

FORUM: SPECIAL ENVIRONMENTAL COMMITTEE

ISSUE: DEVELOPING SUSTAINABLE FORMS OF AGRICULTURE

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"Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." -The United States Environmental Protection Agency



Introduction

Agriculture provides the world with one of the most basic necessities of human survival: food. Today 256% more food is produced with 2% less inputs (seeds, fertilizers etc.) than in 1950.² With a constantly increasing global population of over seven billion, there is a need for more food production. Furthermore, the importance of **agriculture** in our world extends to

¹ **Slope terracing**, a sustainable agricultural technique, in Vietnam Source:

<http://travel.nationalgeographic.com/travel/traveler-magazine/photo-contest/2014/entries/246454/view/>

² (Hazell P, Wood S. Drivers of change in global agriculture. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2008;363(1491):495-515. doi:10.1098/rstb.2007.2166.)



economic reasons, providing many employment opportunities. In the United States of America, 15% of the population works in this domain.³

Agriculture techniques generally tend to serve human needs before taking environmental impacts into consideration. This can be illustrated through the technique of using pesticides to increase the production yield of a crop which contaminates the environment. The way in which farmers tend to their crops has a direct impact on the environment. **Agriculture** is currently responsible for 14% of global greenhouse gas emissions thus contributing a large amount to global **climate change**.⁴ It also accounts for using 70% of the world's freshwater sources.⁵ Fortunately, there are solutions that meet the needs of both humans and the Earth, it is just a matter of putting them into effect.

Definitions of Key Terms

Agriculture: the deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock for sustenance or economic gain.

Sustainable: Refers to techniques that promote environmental health, economic profitability, and social and economic equity.



³ NC state university Source: <http://www.cals.ncsu.edu/CollegeRelations/AGRICU.htm>

⁴ (IPCC (2007) *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III*)

⁵ Clay, J. (2004) *World Agriculture and the Environment: A Commodity-by-Commodity Guide to Impacts and Practices* Island Press

⁶ **Sustainable Development Diagram.** Source:

<https://www.populationeducation.org/content/sustainable-development-goals-vs-millennium-development-goals-what-you-need-know>



Fertilizers: a substance containing 1 or more recognized plant nutrients, which substance is used for its plant nutrient content and which is designed for use, or claimed to have value, in promoting plant growth.

Pesticides: a chemical preparation for destroying plant, fungal, or animal pests.

Greenhouse Gases: any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and the fluorocarbons.

Global Warming: the increase in the average temperature of the Earth's near-surface air in the 20th and early 21st centuries and its projected continuation.

Soil Erosion: the physical loss and the reduction in quality of topsoil associated with nutrient decline and contamination

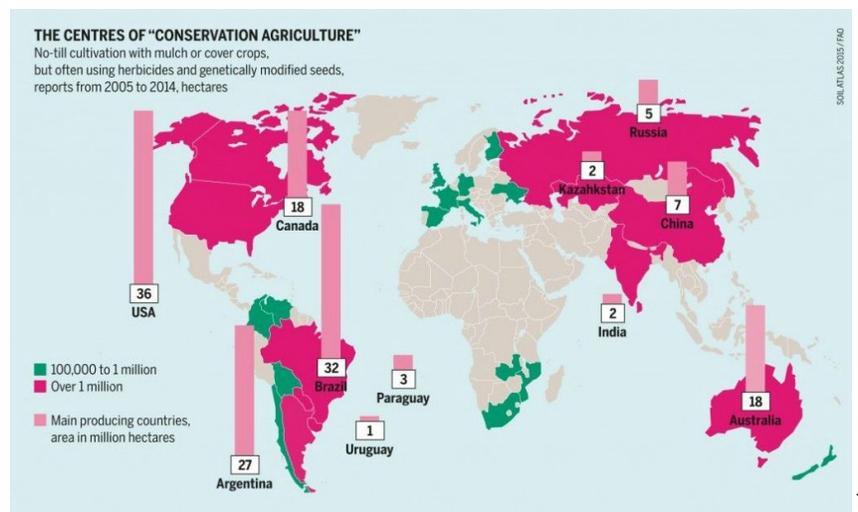
Background Information

Current global agricultural techniques create a large range of consequences that affect many different aspects of our environment, economy, and social equity. **Global warming** is currently one of the top issues concerning the environment. The use of certain fertilizers, livestock, wetland rice cultivation, manure management, burning of savanna and agricultural residues, and ploughing are some examples of the ways that **greenhouse gases** are emitted because of agricultural practices. The UN Food and **Agriculture** Association stated that livestock is responsible for 18% of agricultural **greenhouse gas** emissions. Many big food producing countries such as China, India, and Spain are close to reaching their water source limits. The agricultural sector alone is the greatest user of water but wasteful field application techniques, poor irrigation systems, and inappropriate crop choice. Unsustainable water usage depletes groundwater supply and could change the chemical properties such as pH and salinity which will flow into aquatic ecosystems and create further problems. Since **agriculture** occurs on the soil, it is consequently one of the main sources of soil erosion on the planet thus, largely reducing the amount of arable land.



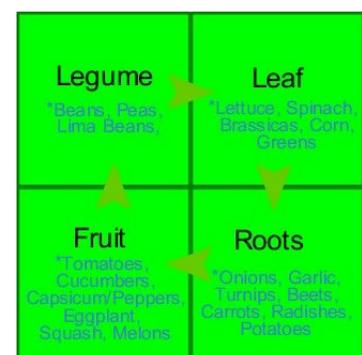
However, this is a vital practice so techniques have been developed to make the consequences less straining on the environment. The following are examples of current techniques that are practiced globally:

- No-Tillage Farming:** This method minimizes soil disruption by leaving residue of the crops on the soil after harvest to protect and provide additional nutrients for the soil. The countries with the leading amounts of no-till farmland are the USA, Brazil, Argentina, Canada, and Australia. 85% of no-till farmland is located in North and South America. This technique reduces soil erosion, conserves water, improves soil health, and reduces sediment and fertilizer pollution in lakes and streams, all while sequestering carbon.



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- Crop Rotation:** This method consists of growing different crops in succession on the same field. Rotation reduces pest pressure on all the crops in the rotation by breaking the pest reproductive cycles. In addition, if a country is using biofuel as an important energy resource this technique should be encouraged. In rotations, farmers can also plant crops, like soybeans and other legumes, that replenish plant nutrients, thereby reducing the need for chemical fertilizers.



⁷ **No-till farming map.** Source: <http://knowledge4food.net/first-iys2015-article-in-a-series-think-twice-before-ploughing/>

⁸ **Example of a crop rotation.** Source: <http://www.theproductivegarden.com/wp-content/uploads/2012/06/rotation.jpg>



For instance, corn grown in a field previously used to grow soybeans needs less added nitrogen to produce high yields.

- **Cover Crops:** A type of plant grown primarily to suppress weeds, manage soil erosion, help build and improve soil fertility and quality, and control diseases and pests. They are usually grasses or legumes, but may be other green plants. They add fertility to the soil without chemical fertilizers via biological nitrogen fixation. They are also a natural way to reduce soil compaction, manage soil moisture, reduce overall energy use, and provide additional forage for livestock. By keeping nitrogen tied up in plant tissue and soil organic matter, limit the creation of nitrous oxide, an example of a greenhouse gas, in the field and downstream. In some cases, cover crops can even increase carbon storage in soil, further reducing heat-trapping gases in the atmosphere.
- **Terracing:** A soil conservation practice applied to prevent rainfall runoff on sloping land from accumulating and causing serious erosion. Terraces consist of ridges and channels constructed across-the-slope. An image of this technique can be found on page 1 of the report.
- **Contour Farming:** This technique prevents or diminishes the downslope movement of water and soil. The effect is very much similar to that of terracing but this is practiced on slopes that are less steep.



⁹ **Contour Farming.** Source: <http://media-2.web.britannica.com/eb-media/78/143478-004-E0A23203.jpg>



- **‘Carbon’ Farming:** Involves using plants grown on a farm to ‘harvest’ carbon from the atmosphere and return it to the soil. It involves combining numerous techniques mentioned above to have all around more sustainable farming on a local and international scale.

Major Countries and Organizations Involved

Each member state is involved in this issue as it is global. However, there are some countries where there is a greater concern of the impact of their **agriculture** techniques. LEDCs tend to contain less sustainable agriculture techniques. Agriculture tends to be the main source of capital for these countries and 70% of their population on average is involved in the sector.

On a positive note, there are also many who have made a substantial effort to improve their farming techniques with technology and legislation. As mentioned previously in the report, North and South America have the highest percentage of no-till farming. The monsoon regions of South-east Asia exhibit widespread terracing. The idea of ‘carbon’ farming was originally proposed by Australian soil scientists as a strategy to manage their farming during a period of drought. According to the Environmental Performance Index conducted in 2010, the top five countries for sustainable agriculture were Mauritius (93%), Costa Rica (91%), Sweden (88%) , Austria (85%), and France (84%).

There is evidence that a ‘quiet’ revolution is occurring particularly on a local scale. For example, 100,000 small coffee farmers in Mexico who have adopted fully organic production methods, and yet increased yields by half. However, on an international and national scale there is still lots of development to be done.

National Sustainable Agriculture Coalition (NSAC): An American grassroots organization devoted to promoting a more sustainable farming system. This organization’s two goals are: to support, build, develop, and engage the grassroots of sustainable agriculture for the health and vitality of the sustainable agriculture movement and to research, develop, and advocate federal policies relating to farm, food, and environmental issues, appropriations, and implementation to support and advance sustainable agriculture.



Community Supported Agriculture (CSA): This organization allows city residents to have direct access to locally grown produce.

Food and Agriculture Organization of the United Nations: “Our three main goals are: the eradication of hunger, food insecurity and malnutrition; the elimination of poverty and the driving forward of economic and social progress for all; and, the sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources for the benefit of present and future generations.” -FAO

Timeline of Events

1989- Resolution passed for Sustainable Agriculture.

2000- Millennium Declaration was signed by world leaders. This declaration pledged to create a more equitable world.

2011- The Carbon Credits Initiative was passed in Australia

2012- Zero Hunger Challenge was announced by Ban-Ki Moon.

2015- United Nations Summit for Sustainable Development

2015- Sustainable Development Goals created on September 25th.

2015- COP21 conference in Paris, France.

Relevant UN Treaties and Events

Zero Hunger Challenge: A challenge launched by Ban-Ki Moon encouraging work towards a world where no one is hungry. One of the five objectives includes: All food systems are **sustainable**.

Millennium Development Goals: A series of universally-agreed objectives to be reached before 2015 for eradicating extreme poverty and hunger, preventing deadly but treatable disease, and expanding educational opportunities to all children, among other development



imperatives. Goal 7 was to “Ensure Environmental Sustainability”. Target 7.A addresses, “Integrating the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources,” which includes the consequences of unsustainable farming.

Sustainable Development Goals: A set of 17 Sustainable Development Goals (SDGs) produced by the United Nations to end poverty, fight inequality and injustice, and tackle climate change by 2030. Goal 2 directly addresses the lack of sustainable agricultural techniques; “End hunger, achieve food security and improve nutrition, and promote sustainable agriculture. 2.4 states, “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.” 2.A states, “Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.” Goal 7 being, “Ensure sustainable consumption and production patterns,” and goal 13 to, “Take urgent action to combat climate change and its impacts,” also relate to creating more sustainable agriculture.

Previous Attempts

Numerous different **sustainable** techniques have been developed and are gradually becoming more and more popular across the world. Individual countries have researched and developed sustainable techniques. MDG 7 was successful in terms of the development of new agriculture technologies however the atmospheric levels of substances that destroy the ozone layer are still increasing (they could increase 10-fold by 2015).

On a local scale, there are many enterprises who now produce crops much more sustainable. The public is now starting to realise the importance of sustainable agriculture and buying more local produce. Many cities encourage citizens to shop in local markets.



Possible Solutions

It is important to take into consideration the potential impacts on the environment (such as: increasing **greenhouse gas** emissions and consequently, **global warming** or **soil erosion**) in an area before commencing agricultural practices. Then the appropriate technology should be developed to ensure that it is being done as sustainable as possible. This is important for each nation as a whole, but also on the small scale within local farms. The technology does not have to be too advanced and can be quite simplistic. It is not necessary for every country to adopt the same techniques.

Investments in educational research to develop further alternative farming techniques should be considered, particularly in LEDCs. These countries are currently undergoing rapid development and thus there is an opportunity to develop new sustainable farming techniques that will ensure minimal impacts on the environment and aid the country's development by, for example, increasing the production yield of a crop. **Agriculture** is one of the main contributors to the typical LEDC's economy and therefore there is most likely a large workforce, increasing the chances of containing workers that are not properly educated. This can be solved by promoting agricultural education by trained experts in these countries to ensure that 'bad' farming techniques are decreased. Also, countries with populations that have a high level of natural increase should have their agricultural activities monitored more closely to ensure that they are not neglecting the environment to provide food for their population.



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Appendices

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