Committee: Environmental Sub-Commission 2

Issue: Measures to limit intensive farming

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INTRODUCTION

The Industrial Revolution brought about huge changes in agriculture. The mechanization that took place, along with a variety of different techniques employed, enabled farmers to vastly increase the productivity of their crops and, as a result, enhance their standards of living. The rapid population growth due to the new conditions increased the demand, which was met by the development of new machinery and the employment of new techniques in order to maximize the yield. This was the beginning of intensive farming, a technique that strives to feed an ever-growing population. According to estimates, the global grain production ought to be doubled by 2050 so as to fully cover the needs of more than 10 billion people. Experts argue that existing yields from existing farmlands would be the ideal solution so as to avoid converting more forests and land into farmland. But the statistics provided by the Food and Agriculture Organization of the United Nations (FAO) reveal that sustainability cannot be achieved by intensive farming, as it results in deterioration of agricultural land and thus undermines the growth of production. The environmental impact seems to be a major setback; as a result, the global community has to come up with a sustainable model of intensive farming that would minimize the threats posed to the environment.

DEFINITION OF KEY TERMS

Intensive Farming

Intensive farming (also known as Intensive Agriculture or Industrial Agriculture) is farming that opts to maximize the yield from crops, mainly by investing more labour or capital per unit land area. In modern years, the term refers to the industrialized production of **livestock**, **poultry**, **fish**, and **crops**[1]. Industrial agriculture therefore strives to increase productivity, while lowering the costs, but the ethics, the effectiveness, and the

[1] "History of Agriculture." *New World Encyclopedia*. New World Encyclopedia, 25 Feb. 2014. Web. 15 July 2015. <http://www.newworldencyclopedia.org/entry/History_of_agriculture>.

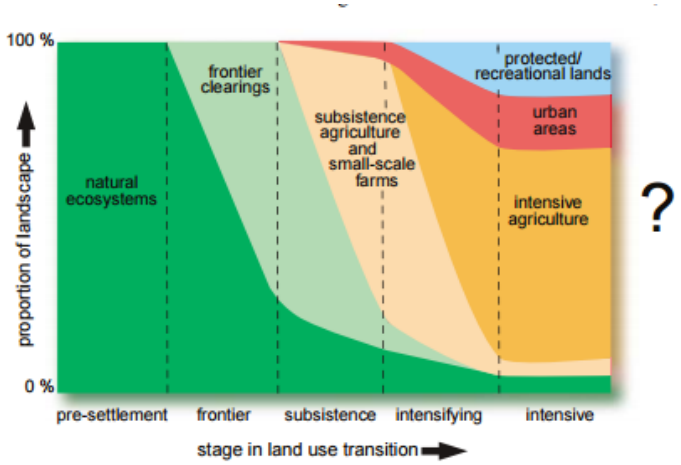


Fig. 1. Land-use transitions. Transitions in land-use activities that may be experienced within a given region over time. As with demographic and economic transitions, societies appear also to follow a sequence of different land-use regimes: from presettlement natural vegetation to frontier clearing, then to subsistence agriculture and small-scale farms, and finally to intensive agriculture, urban areas, and protected recreational lands. Different parts of the world are in different transition stages, depending on their history, social and economic conditions, and ecological context. Furthermore, not all parts of the world move linearly through these transitions. Rather, some places remain in one stage for a long period of time, while others move rapidly between stages. [Adapted from (*1*) and (*2*)]

consequences of the techniques used to do so are questionable. As one can notice from the diagram presented (see Fig. 1), intensive agriculture makes its appearance on the later stages of land use transition and is associated with the socioeconomic conditions of a specific region, and therefore varies vastly among different places in different parts of the world. It is also evident that as humans convert more land into farmland so as to cover their needs, the traditional methods of agriculture and small-scale farms are replaced by massive production of intensive agriculture.

Fallow Ratio

This term refers to the period of time which a plot of land used to cultivate a specific type of crops is left unseeded, compared to the period it is seeded. The higher the fallow ratio, the more the area is left uncultivated so as to replenish nutrients and improve soil structure and fertility. The season of fallow land is often replaced by a season when different kinds of crops are cultivated. This technique is called **crop rotation** and is as beneficial to the soil as fallow periods.

Green Revolution

Programs of agricultural development research and extension launched between the 1940s and the 1960s led to the massive global transformation of agriculture. This transformation was called Green Revolution and gave rise to food production so as to be in accordance with the population growth. The technologies developed during the Green Revolution were synthetic nitrogen fertilizers, pesticides and irrigation projection and were made largely accessible out of industrialized nations during this period.

Soil Erosion and Degradation

"Erosion commonly occurs following conversion of natural vegetation to agricultural land – carrying away fertile soil as well as fertilizers, pesticides and other agrochemicals."[2] When land is eroded a great portion of soil is lost or its quality is reduced and this leads to its degradation, i.e. worse efficacy or even deems it unusable (view link provided in footnote for more information).

BACKGROUND INFORMATION

The basic problem

The need to feed 8-10 billion people in the years to come has been globally recognized, along with the urgency to decrease the percentage of the population who lives in famine. However, there has not been an agreement yet on how to achieve this with sustainable means, while still ensuring that the environmental impact would be as little as possible. But how can we guarantee that the environmental impact is kept under control, but on the same time crop and livestock production is increased? The need for efficient pest management without the use of toxic pesticides, for successful yet not wasteful irrigation and for avoidance of soil erosion is more than evident. Achieving these, however, is a great challenge for the global scientific community, as the knowledge on ecological and biochemical processes still remains inadequate to reach a satisfactory equilibrium. Also, the competition between economic and environmental goals appears to be harsh, as conflicting interests may stand in the way of ensuring a more sustainable, environmentally-friendly future.

In our efforts to maximize the production while on the same time trying to minimize the cost, intensive farming has been the prevalent technique employed in order to deal with an ever-growing demand. Yet, as explained above, this poses severe threats to the flora and fauna, which ultimately leads to some serious concerns about the effects on people's health, as well as concerns about the capability of the planet to support 10 billion people. So, in order to come up with effective solutions, it is essential that we take a closer insight into the problems caused by intensive farming and the reason why they are serious enough to render it insufficient.

[2] "Farming: Soil erosion and degradation". WWF. Web. 1 Sep. 2015. <http://wwf.panda.org/what_we_do/footprint/agriculture/impacts/soil_erosion/>

Soil Degradation

The problem which has gathered the most attention is undeniably the one of **soil degradation**, not so much for its environmental impact, but rather for its potential consequences on the economy. It is the biggest obstacle to overcome for modern day agriculture, as it is pretty difficult to prevent and poses a great threat to sustainable growth. With the surging population numbers and half the fertile topsoil, agriculture has a major problem to face.

However, it is difficult to come up with accurate data, as the estimated time for erosion involves mainly the amount of soil moved from one region to another rather than that lost to agricultural production. As a result, more research on the issue would be rather necessary, so as to pinpoint the cause of farmland destruction. Also, what should be kept in mind is that the problem is rather local than global, since it also depends on the climate of an area, apart from the agricultural techniques used.

Water Management & Salinization

The over extraction of water, in combination with the poor efficiency levels in agriculture have created major problems in terms of water management. The growing competition with the industrial sector for water has given rise to the need to withdraw more and more water, while natural recharge remains low.

An issue of major concern is **salinization**. Salinization is defined as the process of buildup of salts in soil, particularly when their concentration becomes too high and thus toxic for the crops. It usually occurs in rainfed areas with susceptible land patterns or in crops exposed to excessive irrigation. It is a major problem, since the United Nations Environment Programme (UNEP) considers it as one of the main reasons for land loss. This highlights the need for a more careful planning of crop watering.

In addition, the contamination of groundwater and lake water from fertilizers, pesticides and livestock waste poses a great danger both to human health and the soil. Excessively high concentration levels of nitrogen and phosphate of ponds and lakes can lead to **eutrophication**, resulting in high fish mortality and algae blooms, which release toxins that are harmful -even deadly- to fish and humans.

Climate Change & Pollution

Agriculture affects air quality and has a gradual impact on the atmosphere, mainly because of:

- The emissions from land clearance by fire
- Nitrous oxide from fertilizers and manure
- Ammonia from manure and urine

Although it is seldom a leading source, agriculture has a substantial contribution to **Greenhouse Gas Emissions** as well. Contrary to other sources which are responsible solely for carbon dioxide emissions, crop and livestock produce **methane**, **nitrous oxide** and **ammonia**, which, in great quantities, are toxic for the environment.

The impact of agriculture is therefore significant. In order to hinder its expansion, it is necessary to stop the conversion of tropical forests into farmland (**deforestation**) and the burning of agricultural residue.

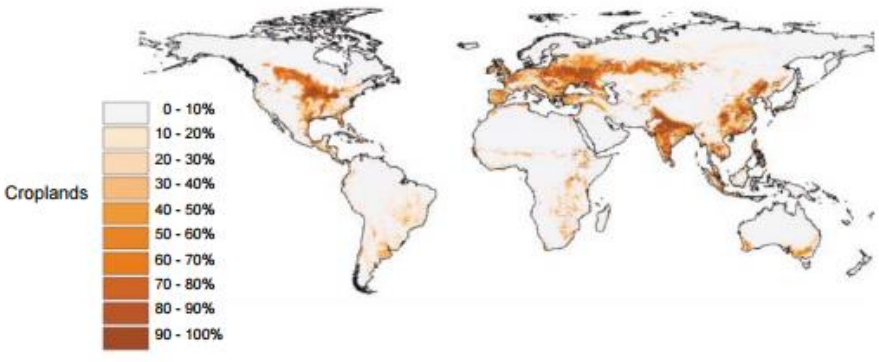
MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

Table 12.4: Global Assessment of Human-induced Soil Degradation (GLASOD)[2]

Region	Total land affected (million ha)	Percentage of region degraded	
		Moderate	Strong and extreme
Africa	494	39	26
Asia	747	46	15
Australasia	103	4	2
South America	243	47	10
Central America	63	56	41
Europe	219	66	6
North America	96	81	1
Total	1964	46	16

Source: Oldeman, Hakkeling and Sombroek (1991).

As we notice from the statistic table presented, the issue of soil degradation is rather universal, with the exception of Australasia, which presents relatively small figures compared to the other regions. Although the map reveals that croplands are more "dense" in economically developed countries and overpopulated countries such as India and China, the problem affects almost every region on the planet. Apart from the expected local soil fertility decline as a result of intensive agriculture, a multitude of different factors contribute to soil degradation and thus render it a global phenomenon. In addition, as intensive farming does not appear as a sustainable solution to meet the needs of 8-10 billion people, alternative solutions ought to be discussed



from the global community as a whole. The countries that resort to intensive farming the most are the United States of America and China, with Eastern European and Central American countries being on the spotlight as well.

The only organization which has expressed concerns on intensive farming is the **UN Food and Agriculture Organization (FAO)**. It has also conducted research on both the environmental impact and the sustainability of the model (see next section).

UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

The UN involvement in the issue has been rather minimal, with the General Assembly or the Environmental Commission having never passed a Resolution referring exclusively to the issue of extensive agriculture. It has been merely touched upon by the FAO, but as its main goal has been the eradication of world hunger and poverty, the organization has primarily focused on halving the number of the hungry globally, as they committed to do with the Millennium Development Goals in 2000. Consequently, limiting intensive farming appears to be totally out of the UN Agenda at the present day, as they opt to put an end to famine by increasing production growth percentages, thus resorting to industrial agriculture.

However, the UN and the FAO officials appear to be aware of the impending danger. Maria- Helena Semedo, the FAO's deputy director general of natural resources, claimed at 2014 World Soil Day that: "Soils are the basis of life. Ninety five percent of our food comes from the soil", while she conceded that "about a third of the world's soil has already been degraded". The causes of soil degradation stem from intensive farming, with the FAO reporting that: "Unless new approaches are adopted, the global amount of arable and productive land per person in 2050 will be only a quarter of the level in 1960 due to growing populations and soil degradation[3]." Apparently, intensive farming doesn't seem to be a sustainable option anymore and new solutions have to be considered. A UN Official stated

[3] Arsenault, Chris. "UN Official: We Have Only 60 Years Of Farming Left If We Don't Change Our Ways." Business Insider. Business Insider, Inc, 08 Dec. 2014. Web. 15 July 2015. <http://www.businessinsider.com/r-only-60-years-of-farming-left-if-soil-degradation-continues-2014-12>.

that: "Organic (farming) may not be the only solution but it's the single best (option) I can think of."

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

It is evident from the problems described earlier that severe environmental issues stem from industrial agriculture. Although the sustainability and the environmental impact of intensive farming have not gathered the fitting attention from the United Nations, States and NGOs, some efforts to minimize the threat they pose to natural habitats have been made. Research has revealed a lot of the technological and policy actions that need to be taken so as to avoid a bleak future. If implemented to a further extent, these techniques could help preserve the environment and increase sustainability. For the time being, the European Union and North America have already taken measures such as:

- Research on slow and other less polluting fertilizing formulations
- Tighter emission and discharge standards for fertilizer factories and higher fines
- Public and private advisory services
- Physical limits on the use of manure and mineral fertilizers

Also, there have been substantial attempts to gradually phase out the use of fertilizers that undermine the environment and are not effective enough, such as ammonium carbonate. Consumer-led organizations that actively support organic farming instead of industrial farming have been trying to limit fertilizer pollution in specific areas.

POSSIBLE SOLUTIONS

Although it may seem difficult at first to go against the current global trend and limit intensive farming despite its widespread support and use at the present time, it is something that has to be done. The vast majority of states, however, have no alternative solution to respond to the current demand for production and thus resort to intensive farming. As it has been explained earlier, it seems that in a few years this would no longer be a viable plan, as harming the land by forcing it to produce more than it is capable of is going to ultimately backfire. Therefore, what you are called upon to do is come up with alternatives that are going to be more efficient and environmentally friendly than intensive agriculture. Measures that are going to just limit industrial agriculture and hinder production are insufficient, as they would just hinder a farming method that is used to feed 7 billion people

in 2015. Instead, the goal is to adopt techniques that are going to facilitate the environmental development of intensive farming and would reduce the environmental toll our planet is taking.

The primary solution put forward by numerous environmental organizations is **Organic Farming**, which does not use any industrial fertilizer or pesticide inputs. As a result, the danger these inputs pose to the environment is averted, but this techniques does not guarantee sustainability. In addition, soil erosion is still present and often the overuse of manure contributes to air and water pollution. So, the promotion of organic farming mainly through incentives or government policies would be a good idea to limit intensive farming. Also, an international agreement for an accreditation mechanism for organic products and research on the development of organic agricultural techniques could be really helpful.

As the issue has not been in the spotlight of attention and far from the UN Agenda, it is necessary to inform the citizens on the dangers of intensive farming and the need for sustainability. As knowledge on the issue is rather minimal for the vast majority, the media and environmental organizations could have a key role in explaining what Intensive Farming is, its environmental impact and possible solutions to the issue.

In an effort to minimize the detrimental effects of industrial agriculture to the environment, solutions to further reduce pesticide and fertilizer pollution and to improve water management by making irrigation (the artificial watering of crops) more effective, are necessary.

Finally, further investments in innovation and new technologies can upgrade the efficacy of (intensive) farming, as an alternative to limiting it. The goal should be to come up with a new sustainable model or to upgrade the current one so as to meet the demands of the population more efficiently. So, investing more in current accessible and quality crops would decrease water consumption and limit the conversion of forests into farmlands, which results in a loss of biodiversity.

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