Land Resources: On the Edge of the Malthusian Precipice?

Two hundred years after Thomas Malthus published his essay predicting that population growth would inevitably outstrip food production, world population is within months of surpassing 6 billion. Was Malthus wrong or just off on his timing? The debate still rages, quite often in the form of political or religious tirades in which facts are irrelevant.

The book begins with a thorough overview of world demographic factors influencing rates of population increase. The authors clearly explain why demographic momentum ensures that, despite recent declines in fertility rates, an increase in global population to 9.4 billion or more by the year 2050 is virtually guaranteed. Equally important, the global distribution of population, land, and other agricultural resources is not even. Regions with the greatest current and future imbalances—Africa and western- and south-central Asia—will face particular difficulties and are unlikely to achieve food self-sufficiency.

Regional differences is a theme maintained throughout the book as the contributors address the primary factors controlling agricultural production including soil resources, water and nutrient availability, and the infrastructure required to support a productive agriculture. An overview of ecological differences among regions and the use of a regional framework for analysis and policy decisions is provided by Sivakumar and Valentin. In their own regional analysis, Penning de Vries and others estimate potential food production and illustrate the wide disparities in potential food security among regions. The authors recognize that dietary aspirations (e.g., vegetarian vs. meat based) and differing attitudes regarding the proper use of land will have a major impact on demands for food and the ability of land to meet that demand. They address this complexity by offering different scenarios that illustrate a range of potential futures.

Water is the main limiting factor to agricultural production in many regions. Malin Falkenmark concludes that by the year 2025, more than half of the world’s population may live in regions where water scarcity precludes food self-sufficiency. Improvements in the water use efficiency of agriculture can help, but water-deficit regions will require food imports.

For the major crops, production per acre has increased dramatically during the last several decades, and optimistic projections of future food supply rely on continuing increases. L.T. Evans provides a summary of the role that crop improvement has played in this increase, and an analysis of the potential for additional gains. His conclusion is cautious: “We should recognize that the surge in cereal yields over the last 50 years, which still has some way to run, has come from what may prove to have been a unique conjunction of agronomic and plant breeding advances which may not be repeated. Further increase in the harvest index will be limited and, so far, the maximum rates of photosynthesis and crop growth have not been improved genetically.”

This sense of caution pervades the book, partly because the contributors recognize that many social and economic factors can block the attainment of maximum potential agricultural production. Edward Barbier focuses on this issue as he examines the link between poverty and land degradation. Others make only limited reference to this issue in their conclusions, for instance “it should be understood that solutions are not always technical in nature, but are also founded on social, cultural and economic considerations.” The book’s focus, though, is on agriculture, and I would characterize most of the contributors as believing that future generations will probably have adequate food, but with regional disparities and little margin for error.

The editors reflect this view when they conclude “If all resources are harnessed, and adequate measures taken to minimize soil degradation, sufficient food to feed the population in 2020 can be produced, and probably sufficient for a few billion more.” Of course, these premises constitute a very big if. A look around the world at the economic and social turmoil in Russia, West and Central Africa, Iraq, Afghanistan, Indonesia, etc. shows some of the barriers to attaining maximum potential production. Floods, droughts, and other environmental perturbations are also wild cards in predicting food production. I was surprised that global climate change receives little mention in this book, nor does the future availability of fossil fuels and other energy sources for agriculture.

The contributors focus on the less developed countries because that is where most of the population increases are projected to occur. However, this could be an important oversight. The U.S. population is increasing by 2.4 million or more annually, and could nearly double by the year 2050. Under such a scenario, the USA could become a net food importer, a change that would have important implications for global food security.

Overall, the 14 papers in this book provide an objective analysis of future global food demand and the potential to meet that demand. Transcripts of the discussions that followed each presentation give a sense of the many unanswered questions. There are no definitive conclusions here, but plenty of information with which readers can start to form their own conclusions.

Richard K. Olson
Center for Sustainable Agricultural Systems
University of Nebraska
Lincoln, NE 68583-0949
(csas005@unlvm.unl.edu)