FOOD FOR THE FUTURE: DEVELOPING STRATEGIES FOR SUSTAINABILITY

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Summary

Something is wrong with our agricultural and food systems. Despite great progress in increasing productivity in the last century, hundreds of millions of people remain hungry and malnourished. Further hundreds of millions eat too much, or the wrong sorts of food, and it is making them ill. The health of the environment suffers too, as degradation seems to accompany many of the agricultural systems we have evolved in recent years. Can nothing be done, or is it time for the expansion of another sort of agriculture, founded more on ecological principles, and more in harmony with people, their societies and cultures?

Humans have been farming for some 600 generations, and for most of that time the production and consumption of food has been intimately connected to cultural and social systems. Yet over just the last two or three generations, we have developed hugely successful agricultural systems based largely on industrial principles. These certainly produce more food per hectare and per worker than ever before, but only look efficient if the harmful side-effects are ignored—the loss of soils, the damage to biodiversity, the pollution of water, the harm to human health. This chapter addresses the extent to which sustainable agricultural systems can be developed without compromising the need to produce enough food. Agricultural sustainability offers some new opportunities by emphasising the productive values of natural, social and human capital, all assets that can be regenerated at relatively low financial cost. National policies, though, remain largely unhelpful to these principles.

1. Introduction

Something is wrong with our agricultural and food systems. Despite great progress in increasing productivity in the last century, hundreds of millions of people remain hungry and malnourished. Further hundreds of millions eat too much, or the wrong sorts of food, and it is making them ill. The health of the environment suffers too, as degradation seems to accompany many of the agricultural systems we have evolved in recent years. Can nothing be done, or is it time for the expansion of another sort of agriculture, founded more on ecological principles, and in harmony with people, their societies and cultures?

In the earliest surviving texts on European farming, agriculture was interpreted as two connected things, *agri* and *cultura*, and food was seen as a vital part of the cultures and communities that produced it. Today, however, our experience with industrial farming dominates, with food now seen simply as a commodity, and farming often organised along factory lines. To what extent can we put the culture back into agri-culture without compromising the need to produce enough food? Can we create sustainable systems of farming that are efficient and fair and founded on a detailed understanding of the benefits of agroecology and people's capacity to cooperate?

As we advance into the early years of the twenty-first century, we have some critical choices. Humans have been farming for some 600 generations, and for most of that time the production and consumption of food has been intimately connected to cultural and social systems. Yet over just the last two or three generations, we have developed hugely successful agricultural systems based largely on industrial principles. They certainly produce more food per hectare and per worker than ever before, but only look so efficient if we ignore the harmful side-effects—the loss of soils, the damage to biodiversity, the pollution of water, the harm to human health.

2. Persistent and New World Food Problems

But why should this idea of putting nature and culture back into agriculture matter? Surely we already know how to increase food production? In developing countries, there have been startling increases in food production since the beginning of the 1960s, a short way into the most recent agricultural revolution in industrialised countries, and just prior to the Green Revolution in developing countries. Since then, total world food production grew by 145% per cent. In Africa, it is up by 140%, in Latin America by almost 200%, and in Asia by a remarkable 280%. The greatest increases have been in China—an extraordinary five-fold increase, mostly occurring in the 1980s and 1990s. In the industrialised regions, production started from a higher base, yet in the USA, it still doubled over forty years, and in Western Europe grew by 68%.

Over the same period, world population has grown from three to six billion (up from 3 billion in 1960; 3.69 billion in 1970; 4.44 billion in 1980; and 5.27 billion in 1990). Again, though, per capita agricultural production has outpaced population growth. Each person today has an extra 25% more food than people in 1961. These aggregate figures, though, hide important differences between regions. In Asia and Latin America, per capita food production has stayed ahead, increasing by 76% and 28% respectively.

Africa, though, has fared badly, with food production per person 10% less today than in 1961. China, again, performs best, with a trebling of food production per person over the same period. Industrialised countries have seen a 40% increase in food production per person.

Yet these advances in aggregate productivity have only brought limited reductions in incidence of hunger. At the turn of the twenty-first century, there were nearly 800 million people hungry and lacking adequate access to food—an astonishing 18% of all people in developing countries. Nonetheless, there has been progress to celebrate, as incidence of under-nourishment stood at 970 million in 1970, comprising a third of people in developing countries at the time. Since then, average per capita consumption of food has increased by 17% to 2760 kilocalories per day—good as an average, but still hiding a great many people surviving on less: 33 countries, mostly in Sub-Saharan Africa still have per capita food consumption under 2200 kcal per day.

There is also significant food poverty in industrialised countries. In the USA, the largest producer and exporter of food in the world, 11 million people are food insecure and hungry, and a further 23 million are hovering close to the edge of hunger—their food supply is uncertain but they are not permanently hungry. A further sign that something is wrong is that one in seven people in industrialised countries are now clinically obese, and that five of the ten leading causes of death are diet-related—coronary heart disease, some cancers, stroke, diabetes mellitus, and arteriosclerosis. Alarmingly, the obese are outnumbering the thin in some developing countries, such as Brazil, Chile, Colombia, Costa Rica, Cuba, Mexico, Peru and Tunisia.

Despite great progress, things will probably get worse for many people before they get better. As total population continues to increase, until at least the mid twenty-first century, so the absolute demand for food will also increase. Increasing incomes will mean people will have more purchasing power, and this will increase demand for food. But as our diets change, so demand for the types of food will also shift radically. In particular, increasing urbanisation means people are more likely to adopt new diets, particularly consuming more meat and fewer traditional cereals and other foods—what Barry Popkin calls the nutrition transition.

One of the most important changes in the world food system will come from an increase in consumption of livestock products. Meat demand is expected to rise rapidly, and this will change many farming systems. Livestock are important in mixed production systems, using foods and by-products that would not have been consumed by humans. But increasingly farmers are finding it easier to raise animals intensively, and feed them with cheap though energetically-inefficient cereals and oils. Currently, per capita annual food demand in industrialised countries is 550 kg of cereal and 78 kg of meat. By contrast, in developing countries it is only 260 kg of cereal and 30 kg of meat. These food consumption disparities between people in industrialised and developing countries are expected to persist.

3. The Development of Ideas about Agricultural Sustainability

All commentators agree that food production will have to increase substantially in the

coming years. But there are very different views about how best this should be achieved:

- Some say agriculture will have to expand into new lands—but this will mean further losses of biodiversity.
- Others say food production growth must come through redoubled efforts to repeat the approaches of the Green Revolution.
- Others still say that agricultural sustainability offers options for farmers to intensify their land use and increase food production.

But solving the persistent hunger problem is not simply a matter of developing new agricultural technologies and practices. Most poor producers cannot afford expensive technologies. They will have to find new types of solutions based on locally-available and/or cheap technologies combined with making the best of natural, social and human resources.

Intensification using natural, social and human capital assets, combined with the use of best available technologies and inputs (best genotypes and best ecological management) that minimise or eliminate harm to the environment, can be termed 'sustainable intensification'. Although farmers throughout history have used a wide range of technologies and practices we would today call sustainable, it is only in recent decades that the concepts associated with sustainability have come into more common use.

Concerns began to develop in the 1960s, and were particularly driven by Rachel Carson's book *Silent Spring*. Like other popular and scientific studies at the time, it focused on the environmental harm caused by agriculture. In the 1970s, the Club of Rome identified the economic problems that societies would face when environmental resources were overused, depleted or harmed, and pointed towards the need for different types of policies to generate economic growth.

In the 1980s, the World Commission on Environment and Development, chaired by Gro Harlem Brundtland, published *Our Common Future*, the first serious attempt to link poverty alleviation to natural resource management and the state of the environment. Sustainable development was defined as *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"*. The concept implied both limits to growth and the idea of different patterns of growth (WCED, 1987).

In 1992, the UN Conference on Environment and Development was held in Rio de Janeiro. The main agreement was Agenda 21, a 41 chapter document setting out priorities and practices in all economic and social sectors, and how these should relate to the environment. Chapter 14 addressed Sustainable Agriculture and Rural Development (SARD). The principles of sustainable forms of agriculture that encouraged minimizing harm to the environment and human health were agreed. However, progress has not been good, as Agenda 21 was not a binding treaty on national governments, and all are free to choose whether they adopt or ignore such principles.

The "Rio Summit" was followed by several important actions that came to affect agriculture:

- The signing of the Convention on Biodiversity in 1995.
- The establishment of the UN Global IPM Facility in 1995, which provides international guidance and technical assistance for integrated pest management.
- The signing of the Stockholm Convention on Persistent Organic Pollutants in 2001, so addressing some problematic pesticides.
- The ten years after Rio World Summit on Sustainable Development held in Johannesburg.

The concept of agricultural sustainability has grown from an initial focus on environmental aspects to include first economic and then broader social and political dimensions:

- *Ecological* – the core concerns are to reduce negative environmental and health externalities, to enhance and use local ecosystem resources, and preserve biodiversity. More recent concerns include broader recognition for positive environmental externalities from agriculture (including carbon capture in soils and flood protection).
- *Economic* – economic perspectives seek to assign value to ecological assets, and also to include a longer time frame in economic analysis. They also highlight subsidies that promote the depletion of resources or unfair competition with other production systems.
- *Social and political* – there are many concerns about the equity of technological change. At the local level, agricultural sustainability is associated with farmer participation, group action and promotion of local institutions, culture and farming communities. At the higher level, the concern is for enabling policies that target poverty reduction.

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Biographical Sketch

Jules Pretty is Professor of Environment and Society and Head of the Department of Biological Sciences at the University of Essex. He has published widely, and his books include *Agri-Culture: Reconnecting People, Land and Nature* (2002), *Guide to a Green Planet* (edited, 2002), *`The Living Land: Agriculture, Food and Community Regeneration in Rural Europe'* (1998*), `Regenerating Agriculture: Policies and Practice for Sustainability and Self-Reliance'* (1995), *`Fertile Ground: The Impacts of Participatory Watershed Management* (1999, co-authored), *`The Trainers Guide for Participatory Learning and Action'* (1995, co-authored); *`The Hidden Harvest—Wild Foods and Agricultural Systems'* (1992, co-authored); and *`Unwelcome Harvest: Agriculture and Pollution'* (1991, co-authored).

He is Deputy-Chair of the UK government's Advisory Committee on Releases to the Environment (ACRE), and served on government advisory committees for DEFRA, DFID, the Cabinet Office and DTI. He is a regular speaker and contributor to media—presenter of the 1999 BBC Radio 4 series *Ploughing Eden* and contributor and writer for the 2001 BBC TV Correspondent programme *The Magic Bean*. He received a 1997 award from the Indian Ecological Society for "International Contributions to Sustainable and Ecological Agriculture", and was runner-up for the 2002 European Sicco Mansholt Prize for agricultural science. He was appointed A.D. White Professor-at-Large by Cornell University for six years from 2001. He was appointed to the International Jury for the Slow Food Award in 2002; he is Chief Editor of the *International Journal of Agricultural Sustainability*, and is a Fellow of the Institute of Biology and the Royal Society for Arts.