



Environment for Food and Nutrition Security

Profound imbalances are increasing pressures on ecosystems to satisfy a growing demand for quantity, quality and diversity of food. This will require substantial changes in the production, consumption and quality of food. We need to produce more food more efficiently, we need to do so in a way that preserves the natural resource base to guarantee adequate food supply for now and future generations, and we need to address the major failings present in the food system today.

ENVIRONMENTAL DRIVERS OF FOOD AND NUTRITION INSECURITY

Technological advancements in the past century have significantly increased world food production, primarily through increased irrigation, fertilizer use and cropland expansion. But unfortunately **such gains have also resulted in environmental degradation**. By 2008, 24% of the global land area was estimated to have been degraded¹, and 40% of the world's agricultural land² is undergoing serious degradation and loss of **biodiversity**. Pollinator services although estimated to provide a value of 353.6 billion USD to agriculture annually, are severely threatened due to habitat loss and pesticide use³. **Pesticide toxicity** has contributed to poisoning up to five million agricultural workers per year⁴, and there is emerging evidence linking it to child stunting.⁵ Similarly, **oceans**, which are crucial for food security through fishing and marine aquaculture⁶, are threatened as a result of overfishing and pollution. **Deforestation** and forest degradation (frequently driven by agricultural expansion including biofuels) cause an estimated 17.4% of the global greenhouse gas emissions that drive **climate change**.⁷ As a result of climate change, it is estimated that production will fall by 5–20% across all crops in Sub-Saharan Africa and by 16 million tons in South East Asia.⁸

Competition for land for food production, demand for energy and the demand for water will become increasingly important issues. Agriculture is already responsible for 70 percent of total global "blue water" withdrawals.⁹ Water stress is likely to increase in many regions of the world with the effects of climate change and ongoing depletion of groundwater. Significant amounts of energy are used in extracting water, producing agricultural inputs, and in post-harvest processing, transport and distribution of food, as well as for the disposal of organic wastes. Energy prices, projected to rise and become more volatile over the coming years will expose several parts of the food system which are highly vulnerable to higher energy costs, for example fishing and production of nitrogen fertilizers. Bioenergy production competes with food production for land and water resources. On the other hand, bioenergy sustainably produced can spur innovation and investment in the agricultural sector, and help increase access to energy.

About one third of all food produced for human consumption is lost or wasted – around 1.3 billion tons every year.¹⁰ Even if just one-fourth of this could be saved, it would be enough to feed the hungry in the world.¹¹ Two-thirds of this is due to post-harvest crop losses (harvesting, processing and distributing). The other third occurs because of waste on the consumption side. In industrialized nations, almost half of the total food waste - around 300 million tons annually - occurs because producers, retailers and consumers discard food that is still fit for consumption.

Smallholder food producers are increasingly marginalized. Unequal access and rights to natural resources and land, lack of credit and safe technologies for small holder food producers, inefficient agricultural subsidies, lack of tenure for women, and lost access to land as a result of large scale purchases, all result in missed productivity gains. Since 2001, a total of 227 million hectares of land (an area the size of Western Europe) has been sold or leased mainly to international investors, the trend intensifying after the 2008 food crisis. Much of it is being left unused suggesting a trend towards land banking,¹² and many smallholders have been affected negatively.¹³ Between 1973 and 2000, countries that had a more equitable distribution of land achieved growth rates higher than those that did not.¹⁴

Political and institutional obstacles, including harmful subsidies, unfair trade practices and inadequate market structures need to be tackled to ensure that the global food system can adequately respond to future threats and pressures whilst safeguarding food security and nutrition. For example, the price spikes of 2008 increased food prices by an average of 63%¹⁵. When poor households spend up to 50 - 80% of their incomes on food purchases¹⁶, such volatility can create huge impacts plunging many millions suddenly into conditions of malnourishment. This crisis was a result of five factors; competition for crop land from biofuels, low cereal stocks, high oil prices, speculation in food markets, and extreme weather events.¹⁷ Governance at national levels needs to consider measures to increase supply and influence demand in a sustainable manner – encompassing robust environmental, socio-economic, and nutritional outcomes.

Today, the world produces enough food to feed all of its population. Yet around 842 million people go hungry and two billion are considered malnourished.¹⁸ Combating malnutrition would contribute to reducing child deaths by up to 3 million, and reducing child



stunting of up to $\frac{1}{3}$ of children in developing countries.¹⁹ At the same time, some 34% of the global adult population is estimated to be overweight or obese with associated obesity-related health conditions rising rapidly.²⁰ The number of overweight or obese adults living in the developing countries tripled from 250 million in 1980 to 904 million in 2008.²¹ Between now and 2050, an **increase in global population**, from 7.2 billion to over 9 billion²² means that global food production will need to increase by 60%.²³ This growth may be accompanied by **changes in the values and preferences of consumers** as diets shift to more resource-dense food, with fat and sugar additives. These trends would place considerable stress on food production capability and the environment, and add to poorer health outcomes.²⁴

A SUSTAINABLE FOOD SYSTEMS APPROACH

Healthy ecosystems can ensure long term access for all to adequate, safe, affordable, diverse and nutritious food. The environment should not be seen only as a risk, but should also be seen as an opportunity - positive linkages need to be actively made between food production and consumption, nutritional health and the underlying social-economic, biophysical and institutional elements which ultimately affect the quantity, quality and affordability of food, while ensuring long term environmental sustainability.

A sustainable food system can be increased through a four-pronged approach:

1. **By a major shift towards diversified, resilient eco-agricultural systems, reversing and restoring degraded lands to their natural potential, and recognizing the value of ecosystem services and natural capital.** This entails sustainable use of land, water and nutrients at the landscape level, while maintaining, valuing and enhancing ecosystem services and biodiversity, and protecting agro-biodiversity. It also entails adequate adaptation strategies that reduce the substantial risks of changing climatic conditions on global food supply; and halting and reversing land degradation, drought, desertification and pollution of water sources. Indigenous and sustainable farming, pastoralism and fishing practices could be promoted.²⁵ Eliminating the use of toxic pesticides and chemicals would reduce deaths by 1 million per year in some regions, and reduce levels of pesticide contamination in up to 90% of water in others, while preventing further degradation to the world's ocean resources and fishing-dependent communities.^{26,27} It has been estimated that average crop yields could increase two- to three-fold in many parts of Africa through implementation of best practice land management and integrated landscape approaches.²⁸
2. **By optimizing efficiency of production of food, water and energy.** This entails improving energy efficiency in food production, from cropping to harvest, through processing to actual consumption. It also entails recycling and harnessing waste for energy, and improving water resource management and efficiency. Introduction of energy efficiency and local renewable energy production are key measures to achieve sustainable agriculture. The loss of some 50 million tons in crop yields can be avoided by reducing emissions of short-lived climate pollutants, particularly black carbon and methane.²⁹ Post-harvest crop losses could be reduced through more efficient infrastructure and technologies, including renewable energy for rural areas. Food waste can be reduced by changing consumer awareness and business practices. Significantly reducing food loss and waste can also help to avoid further conversion of sensitive land, rangelands and forests, thereby reducing conflicts over land, and the use of water, insecticides and pesticides.
3. **By addressing harmful subsidies, unequal access and rights to natural resources, and empowering smallholders and rural women** as critical agents for food security. This entails reducing current and future uncertainty via mitigating climate change. It entails addressing price volatility, including through facilitating better market information, reducing trade barriers, improving trade infrastructure, and improving oversight on commodity markets. It entails changing the nature of agricultural subsidies so that they are linked to sustainability performance criteria,³⁰ and exploring opportunities to reduce 1st generation biofuel subsidies. Enhancing adherence to internationally recognized guidelines on the responsible governance of tenure of land, water, fisheries and forests, including full consultation with local communities, would establish access for land stewards with insecure tenure.
4. **By a major shift towards sustainable diets and consumption** that minimizes environmental impact, increases nutritional value and ensures fair trade and sustainable livelihoods for farmers. This includes mainstreaming environmental and human health issues into food and agriculture policy-making, and raising awareness among consumers and the business community. It also includes addressing sustainable consumption patterns beyond human food, including reducing the use of cereals and food fish in animal feed and increasing range-fed meat through sustainable pastoralism, and ensuring accessible and robust cereal stocks particularly for use in times of extreme weather events.

With business as usual, it is expected that satisfying the different needs of a growing population would lead to land conversion beyond the 'tipping point'³¹ Yet, an integrated, four-pronged set of measures can avert such a possibility while also meeting the UN's Zero Hunger Challenge.³² The opportunity to sustainably ensure food and nutrition security for all is within our reach and cannot be missed in the Post 2015 agenda.

References can be found at: <http://www.unep.org/post2015>.

Comments and questions can be sent to:
unep.post2015@unep.org

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