

CULTIVATED CAPITAL: AGRICULTURE, FOOD SYSTEMS, AND SUSTAINABLE DEVELOPMENT

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Summary

Cultivated capital lies at the heart of concerns about sustainable development for three reasons: First, sustaining agricultural productivity is essential to meeting the world's still growing demand for food. Without adequate food consumption, nutrition and labor productivity are impaired, which in turn limits the pace of economic growth and poverty alleviation. Second, removing poverty requires income growth among the rural poor, many of whom continue to rely on agriculture-based economic systems that generate not just food but also income, fuel, employment, services, and demand for non-food inputs. Third, removing rural food insecurity is a prerequisite to sustaining natural ecosystems since it is the poor who are forced to overexploit local resources to survive today, thereby compromising their chances of survival in the longer term. This article explores these interactions among ecology, agriculture, and food security with a focus on least developed countries.

1. Introduction

For most of human history improving agricultural output was acknowledged as the main counterbalance to hunger. As populations grew, technological change in farming allowed for higher output from each unit of land per given unit of labor. Such productivity growth underpinned early occupational specialization and urbanization, and

over time agriculture came to be accepted not only as the provider of food but also as an engine of broader economic growth.

While increased food supplies never fully succeeded in eradicating hunger, sufficient food was produced by the end of the twentieth century to meet minimum requirements for all inhabitants of the earth—if appropriately redistributed. However, from the 1990s onwards the social and environmental costs of productivity maximization came to be recognized as a potential threat to longer-term sustainability goals. High-input/high-output agriculture was widely condemned as compromising the environment and poor people's lives through over reliance on chemicals and biotechnology, and by its displacement of traditional biomes (major regional ecological communities) and methods. Farming had come full circle and was increasingly seen as part of the problem of hunger, no longer the solution.

This article asks whether concerns for ecological sustainability and mounting food and income demands can ever be met simultaneously in the twenty-first century? The answer lies in resolving potential competition between public (social) and private (individual) priorities. What may be a rational and appropriate choice of food or environmental policies and systems at the national or global level may have very negative consequences at the local level. Conversely, individually rational decisions among farm households may not (in the aggregate) lead to socially or environmentally optimal consequences. In fact, human and ecological vulnerability are inseparable in most of the world's food-insecure regions; neither can be adequately resolved without the other, and few solutions can be sustained without enhancing agricultural productivity among the poor.

The following (second) section of this article establishes a conceptual framework that links food systems to economic and environmental sustainability concerns. The third section examines food supply and demand projections along with arguments that productivity gains have come at the expense of the poor. A fourth section describes latent and actual problems with high input agricultural systems, especially where environmental degradation is concerned. The final section (before the conclusions) explores the potential for food systems adapted to meet food and environmental concerns simultaneously in future decades.

2. Critical Links between Food Insecurity, Poverty, and the Environment

2.1. Concepts and Linkages

All agriculture involves a conscious modification of the natural environment with a view to establishing optimal conditions for selected plant and animal growth. Such modifications can enhance or erode the resource base but neither outcome is predetermined. The effects of cultivation on natural capital depend on a host of factors that include environmental conditions, prevailing economic incentives (policies and prior investment choices), and local cultural norms.

Highly valued cultivated capital can often be sustained only if human, economic, and natural resource systems are managed in mutually supportive ways. Low agricultural productivity is associated with low labor productivity, which is at least partly derived

from impaired food consumption, poor health and nutrition, and limited human capital investments—and all of these are linked to both poverty and environmental degradation. Poverty reduction in most rural locations requires a vibrant agricultural economy that allows for enhanced food consumption as well as sales and services promoting multiplier growth outside of the food production sector. Similarly, degrading soils, loss of tree cover, and depleted water resources can all contribute to poverty and human suffering by depressing agricultural output and human well-being.

The concept of “household food security” captures these interactions, highlighting the ways in which cultivated capital is central to both problem analysis and a search for operational solutions (Figure 1). Food security is today defined as the access by all people, at all times, to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. This definition incorporates four key concepts: i) food availability, ii) food access, iii) food usage, and iv) risk factors that can disrupt any or all of the first three.

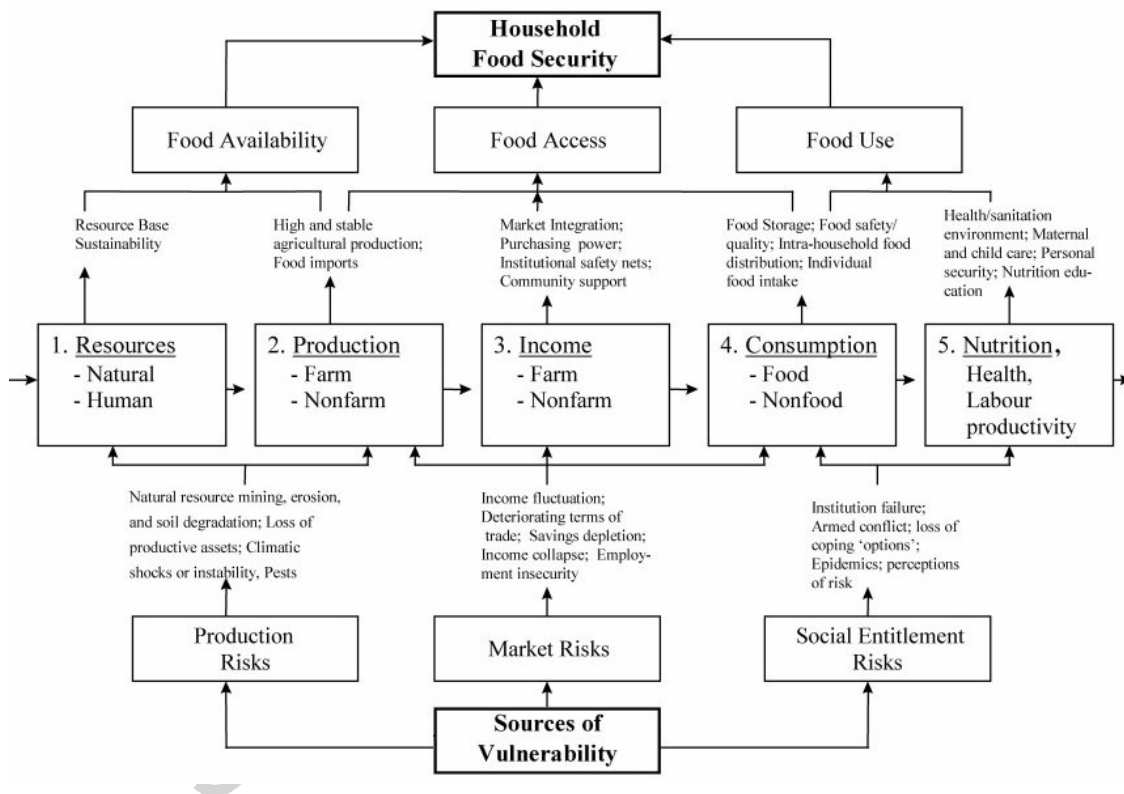


Figure 1. A framework for understanding food insecurity links to agriculture and the environment

Food availability (or aggregate supply) derives from agricultural production (cash crops, livestock, fishing, and forestry as well as food cultivation), ideally by means of a sustainable use of natural resources. The availability of food is a function of domestic production enhanced by net food trade (commercial imports and food aid minus exports, processing and losses). *Food access* refers to the ability of households to secure food in the marketplace. Household purchasing power is critical to food access and this varies

in relation to market integration, price policies, and temporal market conditions. *Food usage* incorporates issues of food safety and quality, sufficiency of required intake at the level of each individual (food management within households), and the conversion efficiency of energy and nutrients by the body according to health, nutrition, and care factors. The “use” factor also allows for less material considerations such as cultural norms and the quasi-spiritual nature of food items in some societies (such as rice in Japan, whale meat among Inuit peoples of Canada, natural salt in India, or *khat* in Somalia).

The fourth element of the definition (*risk*) is crucial to the term “security.” Without reasonable expectation of availability, access, and usage, a household becomes food insecure and often resorts to “resource mining”—seeking to gain additional marginal productivity gains from a given resource base in ways that may in the long run compromise sustainability. Resource mining can mean the cutting of trees for fuel or charcoal production, depletion of aquifers, soil fertility decline through over seeding, or the hunting of endangered species (such as large apes or elephants for food or poaching income). Such predatory activities not only reduce future productivity but may also in themselves compromise biotic integrity of the wider ecological system. That said, the pursuit of unsustainable activities may appear to be economically rational to individuals facing immediate unmet food needs or perceived risks to their food system.

Risks can arise in many quarters. Food supply can be affected by climatic fluctuations, soil fertility depletion, or the loss of a household’s productive assets (via forced sales or losses during war). Market access can be impaired by eroding global terms of trade, market disruption during financial crises, or non-farm income insecurity (the loss of non-agricultural income sources). Food use can be negatively influenced by diseases, physical insecurity (conflict), loss of coping options (such as border closure preventing seasonal job migration), or the collapse of safety-net institutions that once protected people on low incomes. It should also be pointed out that food safety risks are closely associated with evolving technologies based on high levels of chemical inputs, difficulties in the disposal of waste by-products (including slurry), and biotechnology.

Producer and consumer households facing risks are disinclined to make long-term investments in the productive base. This is where competition may arise between public and private priorities. Some smallholders achieve food security on relatively infertile, even degrading, soils when their income sources and assets are diversified and protected from dependence on unreliable rainfall.

For other households, investment in land productivity may represent a viable option towards both short- and medium-term food security where, for example, a market exists for products of intensive agriculture, such as some cash crops. The constraints, incentives, and solutions are site and time specific. The state and nature of environmental degradation depend on how many people in a given locality perceive the risks or benefits of investing in improved resource management. That in turn depends on prevailing economic, social, and cultural incentives that affect potential returns; it also depends on trends in production and the overall availability of food for those who need it most.

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Biographical Sketch

Patrick Webb is director of the Food Policy and Applied Nutrition Program of the Friedman School of Nutrition Science and Policy, Tufts University. Professor Webb teaches graduate courses in food security, risk and vulnerability analysis, and public policy. His research focuses on the determinants of malnutrition, water security, methodological issues in famine vulnerability mapping, and household income diversification. During the mid 1990s, Professor Webb served as a senior policy analyst for the United Nations' World Food Programme (WFP). Before joining WFP, he spent nine years in applied policy research at the International Food Policy Research Institute, headquartered in Washington, D.C. He has worked in 20 countries across Africa and Asia. His book *Famine in Africa* (published by Johns Hopkins University Press in 1999) sold out of its first edition and went into a second run. His latest book (an edited volume) is entitled *Women Farmers: Enhancing Rights, Recognition and Productivity* and was published in 2001 by Lang Verlag, Frankfurt.

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