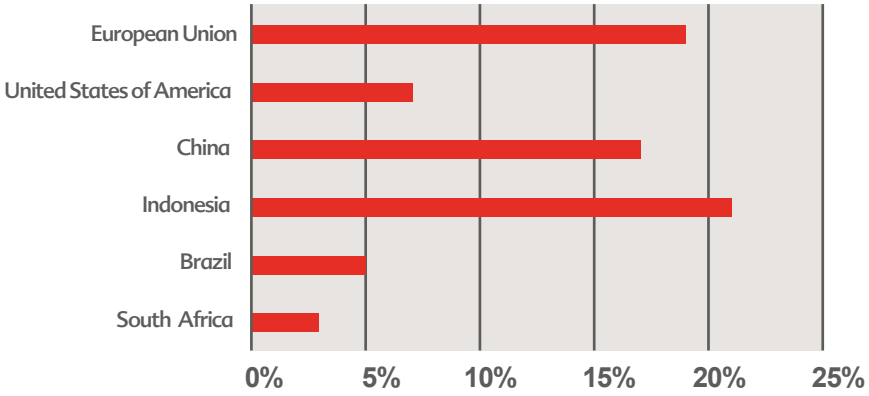
Subsidy - a form of financial or in kind support extended to an economic sector (or institution, business, or individual) generally with the aim of promoting beneficial economic and social outcomes.
Common Agricultural Policy (CAP) - the agricultural policy of the European Union. It implements a system of agricultural subsidies and other programmes. It was introduced in 1962 and has undergone several changes since then. It's main objectives are to ensure a regular supply of food for the European population and to guarantee farmers an adequate income.
Protectionism - the political economic policy of restraining trade between states through methods such as tariffs on imported goods, restrictive quotas, and a variety of other government regulations. These are generally justified on the grounds of allowing fair competition between imports and goods and services produced domestically.
Globalisation - the process of international integration arising from the interchange of world views, products, ideas, and other aspects of culture. Its positive aspects are the spread of democracy and human rights, while its negative aspects include the loss of cultural identity and opening up developing countries to the predatory nature of rich agents and businesses.

[1] Boudreaux, D. 2011 – Do subsidies justify retaliatory proteccionism?
[1] Haley, U.; Haley, G. 2013 – Subsidies to Chinese Industry.

Agricultural Subsidies

All large economies (including emerging economies) invest significant funds in agricultural subsidies (Graph 1). For example, the European Union has, almost since its inception, had an instrument, the so-called Common Agricultural Policy (CAP), that is a formal system of direct support for agriculture, and includes programmes for developing related areas (such as Rural Development). CAP has formally existed since 1962 and has as its main objectives ensuring a regular supply of food for the European population and guaranteeing farmers a decent livelihood. (See Important Concepts above)

CAP has always courted controversy due its large share of the EU's total budget (about 39% in 2013, but at one point it reached 71% in 1984), the relative contribution of each state (with the more industrial nations arguing with the more agricultural nations), a priority on support (directly linked to production or not, payment for environmental services, etc.). It has also been criticised for less logical practices, such as the establishment of quotas for certain products, compensation for farmers not to produce (see "Letter" below) as a means of maintaining high food prices, or the imposition of "quality" standards that promote food waste (see section "Food consumption and waste patterns").



Graph 1 - Percentage of agricultural subsidies revenues (2012)
Source: OECD Statistical Office

ADDITIONAL ACTIVITIES

- Play the Banana Split Game with pupils and teachers in your school and with your family. You can find an updated version by CAFOD in http://www.cafod.org.uk/Education/Primary-schools/Fairtrade.
- Contact a Fair Trade organisation in your area and organise a talk and sale at your school.

TO LEARN MORE

Oxfam International Trade Campaign – http://www.oxfam.org/en/campaigns/trade
Farmsubsidy.org – http://farmsubsidy.openspending.org/
Farmgate – The developmental impact of agricultural subsidies – Action Aid 2002 Report
The great cotton stich-up – Fairtrade Foundation Report 2010

Dear Secretary of State,
My friend, who is in farming at the moment, recently received a cheque for £3,000 from the Rural Payments Agency for not rearing pigs. I would now like to join the "not rearing pigs" business.

In your opinion, what is the best kind of farm not to rear pigs on, and which is the best breed of pigs not to rear? I want to be sure I approach this endeavour in keeping with all government policies, as dictated by the EU under the Common Agricultural Policy...

...If I get £3,000 for not rearing 50 pigs, will I get £6,000 for not rearing 100?...

I plan to operate on a small scale at first, holding myself down to about 4,000 pigs not raised, which will mean about £240,000 for the first year. As I become more expert in not rearing pigs, I plan to be more ambitious, perhaps increasing to, say, 40,000 pigs not reared in my second year, for which I should expect about £2.4 million from your department...

I am also considering the "not milking cows" business, so please send any information you have on that too. Please could you also include the current Defra advice on set aside fields? Can this be done on an e-commerce basis with virtual fields (of which I seem to have several thousand

"I would now like to join the 'not rearing pigs' business."
Excerpts from a letter written by Nigel Johnson-Hill in 2007 to the then Secretary of State for the Department for Environment, Food and Rural Affairs (DEFRA), David Miliband[3]

TO VIEW AND DISCUSS
The Problem with Subsidies -
https://www.youtube.com/watch?v=XVeFimzJg8s

VIPs
Joseph Stiglitz
Nico Roozen
Sicco Mansholt

[3] Letter in full www.dearcustomerrelations.com/best-ever-mischief-letters/defra-the-not-rearing-pigs-business/

However, two of the most negative aspects of CAP result from its impact on the most disadvantaged populations in Europe and in the global Southern. Up until now, the main beneficiaries of CAP have been large agricultural companies (around 80% of subsidies are absorbed by merely 20% of producers in Europe) and excludes many small farmers.

The new CAP has put in place specific measures to alter this scenario, e.g. prioritising and helping young farmers or the establishment of a limit in subsidies paid to individual farmers. On the other hand, the fact that European agriculture (and that of all developed nations) is heavily subsidised ends up creating a situation of unfair competition, and has a profound impact on the economies of developing countries. This is particularly so when we take into account that most people in these poorer countries live directly from farming.

After all, how can a small farmer in Africa or Latin America compete in a market that is controlled by a small group of private companies? For Example, only 5 companies (Cargill Inc, United States; Marubeni, Japan; Bunge Ltd., Bermudas; Archer Daniels Midland, United States; and Louis Dreyfus, France) control 90 % of the world cereal market[4]. Especially when these entities receive millions in production subsidies, while the small farmer receives little or nothing. These large companies will then also receive another X million in export subsidies, while the small farmer sees his/her products barred from entry due to protectionist measures. The only answer to that question is that the small farmer CANNOT compete!

Cotton and Subsidies - how to perpetuate poverty

In 2001, the 143 member countries of the International Labour Organisation began a process (the Doha Development Agenda - DDA) which aims to create a new scenario for global trade, one that promotes and stimulates growth and wealth in developing countries.

Cotton is one of the main export crops in some African countries (Mali, Chad, Benin, and Burkina Faso), representing around 5-10% of GDP. It is a ticket out of poverty for millions of farmers in those countries. However, between 2001 and 2010, the United States, China and the European Union subsidised their cotton producers by over 47 billion euros, thereby distorting the market and giving their cotton producers an unfair advantage.

Despite the fact that African cotton is of excellent quality, cheaper to produce and has less environmental impacts (it is rain-fed and uses less chemical inputs), it is still not competitive on the global markets that are dominated by the United States. The main reason being that a farmer in Mali will be lucky to get 200 dollars per annum per hectare of cotton, while an American cotton farmer will receive, in subsidies alone, 250 dollars annually per hectare. The elimination of subsidies provided by developed countries would mean an increase of over 9% in the family budget of small farmers in Western Africa. Increases of this nature in the past have shown that this extra money would be used for education and health expenditure[5].

[4] Manifesto Food we Want (2011)
[5] Fairtrade Foundation (2010) - The great cotton stich-up

Conclusions

This is the Food We Want Campaign. Throughout these 12 sections we have sought to provide all the necessary information that will enable teachers, students, young people and anyone who is interested to become part of the solution that is needed to change the world for the better. We have presented a global reality that is comprised of many local and regional realities which interlink and form a whole. However, the Food We Want Campaign is neither centred around Northern countries (with their high level of development allowing easy and rapid access to almost anything) nor Southern countries (with their elevated levels of extreme poverty, relative abundance of natural resources and shortages in almost everything else, turning them into easy victims for less scrupulous agents). It has decided instead to discuss these two different realities and to concentrate on their interconnectivity.

Firstly, this booklet (Educational Kit), along with all the other elements of the Food We Want Campaign, is a tool that helps us understand how we arrived at our current situation - how we arrived at a moment in our global history where we have the capacity and knowledge to feed the world. Yet choose not to.

Secondly, this booklet helps us discover and understand the contributions that each of us make towards the current situation. The role that each European citizen plays, consciously or unconsciously, in a global system that not only produces enough food to feed the world, but produces an over abundance that ends up causing illnesses linked to overeating (heart disease, type 2 diabetes, etc.) that are killing millions of people in developed countries.

Thirdly, this Food We Want Campaign Educational Kit helps us understand our role in a new paradigm that is being born, one in which sustainable agriculture is at the heart of a revolution. This is a revolution centred around the satisfaction of needs and the resolution of problems facing all human populations, and not easy, blind profit.

Although each section contains notes and historical references, we can consider that the first three sections give us a historical context, enabling us

to better understand our current situation. The first, “Population and Food Production”, is centred almost exclusively on population evolution and the capacity for agriculture to feed Humanity. The next two, “Agricultural Production Systems” and “Food Sources”, serve to square the distribution capacity of global food production (one of the factors that most contributes to the distribution of Hunger in the world).

Sections 5 and 7 present and develop further some of the classic questions and impacts that are known to the general public (including students) about the production and consumption models that are currently used in the world. “Food Sovereignty” is more concerned with the social impacts of a model that eliminates the capacity of populations to choose their own food models, thus preventing them from escaping models that are imposed on them through external forces. The sections “Soil and Water” and “Pollution” develop questions related to unsustainable use of, and disregard for, resources.

The last five sections cover issues that, although they are not new, have been at the centre of new discussions and debates in relation to Hunger and sustainable agriculture, and for which there is still a shortage of information among the educational community and young Europeans. For example, a lot has been written about “Climate Change”. However, a large proportion of the population does not understand the true extent of industrial agriculture’s contribution to climate change, nor the positive contribution that sustainable agriculture can have in finding a solution to this problem. For this reason, this section informs and explores the contribution that each young person can make simply by choosing the right fruit for dessert.

The sections “Biodiversity, seeds and Genetically Modified Organisms” and “Biofuels and “land grabbing” explore questions that are still absent from school textbooks, but which are already present in the day-to-day lives of each European citizen. These two sections also look to demonstrate how apparently innovative and sustainable ideas, such as biofuels and GMOs, can easily be perverted, transforming potential solutions into big business and perverting the original intent and replacing it with profit. The sections “Speculation and food prices” and “Subsidies and market access” are not political statements

against the financial industry (they could be but they are not). They merely present facts relating to the real impacts of these actions that, for many European citizens, are almost virtual activities played out on computers and financial markets, but which actually affect, in very negative ways, the most fragile people on the planet.

We have not forgotten the fourth section, “Patterns of consumption and waste”, merely deciding to highlight it from the others. In no other document from this Campaign and Educational Kit is it easier to realise how dangerous and wrong the current model of production and consumption is, nor how easy it is for us to avoid it. No rational being would classify as positive a model that sacrifices air, soil, climate, biodiversity, human rights, the existence of our very planet and of humanity, in order to produce food that is not consumed but simply thrown away. In the end, “Patterns of consumption and waste” is both a source of information and an invitation to each young person, teacher, and European citizen to question their role in this system, and to initiate the first steps towards making the changes that Europe and Planet Earth need.

There is an old English proverb that says, “You reap what you Sow”. Historically, agriculture had a very important role in the development of all human civilisations, and it is probable that every country has a similar proverb. In a world where this old proverb rings less and less true, in which the capacity to sow, the results of those efforts and the very possibility of harvesting them, are being gradually taken away from our personal decisions.The Food We Want Campaign is, at heart, an attempt by various organisations to help sow the seeds of change. To help create a new generation of informed consumers and citizens that are concerned with the future of agriculture, and ultimately our planet. As the Japanese philosopher and farmer, Masanobu Fukuoka, said: “The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings”.

The Food We Want campaign and educational kit are not closed tools but will live on through the willingness of its user's to participate in it, the capacity of the Food We Want campaign's supporters and promoters to innovate and implement it, and through contributions and suggestions made to it. For this reason we have left space at the end where you can put down on paper any notes and suggestions that may improve the kit. It would be appreciated if you also added these to the website wwwfoodwewwant.org to inform the wider Food We Want community.

FOOD WE WANT
Booklet

The future of the planet is at risk! Food we want is an international campaign for the promotion of sustainable agriculture and consumption in the North and the South. This booklet of food we want help teachers and students to discover an agriculture that also cultivates rights.

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Co-operation and Development

FOOD WE WANT

Sustainable - Local - Justice

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