
ECOFRIENDLY ENVIRONMENT PAST PRESENT FUTURE

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**J.GOWTHAM NARAYANAN**

Architec

M.Arch., M. Phil(R&D)(Pursuing).

Gandhigram Rural University,

Gandhigram, Dindigul, Tamil Nadu, India

Abstract

Recent attention to the threat of global environmental change has tended to focus on the possible impacts of a changing environment on agriculture and the implications for global and regional food security. These two issues are likely to become especially important in making decisions not only about how to reduce the magnitude of human perturbations to the environment but also about how to improve both food security and environmental quality in the more crowded world of the future.

Keywords: *global environmental change, food security, stress, Global Food System, Hunger, food processing*

Past: The Origins of Agriculture

One explanation for this observation is that agriculture and related technological and social innovations may have emerged initially as a way to compensate for an declining resource base arising from population pressures, environmental fluctuations, or both. In a sense, such "stress" models of the origins of agriculture suggest that hunger and a changing environment may have helped motivate the development and adoption of agriculture.

The Present: the Global Food System, the Environment, and Hunger

Sometime after the Second World War, probably during the early 1960s, humanity surpassed what may have been an unprecedented threshold. It collectively produced enough food calories for the world's population, assuming that all calories were distributed evenly and utilized directly by humans, although during 1987 and 1988 it decreased to less than 10 percent above aggregate requirements in part because of

weather-related production shortfalls in North America and continuing rapid population growth around the world.

Influence of the Global Food System on the Global Environment

The food system may influence the global environment in a variety of ways. The direct impacts of agriculture on the environment include modification of land for agricultural purposes and byproducts of production such as methane released by rice paddies and livestock. Activities such as food processing, distribution, and preparation use fossil fuels, fuel wood, refrigerants, and other inputs and generate wastes. Indirect impacts include the effects of energy, materials, and pollution entailed in constructing and maintaining equipment, transportation and storage facilities, and other infrastructure used in food production, fisheries, and related activities, and in supporting the populations involved in them

Land Use and Conversion

The potential environmental impacts of cropland depend largely on (a) the type of crop production, and (b) the land use that crop production replaces. Net changes in Aledo are associated with crop production are probably modest on the global scale, in part because snow-free land constitutes only about one-fourth of earth's total surface area.

Livestock Production

Animals constitute a second major source of CH₄ emissions, which result from microbial breakdown of cellulose and other carbohydrates in their digestive tracts. Cattle in developed countries and Argentina and Brazil produce an estimated 55 kilograms of CH₄ per head per year. Cattle in other developing countries are thought to produce less, about 35 kilograms per year, because of lower feed intakes despite poor feed quality.

Water Use

Agriculture is; the largest single consumer of fresh water, although its share of total use has declined significantly during the past century and is expected to continue to decline through the year 2000. On a global basis, the water withdrawals for all purposes constitute less than one tenth of total river runoff, and consumptive uses only one twentieth of this total. Withdrawal rates are much higher in some river basins, leading to significant regional-scale impacts on water level and quality in rivers, lakes, and enclosed seas such as the Aral.

The Future

More Crowded, Less Hungry, and Environmentally Livable?

Providing adequate nutrition for this larger population will require at least a comparable increase in *effective* food availability and probably a much higher increase to allow for unequal distribution and better diets. Key issues are (a) whether existing production can be used efficiently, (b) whether production can be increased

without increasing impacts on the global environment, and (c) whether the global food system can adapt to any environmental changes that do occur. Although firm conclusions about any of these issues are not yet possible, a brief discussion of each of them is instructive.

Can Existing Production be More Efficiently Used?

The present global food system entails a high degree of the waste potentially usable food products. Estimates of "postharvest" losses that is, losses between harvest and delivery of food at the retail level range from 10 to 30 percent or more. The expansion of rangeland for livestock production is also likely to have high levels of impact, especially to the extent that tropical forests are replaced and overgrazing occurs, contributing to land degradation, soil erosion, and desertification. Increased livestock numbers may increase by methane emissions, unless new breeds of animals with lower emission rates are introduced.

Can the Global Food System Adapt to Environmental Change

Even more poorly understood are the many complex links and feedbacks that are likely to exist between (a) food system activities that contribute significantly to environmental change, (b) food system activities that would be directly or indirectly affected by environmental change, (c) impacts in related activities such as energy production and transportation, and (d) actions taken to reduce or modify the effects of these activities.

Conclusion

Thus, it is clear that the problem of providing more food to more people during the next several decades is greatly complicated by the threat of global environmental change. Measures to prevent such change or to improve adaptive capabilities could conceivably have effects on the global food system as profound as some of the expected effects of global environmental change itself.

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