

Population & Agriculture

One of the most basic human needs is food. However, today, one-third of the world's population lacks food security—the state of affairs in which all people at all times have access to safe and nutritious food to maintain a healthy and active life. According to the United Nations Population Fund, the global population could increase by as much as 2 billion in the next 25 years. If this happened, world food production would have to double to provide food security for the projected population in 2025.

To meet the needs of the approximately 80 million people added to the earth each year, governments and farmers work to increase agricultural yields. In order to increase yields, changes in land-use practices occur that can have negative impacts on the environment. As we strive to support the growing population by trying to obtain higher yields from already heavily used natural resources, deforestation occurs, soil loss escalates, freshwater becomes scarce, and pollution increases. As a result, the world's ability to produce food may be

shrinking—not expanding. We may be headed toward a decrease in agricultural yields as population grows, development increases, and our most fertile land becomes degraded. In this process, we also continue to lose wildlife habitat, causing more and more species to become extinct.

The Green Revolution

In the 1960's, the Green Revolution was a remarkable achievement in improving world food production through the use of modern day irrigation, fertilizers, pesticides, and new seed

varieties that resulted in increased yields of crops. Clearly, the production advances of the Green Revolution are no myth. Irrigated land is more productive than rain-fed land. New seed varieties are responsible for tens of millions of extra tons of crops harvested each year that help reduce hunger around the world. By the 1990s, almost 70% of the world's corn, 75% of Asian rice, nearly half of the wheat planted in Africa, and more than half of the wheat planted in Latin America and Asia were sown with these new varieties. Overall, it was estimated that 40% of all farmers in the Third World were using Green Revolution seeds accompanied by pesticides and fertilizers. Between 1970 and 1990, this revolution aided in reducing the number of hungry people from 942 million to 786 million, a 16% drop.

Environmental Consequences

Although the Green Revolution has greatly aided world food production, it has also resulted in serious environmental degradation. Agriculture consumes 70% of the freshwater withdrawn annually by humans, draining aquifers faster than they can be replenished and causing the water tables to fall. Global water consumption rose six-fold between 1900-1995, more than double the rate of population growth. It is estimated that by 2015, nearly half the world's population will live in water stressed countries (with

less than 1700 cubic meters of water per capita per year).

Farmers are also planting fewer varieties of crops to benefit from high yielding varieties. This uniformity has led to a lack of genetic

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diversity among plants and greater chance of disease. In turn, this threat of disease has led to an increase in the use of chemical fertilizers and pesticides to protect the genetically vulnerable crops. The use of pesticides worldwide has increased more than 30 times between 1950 and the end of the 1980's. This increase has resulted in more species of weeds, diseases and insects becoming resistant, up from 100 species in the 1950's to over 700 today, and to the elimination of beneficial insects and plants that are essential for the natural balance of our ecosystems. Increased pesticide and fertilizer use also magnifies the dangers of agricultural run-off. Agricultural run-off



Photo by Liz Gilbert on behalf of the David and Lucille Packard Foundation





seeps into ground water and watersheds, altering the nutrient balance causing pollution, eutrophication (the overabundance of nutrients), and algae blooms that feed off of surplus nutrients and use up oxygen needed by fish.

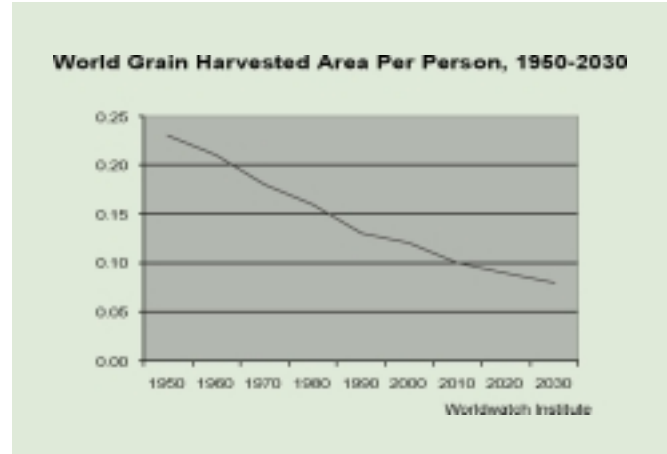
While the Green Revolution has dramatically enhanced food production throughout the world by improving crop yields, technology often fails to address environmental concerns. For example, technology is unable to recharge underground reservoirs, nor does it serve as an impetus for reducing personal water consumption.

Meat and Pastureland

The percentage of world farmland planted with grain increased until 1980. However, it has decreased since then (declining 12% between 1984-1994) due to

soil erosion, waterlogging, salinization of irrigated land, air pollution, and water shortages. In 1996, grain stocks dropped to their lowest level in 30 years and well below the 17% that the United Nations Food and Agriculture Organization considers necessary for world food security. Today's grain area per person is .30 acres, and with current population growth is projected to drop to .25 acres by 2010 and to .22 acres in 2020.

Although grain cropland is decreasing, the demand for grain is increasing as the human population grows and more people eat meat. Worldwide, two out of every five tons of grain is fed to livestock, poultry or fish. Between 1990-1995, China, the world's most populated country, increased its population by nearly 66 million people. During that time, China



increased grain consumption by 40 million tons but fed 33 million tons of that to livestock.

Livestock require grain for food, but they also require land for grazing. To provide grazing land, cattle ranchers in many countries are clearing vast amounts of forestland. It is estimated that 20-30% of the world's forests have been converted to agriculture, increasing available farmland but resulting in extensive species and habitat loss. In addition, in most cases, these deforested lands are not suitable for long-term farming or grazing and are quickly degraded and abandoned.

Worldwide Hunger

The Universal Declaration on Human Rights (UDHR) adopted by the United Nations in 1948, stipulates that everyone has the right to a standard of living adequate for the health and well-being of themselves and their families, including food. Yet, over 800 million people worldwide still cannot meet the basic needs for energy and protein. In developing countries, 54% of young child mortality is associated with malnutrition and each year 50 million children are mentally or physically harmed due to inadequate nutri-

tion. In many developing countries, a combination of rapid population growth and lack of socioeconomic development results in an increase in the total number of individuals who are malnourished.

Hunger is only a problem in developing countries, right? Wrong. In 1999, over 3 million households, or 8.5 million adults and children in the United States experienced hunger.¹ Moreover, in 2000, 33 million people (or 10.5% of all U.S. households) were food insecure²; 13 million of these were children under the age of 18.³

Population and Agriculture in the U.S.

Currently 470 million acres of arable land are cropped for food production in the United States. A



substantial portion of this land is harvested for animal feed, and one out of three acres is harvested for export. The projected

doubling of the U.S. population by 2050 will lead to an increased demand for food and an increased demand for development, affecting agricultural land availability and potentially reducing the arable land base by nearly 120 million acres. In addition, current agricultural policies that favor large industrial farms, while providing little assistance to smaller family farms, increase the pressure on these smaller farms that are often in economic straits with few other options than to sell their property to developers. In the short-term, the way in which we choose to develop land and design public policy will have drastic consequences for our ability to produce food.

Urbanization affects food production and food security, agricultural land is replaced by new development and smaller family farms disappear reducing the availability of locally grown produce.

- One acre of natural habitat or farmland is converted to built-up space or highway for each person added to the U.S. population.⁴ In the five-year period 1992 -1997, more than 3 million acres of prime farmland were converted to developed land.⁵
- More than 99.5% of U.S. food comes from the land.⁶
- For every 1% increase in food demand, farm prices increase 4.5%.⁷
- 86% of our fruits and vegetables and 63% of our dairy products are produced on urban-edge farms threatened by development.⁸

At the same time that we are losing farmland, there is a greater stress on remaining farmland to increase yields, leading to a

greater use of pesticides and fertilizers. Although pesticides and fertilizers increase agricultural yields, they have the potential to injure other organisms, including humans and wildlife. In the U.S., the total pounds of active ingredients in pesticides applied on farms increased 170% between 1964 and 1982. There are about 20,000-67,000 pesticide poisonings cases per year in the U.S. The increase was 33 fold between 1945 and 1990.

Why Care?

The negative implications of population growth on food production and food security pose major threats to human health, the economy, the environment, and wildlife. The use of pesticides and fertilizers to increase the productivity of land is causing soil erosion and pollution and, ironically, is contaminating the very system that supplies us with food. Also, deforestation, the use of marginal lands and destruction of pristine lands to expand the available land base for food production, and the paving over of farmland creating fragmented habitat, are increasing the loss of biodiversity. We must realize that our health and survival depend on our ecological relationship with the environment.

What Can I Do?

To help achieve a balance between people and the environment, you can:

- Support efforts that promote sustainable agricultural practices in agricultural policies. For more information, visit the National Campaign for Sustainable



CASE STUDY:

Population and Agriculture in Ecuador

The U.S. Agency for International Development (USAID) funds programs around the world that help reduce population growth and environmental degradation. For example, in six communities in Ecuador, World Neighbors and CEMOPLAF (Center for Medical Guidance and Family Planning) have joined to integrate population and environment issues by simultaneously addressing health, agriculture, and natural resource management. Not only does the staff of CEMOPLAF and World Neighbors implement the programs but more importantly, voluntary promoters do much of the work.

Receiving no compensation for their work, voluntary promoters travel to rural communities to teach people about family planning, soil and water conservation, the use of cover crops and compost, vegetable production, and small livestock improvement. They also help establish family, community, and school gardens. Voluntary promoters encourage people to visit, if possible, CEMOPLAF family planning clinics to get thorough medical exams.

The remoteness and economic status of many rural Ecuadorians means that these programs' services are their only means for improving their health, the health of their children, and the health of their environment. The communities with integrated programs have seen a significant increase in the acceptance of family planning, as well as the use of sustainable agricultural practices.

CASE STUDY:

Agriculture and Western Prairie Fringed Orchid



Listed as threatened in 1989, the western prairie fringed orchid historically inhabited much of the western central lowlands, the eastern Great Plains, and the interior

plains of Canada. Within the last 50 years, the number of western prairie fringed orchid populations has been significantly reduced throughout most of its range and is believed extinct in Oklahoma and South Dakota. Today, Minnesota, North Dakota, and Manitoba, Canada are home to the largest-known surviving populations. The primary threats to this orchid are the conversion of prairie habitat to cropland, the intensive mowing of hay meadows, overgrazing by livestock, and natural succession. Like

the western prairie fringed orchid the prairie grasslands have also been squeezed out by agricultural expansion and urban development.

The prairie grasslands that once cloaked the continent have been reduced to less than one percent in the last 150 years. For hundreds of miles across the Midwest, native prairie survives only in scant patches of a few acres or less. Agricultural development destroys this fragile ecological balance through plowing, mowing, and the application of insecticides,

fungicides and herbicides. The use of such chemicals can eliminate the plant's pollinators and its fungal host ultimately killing the plant itself, not to mention adding to the threats posed by agricultural run-off.

Human transformation of the North American prairie grasslands to cater to the demands of a growing population has threatened the western prairie fringed orchid and countless other species that depend upon the habitat they create.

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Agriculture at www.sustainableagriculture.net

- Support improvements and adequate funding to Farm Bill programs that help farmers/landowners work toward improving soil, water, and wildlife conservation. For more information, visit www.nrcs.usda.gov
- Support updates to federal transportation laws that favor smart growth development and encourage U.S. funding that assists communities as they plan

for growth. To find out more, visit www.nwf.org/smartgrowth

- Reduce your meat consumption. It takes ten times the water and grain resources to produce one 2,000-calorie meal of meat than one 2,000-calorie serving of grains and vegetables.
- Support U.S. funding of international development assistance programs to help people worldwide meet their basic needs and develop in a sustainable manner.
- Encourage U.S. funding for

international family planning programs that provide education and health services and empower women and communities to improve their health and the environment.

- Learn about and create your own Backyard Wildlife Habitat, visit www.nwf.org/habitats/. NWF encourages everyone—homeowner, teacher, and community leader—to plan their landscape with the needs of wildlife in mind. Native plantings

can reduce the need for water and chemicals, thereby maintaining or even enhancing biological diversity.

- Become active in programs, such as the National Wildlife Federation's Population & Environment Program, that work for these and related causes. www.nwf.org/population
- Support local farmers and buy organic grown crops; this reduces fertilizer and pesticide use, thereby decreasing pollution and soil erosion.

¹ According to the USDA's Food Security Core Module (FSCM), Hunger is defined as the uneasy or painful sensation caused by a recurrent or involuntary lack of food and is a potential, although not necessary consequence of food insecurity. Over time, hunger may result in malnutrition. <http://www.centeronhunger.org/FSI/fsimeas.html>

² According to the USDA's Food Security Core Module (FSCM), Food Insecurity occurs whenever the availability of nutritionally adequate and safe food, or the ability to acquire acceptable foods in socially acceptable ways, is limited or uncertain. <http://www.centeronhunger.org/FSI/fsimeas.html>

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⁴ Food, Land, Population and the U.S. Economy, David Pimentel, Cornell University and Mario Giampietro Istituto Nazionale dell; Nutrizione, Rome. Released November 1994 <http://www.carryingcapacity.org/resources.html>

⁵ Acres of 1992 Prime Farmland Converted to Developed Land in 1997, Natural Resources Conservation Service, United States Department of Agriculture: <http://www.nrcs.usda.gov/technical/land/meta/m5077.html>

⁶ Food, Land, Population and the U.S. Economy, David Pimentel, Cornell University and Mario Giampietro Istituto Nazionale dell; Nutrizione, Rome. Released November 1994 <http://www.carryingcapacity.org/resources.html>

⁷ Household Food Security in the United States, 2000. Washington, D.C.: Economic Research Service, U.S. Department of Agriculture. March 2002. <http://www.centeronhunger.org/fsifacts.html>

⁸ The American Farmland Trust website at www.farmland.org.