

REVIEW

Food and thriving people: paradigm shifts for fair and sustainable food systems

Geoff Tansey^{1,2}¹Department of Peace Studies, University of Bradford, Bradford, West Yorkshire, BD7 1DP, UK²Centre for Rural Economy, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK**Keywords**

Food security, innovation, malnutrition, paradigms, sustainability

Correspondence

Geoff Tansey, Department of Peace Studies, University of Bradford, Bradford, West Yorkshire, BD7 1DP, UK. Tel: 01422 842752; Fax: 01274 235240; E-mail: geoff@tansey.org.uk

Funding Information

No funding information provided.

Received: 4 January 2013; Revised: 1 February 2013; Accepted: 9 April 2013

Food and Energy Security 2013; 2(1): 1–11

doi: 10.1002/fes3.22

Abstract

This article looks beyond the physical sciences to address the problems of hunger, malnutrition, and environmental degradation. It discusses the challenges and problems with global food security and where and why paradigm shifts are needed to meet those challenges in a fair and sustainable way. It discusses food's role as a satisfier of human need, the importance of history in aiding the understanding of contemporary challenges and the fundamental changes needed to achieve the goal of fair and sustainable food systems.

Introduction

This article¹ looks beyond the physical sciences to understand the problems of hunger, malnutrition, and environmental degradation. The justification for this is that in addition to the physical, chemical, and biological systems, which allow and maintain food production, there are two other fundamentals for our consideration.

(1) One is the recognition that what we see today in our food systems has a history and that things could be different. The challenge here is to learn from that history.

(2) The other is that food plays a key part in satisfying basic human needs. However, those needs are complex and multifaceted. They include the physiological, psychological, social, and cultural – and so take us into the realms of economics, power, and politics.

I argue here that we need a range of paradigm shifts – of thinking of things differently – across all three areas to meet the challenges of creating a world in which everyone is well fed in fair and sustainable food systems.

To produce research strategies and technologies “to sustainably enhance productivity and resource use efficiency in such a way that adoption of research outcomes can be expected to impact the resulting societal interactions in ways that benefit people, planet, and profit”,² means thinking carefully about those words and their implications. Such aims may also require changes in the ways in which we do research and the questions being asked in research.

It is possible that if we did no more crop science research beyond that needed to maintain current yields in the face of the evolution of pests and diseases, but

(a) exploited the understanding of a whole range of sciences – from crop to soils to agronomy, to entomology and many more – that we already have (linked to and working with small-holder farmers), and

(b) structured economic and legal incentives so that farmers were encouraged to produce more, then a great deal more food could be produced, a vast amount of waste could be avoided, and nine billion people could be fed adequately. That, of course, is also pro-

vided that in those parts of the world which have not yet done so, people do not adopt the highly processed, high fat, sugar, meat, and dairy diets that have developed in the relatively recent past and which are so closely linked to unhealthy outcomes for the human population. Changing dietary habits in many richer societies would also contribute more generally to a fair and equitable food system.

Here, I look briefly at the challenges and problems with global food security and where and why we need paradigm shifts if we are to meet those challenges in a fair and sustainable way. The basis of my thesis is as follows:

(i) There is no shortage of food or capacity to *physically* produce enough food to feed adequately the current and foreseeable population *globally*.

However, we do not live globally. There are huge problems with the following:

- food insecurity, hunger, and malnutrition: This happens at an individual, household, and community level within nation states and is closely linked to the distribution of wealth, poverty, and powerlessness.
- what societies choose to use land for, who has access to it, and the relative priorities among its use for food, feed, fiber, and fuel.
- the long-term viability of the relatively recently developed industrial production systems and dietary trends that have adverse impacts upon human health, biodiversity, soils, and fresh water.
- sharing knowledge, best practices and technologies, and ensuring fair returns to labor.

(ii) Contemporary western, especially American, dietary patterns – built around *diets* high in fast and processed foods, containing high levels of sugar, salt, fat, meat, and dairy products – should be avoided by other countries and need to change where they are presently the norm.

(iii) The historical and current socioeconomic structures, cultural changes, and incentive systems have driven *much* innovation in farming practices, consumption patterns, and research priorities in a mistaken direction for decades and need changing to achieve the core goal of fair, healthy, sustainable food systems for all.

Paradigm Changes

In the Food Security/Sustainability literature, statements are frequently found like “Feeding everyone well is a primary challenge for this century. Overeating, undernourishment and waste are all on the rise and increased food production may face future constraints from water scarcity. We will need a new recipe to feed the world in the future.” (Report for World Water week, Stockholm 2012

[Jägerskog and Jønch Clausen 2012]). The need for fundamental change and going beyond business as usual has also been the refrain from a wide range of recent reports on the future of food and farming (e.g., International Assessment of Agricultural Knowledge, Science and Technology for Development 2009, the French Agrimonde study [Paillard et al. 2011], and the UK Foresight report [2011] on Food and Farming).

A New Definition of Food Security?

I argue here and elsewhere³ that to meet the goal of eradicating food insecurity, hunger, and malnutrition, more is needed than just changing our approach to farming from an industrial model to one based on agro-ecology linked to nutritional needs. The goal of linking food security and nutritional need is the one highlighted in a recent consultation document of the UN Committee on Food Security called “Coming to terms with terminology”.⁴ There are over 200 definitions of food security in the literature and a long history of shifts in thinking. At its meeting in Rome in October 2012, the Committee considered, but did not agree on, a new definition for food security:

“food and nutrition security exists when all people at all times have physical social and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services, and care, allowing for a healthy and active life.”

While this could be seen as an improvement on earlier definitions – if it does not lead to a narrow focus on nutrients, but includes the sociocultural and economic influences on dietary patterns – it still does not overcome key flaws highlighted with earlier definitions. These include environmentalists’ objections that this pays no attention to the way our food is produced,⁵ while the food sovereignty movement in particular argues that it ignores the issues of power, distribution, equity, and control.⁶ Many definitions also miss out the dimension of living in fear of going hungry (Maxwell 1996).

Or Moving Beyond Food Security Thinking?

We need to question whether thinking in terms of something labeled “food security” is enough to ensure a well-fed world.⁷ The term “food security” is often linked to a national or regional security way of thinking which is inadequate to meet the global challenges we face. The four key challenges are (e.g., Abbott et al. [2007]):

(1) **Climate destabilization:** This is a result of the unintended consequences of technological developments since the late 18th century, based on the replacement of human and animal power with fossil fuel-based power systems. It is also based on an economics that took no account of the environmental costs of resource depletion, and had a linear view of production processes. Continued fossil fuel use will increase the difficulties societies face in dealing with climate destabilization and its impact upon growing seasons, sea levels, extreme weather events, and migration.

(2) **Marginalization of the poorest people:** Inequality has been growing, in most countries, in the past 30 years, just as the capacity of people everywhere to see what is happening in other parts of the world, of the poor to see how the rich live, has never been greater (Jolly 2010). The disparity in wealth between the richest parts of the world and the poorest is unsustainable. A decade ago, only 10% of the world's adults owned approximately 86% of the world's household assets and 50% of the world adults owned barely 1%. Since this time, too little has changed (Davies et al. 2006).

(3) **Competition over resources such as land, water, minerals, food, and energy:** Most economic models are based on continuing consumption growth and use deeply flawed indicators of progress, such as GNP. How societies and nations deal with this will determine in large measure whether there is a repeat of the kind of conflicts seen before. Conflicts – both historically and contemporarily – bring huge food insecurity problems with them. The International Food Policy Research Institute (IFPRI) found that “between 1970 and 1990 violent conflicts led to hunger and reduced food production and economic growth in 43 developing countries” (Messier et al. 1998).

(4) **Continuing high levels of militarization:** The devotion of so much human creativity, material resources and money, and research and development into preparing better means of death and destruction is deeply unwise, wasteful, and exacerbates rather than contributes to solving the above challenges. Also, given the global interconnectedness of these challenges, the old national security approaches upon which this activity is based fail to recognize that the true challenges for future human security require a different approach than imagining that peace and security can be secured through military means. Today's scientific and technological developments also attract military interest and funding. For example, the US Department of Defense announced early in 2011 that, of its \$12 billion R&D budget for 2012, it will spend just over \$2 billion on synthetic biology, modeling human behavior, engineered materials, cognitive neuroscience, quantum materials, and nano-science engineering.⁸ A more promising approach would be to look at what will deliver sustainable security for human beings on this planet, including the way we make provision for

our food and water, and the range of innovation needed to ensure that everyone can be well fed. This requires interdisciplinary, multicentered research that involves both natural and social scientists.

Moving on From Technological Innovation and 20th Century Thinking

Today's challenges require social and economic, not just technological, innovation to avoid the horrendous conflicts for which there is a great potential. We seem to be in a period in the early 2010s that is rather similar to the early 1910s. A whole range of new technologies are on the horizon which may make many old business models obsolete. We also see enormous geopolitical changes in the landscape of power and control over land and resources in the world as well as in international institutions.

Clearly, there will be dramatic change this century. But just what that will be is far from clear. Few in the 1910s would have predicted what would have happened by 1950 – two world wars, an epidemic of flu after the first World War that killed more than the war itself, the creation of the USSR, a massive depression and the development of weapons of mass destruction, capable of rendering large parts of the planet uninhabitable. Yet, with hindsight, we can see that the old empires were fading at the beginning of the 20th century, that the technologies likely to be developed and deployed were already in the early stages of development, and that the way governments responded to events was very likely to lead to conflict. So, I am a little suspicious of projections to 2050 based on rationalist models with limited information. I think the projections are easier to make in terms of the physical Earth system, and how the environment will respond to changing energy inputs linked to greenhouse gas levels in the atmosphere than we are in saying how our social and political entities will cope with future stresses and strains. To get safely through the next 40 years requires us to think and act differently.

Refocusing Scientific Efforts

The probable failure to limit global average temperature rise to 2°C, with current projections of probably 4°C and possibly 6°C rises, will cause a degree of disruption to normal weather patterns, trading patterns, habitation patterns, and food production that has barely sunk in. It will be a major challenge to maintain a healthy food system and avoid regional and global conflicts this century. The paradigm shift we need here is really fundamental. A photograph taken on the Apollo 8 moon mission shows the reality of our one planet, a blue and white shimmering pearl, hanging in the darkness of space. What that photo

shows is what we humans have got, whether we are British, Chinese, Indians, or whoever on this planet. It is a fiction to think we can go elsewhere, off this planet, to seek our salvation. The way we have managed our affairs in the first few millennia of humankind's existence in the historical period, and produced more and more terrible weapons, is not fit for purpose from now on. It is time to let go of out-dated concepts of security and national security doctrines. We should think of food, human and planetary well-being, and our capacity to thrive as global citizens grounded and based in diverse cultures and nations who must cooperate, not compete, together to survive. Not easy to do but completely necessary.

Part of a switch from militarization should see a re-focusing of the strategic and logistical skills developed by the military to tackle those other challenges. This includes organizing the capacity from local to global levels to deal with the inevitable fluctuations in harvests and increasing natural disasters that are likely.

Beyond Food Security to Food as a Satisfier of Human Needs

One reason I dislike the term food security, and similar terms like energy security, is because they pitch us into a way of thinking which sees national security in old-fashioned, destructive, and competitive ways.

By addressing the fundamental issues of equity, sustainability of the methods we use to provide the basic human requirements for food, water, shelter and the like, and cooperative mechanisms to deal with conflicts without resort to war, we are much more likely to get to the middle of this century peacefully. This is why we should not think about food security as a topic in and of itself but rather of the role food plays in meeting our human needs.

Here, I draw on the approach to human needs that the Chilean economist Max-Neef (1992) has taken. He argued that food is not a human need but rather a satisfier of the human need for subsistence, that is, the need to remain alive. He saw that human needs must be understood as a system:

“... that is, all human needs are interrelated and interactive. With the sole exception of the need of subsistence, that is, to remain alive, no hierarchies exist within the system. On the contrary, simultaneities, complementarities, and trade-offs are characteristics of the process of needs satisfaction....”

We have organised human needs into two categories... on the one hand, the needs of Being, Having, Doing and Interacting; and, on the other hand, the needs of Subsistence, Protection, Affection, Understanding, Participation, Creation, Leisure, Identity and Freedom.

...food and shelter must not be seen as needs, but are satisfiers of the fundamental need for Subsistence. In much the same way, education (either formal or informal), study, investigation, early stimulation and meditation as satisfying as the need for Understanding...

A satisfier may contribute simultaneously to the satisfaction of different needs, or conversely, a need may require various satisfiers in order to be met. Not even these relations are fixed. They may vary according to time, place and circumstance. For example, a mother breastfeeding her baby is simultaneously satisfying the infants needs for Subsistence, Protection, Affection and Identity....

...fundamental human needs are finite, few and classifiable; and... are the same in all cultures and in all historical periods. What changes both over time and through cultures, is the way or means by which the needs are satisfied... one of the aspects that define a culture is its choice of satisfiers. Whether a person belongs to a consumerist or to an ascetic society, his/her fundamental needs are the same... Furthermore, needs are satisfied within 3 contexts; (1) with regard to oneself... (2) with regard to the social group... and (3) with regard to the environment.”

Those concerned with food production have a particular interest in understanding the ways soils, water, plants, and animals work and interact. From the rice terraces of Yunnan to the terraces in Yemen, human creativity has been demonstrated all over the world through people's ability to manage environments over a long term and deliver sustenance to those societies through various forms of farming, herding, and fishing. People have also developed a huge range of cuisines and different means of cooking.

Subsistence and the other needs are satisfied by *being* healthy and adaptable; *having* food and shelter and work; *doing* things such as eating, procreating and resting, and *interacting* with the living environment and the social setting. It is why food is a very complex element in human societies with cultural, social, economic, and ritualistic as well as physical characteristics. It matters how and with what we seek to fulfill these needs. Focusing, for example, on short-term yield increases but using methods that are unsustainable in the long term undermines a society's ability to meet people's real needs. One of the fundamental criticisms of consumer capitalism is that it fails to satisfy a wide range of human needs and narrowly focuses life objectives on just having and is fundamentally unfulfilling. Drawing from this approach to human needs helps see why we need a broadly based research agenda encompassing social, economic, and cultural as well as physical aspects of food, and why simply producing more food is an insufficient criterion to contribute to human thriving.

History Matters

‘To be ignorant of the past is to be forever a child’, Cicero, 46BC⁹

It is important to understand the history that underpins the way food production, consumption patterns, and the drivers of the direction of innovation today came about. The spread of plants and animals from their places of origin clearly shows globalization at its earliest in human history. As human beings interacted across this planet, they took seeds and plants with them, they domesticated different kinds of animals, and took those with them. Civilizations developed beyond hunter gatherer tribes into kingdoms and principalities, the elites of which depended on the extraction of wealth from an agricultural base to support their activities, and which often then came into conflict over resources held by others. The central component in the shaping of the global food structure today is that of European expansionism and imperialism since the 15th century. European powers, largely through military force, but sometimes through economic pressure, re-structured the global production patterns and changed what was grown and for whom (Fraser and Rimas 2010).

The United Kingdom’s history is one of militaristic and imperial expansion. It sought income flows, sources of raw materials and cheap food to fuel its industrialization.¹⁰ It is a history where people in those times felt they had the right, and sometimes the moral superiority to go anywhere in the world and seek to extract from those places what they wanted. Initially, this was often by trade, including trade in drugs such as opium. When that trade was threatened, military action was often used to achieve these aims, often taking over the lands involved, as the unfortunate history of Anglo-Chinese relations in the 19th century illustrates (Bickers 2012).

History matters. It helps us understand how

- things could be different
- the context within which the questions scientists address arise and the types of technologies that are developed
- current apparently normal institutions and activities were shaped and created
- the future is not fixed
- we have opportunities to create a future that is different from where current trends appear to be taking us.

Those of us living today are not responsible for the actions of our ancestors, but we do live with their consequences and also the need to readjust now if we are to achieve a fairer and more equitable world.

Current Consumption Patterns and Drivers

So what has driven and still drives the global expansion of the food and farming systems of Europe and North America, particularly during the last half of the 20th century? The key crisis facing farming and the food system of the rich countries has been one of overproduction, saturated markets, and limited demand (OECD 1981). In the post Second World War trauma, there was a rapid push to increase production using more fossil fueled, industrial farming methods, and monocultures focusing on key commodity crops. Soon, far more food than was needed to feed the populations of Europe and North America was being produced and different mechanisms were used in these regions to deal with this. There was a consequent need to dump food surpluses on other countries, find new uses for them, and also to create new markets for key commodity crops like wheat, maize, and soya. At the same time, North American and European farming practices were promoted globally.

Food highlights the contradiction in current economic orthodoxy, which promotes continuing economic growth and increases in consumption. This is the antithesis of what our food needs are for our individual health and well-being. There is only so much food that people can eat. What we each need is *sufficient* of the right kind of food to sustain a healthy, active life. Companies in today’s business environment require growth to deliver returns for their owners and shareholders. Competitive pressures push food businesses to seek technological innovation, increased productivity, and diversification in new products and markets. In such a system, food businesses have to find ways of getting people to consume more. To this end, they have turned cheap food into expensive food – maize and soy into meat and dairy – and at the same time promoted increased consumption, with the help of science and technology, and brands, marketing, and advertising (Tansey and Worsley 1995).

Changing what we eat

Businesses have been highly successful in changing the consumption patterns and the quantities of food consumed, initially in the United States and then in Europe and, subsequently, globally. To do this, marketers drew on an understanding of human behavior to promote the desired consumption patterns of the industries providing such foodstuffs. One notable effect has been the progressive increase in the portion size being served in many restaurants. This began from the realization in the United States that customers would not go back for a second portion of a soft drink in its standard seven ounce size

bottle, but if you served it in cups and made the cups bigger they would be willing to consume twice as much. Since that time there has been a massive increase in the portion size not just for soft drinks but alcohol (from the one standard 125 ml glass to 175 and even 250 ml) as well as fast foods. Another push affecting consumption patterns has been to turn cheap plant commodities with which you could feed yourself well and relatively cheaply into more expensive products. Today, much meat and dairy can be seen as ‘value-added grains and pulses’. A second issue – important for human health – has been an increase in consumption of fast foods, especially fried foods, fats, and sugar-filled foods, and increased frequency of eating as grazing throughout the day has become more common.

These foods are appealing to humans. During our evolution, they were scarce, they required lots of work to get, and so were rarely available or expensive. We both have a taste for them and associate them with wealth and power. Yet, promoting greater consumption of sugary, fatty foods by pandering to particular tastes is highly damaging to the general health of the population. So much so that today ‘over two-thirds of adults in the United States are overweight or obese, and over one-third are obese’.¹¹ The same trend is developing in Europe and in many poorer countries. A wide range of health problems affiliated with this diet have become well documented, including diabetes, heart disease, and some cancers. Today, according to the World Health Organization (2012), “65% of the world’s population live in countries where overweight and obesity kills more people than underweight”. Moreover, the poor are often differentially impacted because food of this kind provides a source of cheap calories; this is reflected in growing inequalities and shorter life expectancies. However, accepting the idea that we have enough of particular material goods, and accepting limits to consumption of products including food, is not part of today’s conventional economic thinking. Historically, modern western, industrial diets (and lifestyles) are an aberration, and the huge range of cuisines and dietary patterns historically did not result in such hugely overweight populations.

Expanding From Saturated Markets

With markets in rich countries already saturated – literally with fat and the amount of food available – large corporate players throughout the food system have been seeking new markets to take their products to. One example is with milk. No one has to drink milk – whether from cows, sheep or goats – and the majority of the world’s population are lactose intolerant. Yet, many businesses – from the packaging and dairy equipment indus-

tries to the cattle breeders and major food production companies – want to sell consumption of milk and milk products everywhere as some kind of norm. It is more profitable than selling plant-based diets in markets not yet used to consuming milk and milk products.

What the marketers are really good at is understanding the cultural aspects of food consumption, the aspirations, and drivers that underpin human activity and desires which can be channeled to consumption of specific products *as if* they would meet a human need. In fact, they meet a corporate need to expand markets, control their markets as far as possible, and prevent competition for other things that would take the place of their products in meeting real human needs. Hastings (2012) argues that the marketing campaigns of multinational corporations are harming our physical, mental, and collective well-being and undermining human health – and health, as defined by the World Health Organization (WHO), is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”. From 1995 to 2009, total advertising spend grew by an estimated 50%, approaching \$500 billion by 2011, with food being the third highest advertising sector (UNEP 2012).

True Costs and Terms of Trade

We do not pay the true costs of food either in terms of the environmental impact of the production system, or the health costs of inappropriate consumption patterns, or the fairness of the distribution of rewards to food and farm workers and many farmers, especially in developing countries (Food Ethics Council 2010, 2013). Overconsumption – whether of fertilizers in farming or foodstuffs or through waste – promotes increased greenhouse gas emissions. Fat is indeed a greenhouse gas issue not just an individual and public health issue. In general, the terms and conditions for those working in food and farming are worse than the average across all industries and services, with farmers’ livelihoods in particular being squeezed over recent years. Change in company structure, the development of transnational corporations in most parts of the food system – underpinned by changing legal frameworks – has also led to huge vested interests in maintaining these production and consumption patterns created in the rich world in the 20th century. There is a growing capacity of these organizations to influence and shape the regulatory frameworks in their interests.

Farmers are a group who pay retail prices for both their inputs¹² and their food but get wholesale prices for their products. They are price takers and are increasingly squeezed by the larger suppliers and buyers on either side of their businesses. It is also one reason why today the

policy-driven expansion of agrofuels, and the various subsidy programs, is so welcomed by some farmers for whom it is a new opportunity to make a living in an increasingly squeezed industry.

A second element affecting farmers is an increasing concentration of power throughout every sector of the food system from suppliers of energy, fertilizers, pesticides, and seeds to the traders who move commodities around the world, to the food manufacturers and processors of those commodities and farm produce, and of retailers and caterers who increasingly move them into consumption by the final purchasers. The difference in bargaining power among these groups is very important in structuring how the profits derived from the production are split. When it comes to profit, the key questions are whose profit, in whose interests, to what end is it derived, and how is it measured.

Skewed Innovation

One consequence of this prevailing structure has been a skewing of the nature of innovation in food and farming systems, toward the desires and consumption patterns of what the rich can afford to buy, and to develop farming practices and approaches that serve the needs of the key input supply industries and the major players who buy the products of the farming population, with a neglect of agro-ecological research and practices as well as the needs and practices of the poor. There has also been a diminution in terms and conditions for farmworkers and increased casualization of farm work, often reliant on migrant labor.

One of the key changes in the last 20 years, which has profound effects on the future control of food, is the expansion of rules on patents, copyright, plant variety protection, and other so-called forms of 'intellectual property'. These are better thought of as monopoly or exclusionary privileges. They create scarcity where there is none – by restricting access – on the basis of the contested claim that the monopoly rents they permit will support further creativity. They are fueling a further concentration of power at the base of the food system in terms of the plants and animals used by farms throughout the world. These rules were lobbied for and promoted by a very small number of largely US-based transnational companies and successfully introduced into the World Trade Organization through the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS) (Tansey and Rajotte 2008).

A New Balance

All of this argues that new research should contribute to a more well-rounded approach to creating fair and sus-

tainable food systems in the future. It should be grounded in an understanding of the balance that we need to achieve between three key elements: well-being, autonomy, and justice. The impact on well-being means well-being for the different interests of actors in the food system – farmers, farmworkers, consumers, and different businesses, as well as the well-being of animals and the environment, including soil.

The second element is the impact upon the autonomy or freedom of action of those involved – from small farmers to consumers to animals.

The third is how far the practices and activities are just in the sense of being fair to those different groups affected. These are the three elements, which can be used to create an ethical matrix to help clarify impacts of different policies and technologies on different groups and the environment, that those in the Food Ethics Council consider in reflecting upon what is driving change within the current food system.¹³

These issues were highlighted in the UK Food Ethics Council's (2010) report *Food Justice* which came out of the Council's Food and Fairness Inquiry held in the UK in 2010. It was clear to the Council that within the context of concern over future global food availability, most attention was being focussed on the health and sustainability aspects of the challenges in the food system, and far too little on the social justice aspects – without which any changes to the system will not be sustainable. In the report, the Inquiry reframed the ethical matrix categories around the ideas of fair shares, fair play, and fair say as a way to look at what was happening in the food system in the United Kingdom. In the light of many calls saying business as usual was not an option, a follow-up piece of work examined what going "Beyond Business as Usual" would mean. It highlighted the need not just to tweak the existing system, which was necessary, but also seek transformation of it through changing the economic model and how markets worked, along with new business models (Food Ethics Council 2013).

Soil, Land, and Water

Both industrial farming practices and expansion of monocultures have led to a decline in soil quality and to soil erosion in many places (Lal 2009), as well as massive genetic erosion and loss of plant agro-biodiversity (FAO 1998). As Lionel Ranjard, director of research at the French Institute for Agronomic Research (INRA) was quoted as saying "The more we have monocultures, the more we deplete microbial presence. Vineyards present the lowest microbial biomass. At what point do we lose so much biodiversity that the soil shuts down from a functional point of view?" (Carolyn 2012). Soils are the

greatest reservoir of biodiversity – most of it still largely unknown – on the planet.¹⁴ Many current conventional farming practices are greatly undermining that biodiversity. These practices rely on an industrial model, with uniform crops, mechanical harvesting, food processing, and narrow measures of economics, rather than a system based on ecological efficiency.

There is clearly much to learn from those traditional and indigenous systems in China, India, Peru, and elsewhere where farming has been practiced successfully and sustainably over thousands of years. Lessons can be learned from water capture to soil management and cropping patterns but also the social, cultural, and economic relations that facilitated those methods. The question is how to share the insights and knowledge arising from those systems for today's challenges.

Land may be seen as a commons, controlled, managed, owned, treated as sacred, or seen as there to be plundered for whatever it holds, on or below it, under relationships determined by the communities, societies and states holding sovereignty over it. The central issues are what is the land for, who has the capacity and control to say what is grown on it or what land is used for? Here, questions of land rights become central and issues of land reform. Such concerns are at the heart of a growing movement around the world under the title of food sovereignty.¹⁵ Here, local people and communities, especially those small farmer, fisherfolk, and herding communities whose livelihoods are threatened by the current direction of change, and which still produce the majority of food consumed in the world, argue that they are the ones that need to be supported and developed to deal with the challenges ahead. Many are already having to be innovative and adapt to climate destabilization.

The EU sees farmed land as the production base for food, fiber, feed, and fuel. While here I focus on food production, it is essential to look at land use as a whole, which requires thinking about land-use capability, and about maintaining the health and well-being of the soil. We also have to prioritize what we use the land for. If, on the basis of a flawed economic system and set of incentives, short-term discount rates and subsidies, we pitch the wallets of the wealthy against the needs of the poor in determining what is grown, then the expansion of the use of the land for agrofuels, for example, is highly likely, and this will undermine the goal of feeding everyone well.

Furthermore, promoting demand for feed for livestock to support high levels of intensively produced meat and dairy consumption, and the production of sugar and fats to feed into processed food-based diets, will not deliver a fair and sustainable food system and a healthy population, no matter how much we manage to increase pro-

duction of key commodities. The social, economic, legal, and cultural factors that underpin the way the food system is structured must be part of the research-setting agenda. This may involve looking at the failure to invest in rural people and distribution systems so that food that is produced on the farm is not wasted before it gets to the users, or looking at wasteful consumerist societies where massive amounts of food are wasted in both catering, distribution and the household end of the food system. It also involves being more self reflective about who sets the research agenda and where farmers and the public fit into that.

Without such changes, we will not achieve the goals that were spoken of in the Committee on Food Security's attempt to come to terms with the terminology. That is the goal of fair, sustainable food systems enabling human thriving – that is, health in its fullest sense, in which food insecurity, hunger, and malnutrition are eradicated. Such food systems have to balance a set of objectives – sustainable, secure, safe, sufficient, nutritious, equitable, and culturally appropriate, diets for all.

Paradigm Shifts

“There is a strong need for the paradigm shift to focus on soil-based strategies for increasing food production, while restoring the natural resource base, improving the environment, and making agriculture an integral component of the solution to addressing the global issues of the 21st century. If soils are not restored, crops will fail even if rains do not; hunger will perpetuate even with emphasis on biotechnology and genetically modified crops; civil strife and political instability will plague the world even with sermons and mantras on human rights and democratic ideals, and humanity will suffer even with great scientific strides.”R. Lal (2009)

What does this mean for a world in which an increasing majority live in urban areas, and which is increasingly dominated by a small number of large corporations in different parts of the activities in the food system? What does it mean for setting a research agenda that will deliver the right kind of food to enhance human well-being? It certainly means going beyond an anthropocentric approach – the planet does not need us but we need it. Currently, mainstream policy assumes that we humans are smart enough to come up with technological fixes to carry on in the way we are now, but this may well be a great delusion. It is more likely that we need to have a major rethink and recognize that we may have gone down a cul-de-sac in the last 150 years and in particular in the last 50 years, in the way we have developed our farming systems.

So, we need paradigm changes – to shift the way we think and act and then over time to progressively and differentially move from the way we do things now to a new way of acting across a whole set of disciplines and areas – not just to a soils rather than seed-based approach as suggested by Lal (2009). To do this suddenly will be very disruptive. However, it will also be very disruptive if we see collapse brought about by climate destabilization, by the reckless innovation we have seen in the financial system, by the use of weapons of mass destruction, or by the failure to stabilize the numbers and equalize the living standards of the human population.

There is a danger that technological innovation today looks for solutions that help *avoid* the change needed. We need to change social, economic, political, institutional, and legal areas if we are to tackle the roots of the problems we face. It also means dethroning the mantra around competition as a good in itself. Rather, we need to see competing as sometimes useful but not as the dominant need but rather new cooperative, knowledge sharing systems to share best practices, and facilitate a better life for the poorest majority on the planet.

There are some signs of the institutional innovation needed for new, more inclusive, global governance structures in the restructuring in the United Nations Committee on Food Security based in the UN Food and Agriculture Organization, with the inclusion of civil society groups representing peasants, fisherfolk, and herders and consumers. This is in contrast to the top down approaches still coming from the G8 and G20.

This view of the future sees humans as part of the biosphere who need it to function well for us to thrive. It sees diversity as strength and processes happening in cycles. It seeks to marry the best science with traditional indigenous knowledge about how to farm sustainably. The priorities for scientific research and technological innovation should be to use the revolutions in understanding the nature of living organisms to work more effectively with ecological systems, rather than to redesign life. This future sees that current commodity patterns are linked to past imperial and economic interests. It recognizes we have got things wrong about land before, from the Romans' destruction of North African granaries to the dust bowl in the United States in the 1930s, and it will happen again, unless change our activities (Fraser and Rimas 2010).

Such approaches are complex, multilinear, and not necessarily easily mechanized – although the need for far more appropriate mechanization to take the drudgery out of family farmers' lives remains. They are likely to be more labor intensive and require deep interest in and knowledge of the land. In responding to climate destabilization, the focus should be on exchanging knowledge and

skills between people in different environments as weather patterns change, using low fossil fuel input farming systems with renewable energy, building soil carbon retention by promoting biodiversity, and putting science and technology into socioeconomic and cultural contexts. This is a future that sees limits to human action; it knows that ecology rules, and we need to restructure our economics to recognize that (e.g., Dietz and O'Neill 2013); it is keen on science, but requires more ecological approaches than technological dominance.

Changing to *cooperation, diversity and equity* requires a major socioeconomic paradigm shift. As Tim Jackson, professor of sustainable development at the University of Surrey, noted in 'Prosperity Without Growth', a report for the UK's, now abolished, Sustainable Development Commission:

There is as yet no credible, socially just, ecologically sustainable scenario of continually growing incomes for a world of nine billion people.... Simplistic assumptions that capitalism's propensity for efficiency will allow us to stabilise the climate and protect against resource scarcity are nothing short of delusional (Jackson 2009).

The key to meeting the challenges posed in feeding 9 billion lies in paradigm shifts toward sustainable economics and farming systems. These might cover the trade rules, the intellectual property framework, the regulatory framework, and the cultural and dietary influences that shape food preferences – including advertising and market development activities of the major corporations involved. This is particularly important at a time when, in many parts of the world, there are serious concerns about the activities of sovereign wealth funds, private investors, and corporations in taking over land and often causing severe hardship to those who already use that land, to develop crops to export back to the investing nation or firm. We must be aware of and avoid the dangers of repeating that kind of external control of land and lives, badly done by Europeans over several centuries. Many now fear not so much that China may become the major new global power, which it surely is, but that it will behave in ways Europe and the United States have in the past and follow their consumption patterns – which would be disastrous for health and sustainability (GRAIN 2012; Nair 2011).

It also requires incentive systems that promote enough, not excess, different kinds of enterprise and innovation and sharing and exchange of knowledge and skills – as well as developing innovative policies on physical stocks and emergency assistance in case of increasingly likely extreme events. Fair and sustainable food systems, require, as Michel Pimbert argues, moving from vicious cycles to virtuous circles (Pimbert 2012). In doing so, we

must be clear on the policy goal, and its meaning so that there is common understanding.

Whatever is invented, however benign and well-intentioned the inventor or researcher, it is not the inventor or researcher who will determine how, or for what ends, it will be used. Unless we have real paradigm shifts from the geopolitical level right through to the individual citizen – so that we see ourselves as citizens of this small planet, who happen to live in one of its many diverse, national, ethnic cultural groupings – then the potential to undermine human security in all its aspects, not just food, is greater in the 21st century than in the 20th century. But so too is the prospect for a more cooperative, sharing world facing up to the challenges, celebrating our human diversity, and committed to creating a more equitable world.

Conflict of Interest

Geoff Tansey is an independent writer and consultant. He is a member and trustee of the Food Ethics Council, an honorary research fellow, Department of Peace Studies, University of Bradford and honorary visiting fellow, Center for Rural Economy, University of Newcastle, all in the United Kingdom. The views expressed here are personal and should not be attributed to any of the organizations with which he is connected. See <http://www.tansey.org.uk>.

Notes

¹This is a revised version of a working paper presented at an International Workshop on Food Security: Science, Technology and Policy, Beijing, China, 23 September 2012. I am grateful to Bill Davies of the Lancaster Environment Center for his invitation to speak in the workshop and his suggestions which helped me to turn the speech into this article, and I am grateful for the comments of two anonymous referees.

²This formulation of the issue was that proposed for the policy workshop in Beijing and seems to represent a common way of thinking for many scientists working on food issues.

³See, for example, “Reworking the global food system” in *World Disasters Report 2011 – Focus on Hunger and malnutrition*, International Federation of Red Cross and Red Crescent Societies, Geneva, 2011, available at <http://www.ifrc.org/publications-and-reports/world-disasters-report/wdr2011/>.

⁴Draft paper for Committee on Food Security, “Coming to Terms with Terminology: Food Security, Nutrition Security, Food Security and Nutrition, Food and Nutrition Security”, Revised Draft 25 July 2012, available at <http://www.fao.org/fsnforum/forum/discussions/terminology>, accessed 21 November 2012.

⁵See, for example, the former UK Sustainable Development Commission’s (2009) suggestion for a broader based definition based on genuinely sustainable food systems.

⁶Declaration of Nyéléni, (2007) at <http://www.nyeleni.org>.

⁷A recent paper that reviews policy thinking in this area is Lang and Barling (2012).

⁸See <http://www.dvidshub.net/news/65559/science-chief-charts-future-technologies#.UKyYiYVw2cc>, last accessed 21 November 2012.

⁹This is the variant translation given at <http://en.wikiquote.org/wiki/Cicero>, another version reads ‘Not to know what happened before you were born is to be a child forever’. Web consulted 4 September 2012.

¹⁰Cain and Hopkins (1993) argue “...put simply, overseas expansion and the imperialism which accompanied it played a vital role in maintaining property and privilege at home in an age of social upheaval and revolution... Imperialism, then, was neither an adjunct to British history nor an expression of a particular phase of its industrial development but an integral part of the configuration of British society, which it both reinforced and expressed...imperialist enterprise was enfolded in a grand development strategy designed by Britain to reshape the world in her own image. It was spearheaded, not by manufacturing interests, but by gentlemanly elites who saw an empire and means of generating income flows in ways that were compatible with the high ideals of honour and duty, and it remained a dynamic, expanding force long after decline, as measured by British comparative industrial performance, is conventionally thought to have set in.”

¹¹See <http://win.niddk.nih.gov/statistics/>, accessed 21 November 2012.

¹²Farmers and their fossil fuel-based high-input farming system do get various forms of subsidies in most OECD countries, however, amounting to US \$252 billion in 2011. See OECD, *Agricultural Policy Monitoring and Evaluation 2012: OECD Countries*, available at <http://www.oecd.org/tad/agriculturalpoliciesandsupport/agriculturalpolicy-monitoringandevaluation2012oecdcountries.htm>.

¹³For more information about the ethical matrix, see <http://www.foodethicscouncil.org/node/119>, last accessed 21 November 2012.

¹⁴See, for example, *Exploring the Soil’s Genetic Biodiversity*, available at <http://www2.cnrs.fr/en/1600.htm>, accessed 21 November 2012.

¹⁵See <http://www.foodsovereignty.org>, accessed 21 November 2012.

References

Abbott, C., P. Rogers, and J. Sloboda. 2007. *Beyond terror: the truth about the real threats to our world*. Random House, New York and London.

- Bickers, R. 2012. *The scramble for China: foreign devils in the Qing Empire, 1832–1914*. Penguin, London.
- Cain, P. J., and A. G. Hopkins. 1993. Pp. 45–46 *in* *British imperialism: innovation and expansion, 1688–1914*. Longman, London.
- Carolyn, L. 2012. Living soil. *Resurgence Ecol.* 274:17
- Davies, J., S. Sandström, A. Shorrocks, and E. N. Wolff. 2006. The global distribution of household wealth. *Wider Angle* 2:4–7. Available at http://www.wider.unu.edu/publications/newsletter/en_GB/PDF-files-earlier-editions/ (accessed 3 May 2013).
- Dietz, R., and D. O'Neill. 2013. *Enough is enough: building a sustainable economy in a world of finite resources*. Earthscan from Routledge, London.
- FAO. 1998. *The state of the world's plant genetic resources for food and agriculture*. FAO, Rome.
- Food Ethics Council. 2010. *Food justice: the report of the food and fairness inquiry*. Food Ethics Council, Brighton. Available at <http://www.foodethicscouncil.org/node/465> (last accessed 21 November 2012).
- Food Ethics Council. 2013. *Beyond business as usual: towards a sustainable food system*. Food Ethics Council, Brighton. Available at <http://www.foodethicscouncil.org/node/689> (last accessed 1 February 2013).
- Foresight. 2011. *The future of food and farming: challenges and choices for global sustainability*. Final Project Report. The Government Office for Science, London.
- Fraser, E. D. G., and A. Rimas. 2010. *Empires of food: feast, famine, and the rise and fall of civilizations*. Random House, New York and London.
- Hastings, G. 2012. Why corporate power is a public health priority. *BMJ* 345:e5124.
- GRAIN. 2012. *Who will feed China: agribusiness or its own farmers? Decisions in Beijing echo around the world*. Seedling, August 2012
- International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). 2009. *Agriculture at the crossroads, synthesis report*. Island Press, Washington, DC. Available at <http://www.unep.org/dewa/Assessments/Ecosystems/IAASTD/tabid/105853/Default.aspx> (accessed 3 May 2013).
- Jackson, T. 2009. *Prosperity without growth? The transition to a sustainable economy*. Sustainable Development Commission, London (revised and published as a book of the same name by Earthscan 2010).
- Jägerskog, A., and T. Jønch Clausen, eds. 2012. *Feeding a thirsty world: challenges and opportunities for a water and food secure world*. Stockholm International Water Institute, Stockholm. Available at www.siwi.org/documents/Resources/Reports/Feeding_a_thirsty_world_2012world_waterweek_report_31.pdf (accessed 3 May 2013).
- Jolly, R. 2010. *Inequality and millennium development goals*. Annual Erskine Childers Lecture, London, 15 June 2010. Available at <http://www.tv786.net/vijay7> (accessed 3 May 2013).
- Lal, R. 2009. Soils and world food security. *Soil Till. Res.* 102:1–4.
- Lang, T., and D. Barling. 2012. Food security and food sustainability: reformulating the debate. *Geogr. J.* 178:313–326.
- Max-Neef, M. 1992. Development and human needs. Pp. 199–200 *in* P. Ekins, M. Max-Neef, eds. *Real-life economics – understanding wealth creation*. Routledge, London.
- Maxwell, S. 1996. Food security: a post-modern perspective. *Food Policy* 21:155–170.
- Messer, E., M. J. Cohen, and J. D'Costa. 1998. *Food from peace: breaking the links between conflict and hunger*. 2020 Brief 50. IFPRI, Washington, DC.
- Nair, C. 2011. *Consumptionomics: Asia's role in reshaping capitalism and saving the planet*. Infinite Ideas Ltd, Oxford. Available at <http://www.consumptionomics.com/the-book> (accessed 3 May 2013).
- OECD. 1981. *Food policy*. OECD, Paris.
- Paillard, S., S. Treyer, and B. Dorin, coord 2011. *Agrimonde: scenarios and challenges for feeding the world in 2050*. Éditions Quæ, Versailles.
- Pimbert, M. 2012. *Fair and sustainable food systems: from vicious cycles to virtuous circles*. Institute for Environment and Development (IIED) briefing, June 2012. Available at <http://pubs.iied.org/17133IIED.html?k=Pimbert> (accessed 3 May 2013).
- Sustainable Development Commission. 2009. P. 10 *in* *Food security and sustainability; the perfect fit*. SDC position paper. SDC, London.
- Tansey, G., and T. Rajotte, eds. 2008. *The future control of food: a guide to international negotiations and rules on intellectual property, biodiversity and food security*. Earthscan, London. Available in English at <http://www.idrc.ca/EN/Resources/Publications/Pages/IDRCBookDetails.aspx?PublicationID=79>, and in Spanish at <http://idl-bnc.idrc.ca/dspace/bitstream/10625/39892/1/128642.pdf>. Chinese translation published in 2012. ISBN 978-7-109-177226-5 (accessed 3 May 2013).
- Tansey, G., and T. Worsley. 1995. *The food system: a guide*. Earthscan, London, U.K.
- UNEP. 2012. P. 34 *in* *Avoiding future famines: strengthening the ecological foundation of food security through sustainable food systems*. United Nations Environment Programme (UNEP), Nairobi, Kenya. Available at <http://www.unep.org/publications/ebooks/avoidingfamines/> (accessed 3 May 2013).
- WHO. 2012. *Obesity and overweight*. Fact sheet No. 311, May 2012. Available at <http://www.who.int/mediacentre/factsheets/fs311/en/index.html> (accessed 21 November 2012).