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Food Security

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Abstract: Food security has become an increasingly important, but contested, term since the global food price spike of 2008. Ongoing price volatility, linked to a range of causal drivers, has raised the stakes in formulating solutions to feeding a world of 9.7 billion by 2050. In contrast to those who favor treating food security as a scientific problem requiring technical solutions that lead to greater output are those who promote a rights-based approach to food best represented by the food sovereignty movement. With global food production facing a range of interlocking challenges, food security has become increasingly entangled with sustainability such that new ideas and policy initiatives are emerging across the realms of production and consumption.

Food systems are in transition with significant implications for our understanding of 'food security'. A range of inter-connected environmental issues is challenging food production while complex social, economic and public health matters are reshaping food consumption practices. In consequence, food security is less easily defined than it was in the mid-1970s when a series of humanitarian disasters affecting the Horn of Africa, South Asia, and the Sahel (1972–1973) - together with escalating global cereal prices - led to an understandable emphasis on supply side solutions. The 1974 World Food Conference gave rise to the first widely adopted definition of food security as the "availability at all times of adequate world food supplies of basic food stuffs … to sustain a steady expansion of food consumption … and to offset fluctuations in production and prices."

The 1974 definition was a consequence of its time and is clearly framed by the imperative of production and supply that strongly resonated

with the prevailing agricultural modernization discourses of the era, best exemplified by the Green Revolution model of technology transfer. The development and dissemination of high-yielding varieties of wheat and rice as part of a "package" of technologies that sought to increase scale, levels of mechanization, and market orientation while successfully increasing "output" were to have enormous unanticipated consequences for rural societies. While aggregate output rose in those regions endowed with the necessary resources (soils, water, and infrastructure) required for the technology (principally Southeast Asia, the Punjab, parts of Latin America), other regions (especially in sub-Saharan Africa) were marked by deepening hunger, malnutrition, and disease. Understanding the complexities of food insecurity and vulnerability was aided by local and regional studies conducted by geographers and other rural development specialists.

However, probably the single most important contribution to shifting the prevailing view of food insecurity was the publication of Amartya Sen's *Poverty and Famines* (Sen 1981). Here Sen forcefully demonstrated that hunger and starvation are not an inevitable consequence of a decline in the *availability* of food, but rather reflect the circumstances of people not being able to secure *access* to food. For Sen, this can be explained by understanding people's entitlement relations, which might derive from endowments in land, other assets, or their labor power and which provide the basis for survival under "normal" conditions. Changing circumstances, such as the occurrence of drought, may reconfigure entitlements as the abandonment of agricultural production in the absence of rainfall, for example, renders rural wage laborers vulnerable to unemployment and hunger. Livestock owners face a similar predicament as, in the absence of adequate grazing, animals weaken and their value drops, while grain prices invariably soar. Entitlement theory consequently contributed to a shift in food security thinking away from the macroscale and toward the individual and household level.

Food security was, moreover, once synonymous with the supply of high-calorie staples such as cereals and tubers to resolve problems of protein-energy malnutrition. The logic of the Green Revolution was to deliver increased calories above all. But calorie intake says little about nutritional status, and by the late 1980s health and nutrition research better understood that minerals, vitamins, and trace elements – including iron, iodine, folate, and vitamins A, B complex, and C – play a critical role in human wellbeing. Globally, today, "over 165 million children are stunted and two billion people lack vitamins and minerals for good health" (Khoury *et al.* 2014). Indeed, it has been estimated that 2 billion people are anemic

– over 30% of the world's population – making it the most widespread nutritional disorder in the world.

By the time of the World Food Summit in 1996 the definition of food security had evolved to reflect issues of access and the variety of analytical scales from the household to the global level, as well as social and cultural influences over food preferences. Thus food security is said to be achieved when "all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

Over the last two decades or more food security has continued to accumulate a multiplicity of meanings and associations reflecting the boundary nature of the concept: it has crossed many academic disciplines besides geography, and been a focus for applied work in the agricultural, environmental, and health sciences. Yet, if there is one pillar that has anchored food security discourse over the past half-century or more, it is the central role of technology-led production as the key to food availability.

Food Security and Productivism

From the second half of the twentieth century, astonishing increases in agricultural productivity were achieved as a consequence of a series of interconnected technological developments, involving seeds, chemicals and machinery. This paradigm, which has come to be labeled *productivism* for its singular focus on output, has enabled the world today to produce sufficient food by volume of crops to meet the needs of the world's growing population. However, an estimated 840 million people remain in a state of food insecurity: a consequence less of output failure than of structural shortcomings in access to food, compounded by locally contingent variables such as affordability or conflict. Yet productivism, together with the development and intensification of global trade, has proven the axiomatic principle promoted by international organizations and national governments by which food security would be achieved.

The development of the global food system since the 1980s has witnessed the emergence of new trading patterns that have had huge repercussions for some of the poorest and least food-secure countries. For example, the rise of the new agricultural exporting countries such as Kenya has led to their engagement with nontraditional, high-value fruit, flower,

and vegetable contract production for major supermarket chains in the North. Meanwhile other countries have witnessed extensive cereal and oil seed cultivation in response to the rising global demand for livestock feed and biofuels. Such large-scale commercial developments have often served to marginalize millions of small farmers through dispossession of land, depletion of water resources, or loss of local market share. At the same time, closer economic integration leads to increased exposure to international market forces for hundreds of millions more. The consequence of these developments have been to disrupt conventional readings of food insecurity as constituting supply-side failures.

During the first decade of the twenty-first century, cereal prices rose to their highest levels in real terms since the early 1970s, reaching a peak in 2008, which was followed by significant price volatility. Such dramatic increases triggered violent protests and widespread civil unrest across the world as household budgets could no longer meet basic dietary needs and the number of food-insecure people reached 1 billion. Unsurprisingly, attention turned to identifying the drivers of these price rises, and their continuing volatility. Among the drivers for which analytical models demonstrated a link with food prices were: financial speculation on global commodity markets; extreme weather events and potential climate perturbations; declining grain stocks, possibly linked to falling public investment in agriculture over two decades; and rising consumer demand, as a consequence of demographic increase and also of changing dietary composition. However, the clearest correlation with the behavior of food commodity prices was that of hydrocarbon energy prices which rose steadily through the decade, reaching a peak in July 2008 before falling back. For many analysts it was higher oil prices and the associated expansion of the biofuels sector that has been most responsible for undermining food security worldwide.

A consequence of tightening oil markets as demand outstrips supply capacity has resulted in a huge boom for biofuel crops capable of being converted to either ethanol or biodiesel. By 2010, the combined amount of maize and sugarcane from the United States and Brazil respectively used as feedstock for ethanol amounted to 460 million tonnes, or 6% of global crop production by mass (Cassidy *et al.* 2013). It has been estimated that the volume of maize currently diverted to ethanol distillation in the United States would be sufficient to feed 400 million people for one year. The setting of mandatory targets for utilization of renewable energy sources in the transport sector by the European Union, the United States, and other countries has driven the expansion of maize and sugarcane, as well as palm

and other vegetable oils, for conversion to biodiesel, across arable land. The essential fungibility of agri-commodities like these suggests that the food needs of the poor are subordinate to the energy requirements of the more powerful. This is best illustrated by the appropriation of land currently underway throughout the poorest countries of the Global South as powerful states and corporations engage in deals to acquire land and water resources. It has been estimated that up to 227 million ha – an area equivalent to the total arable land of Western Europe – has been identified as suitable for occupation by foreign investors. Two-thirds of this land grabbing is in Africa, and 60% is destined for biofuel crops.

A 'productivist' framing of food security has favored the setting of ambitious output targets - such as a 70-100 percent increase in food production by 2050 to feed a world of 9.7b – as justification for treating food security as a scientific problem requiring purely technical solutions. Proponents of this approach most often focus on the low yields of indigenous farming systems and argue that modern technologies through a new Green/Gene Revolution could do much to achieve food security across the poorest countries. Critics, on the other hand, have argued that not only does this emphasis on imported technologies smack of a neocolonial attitude that undervalues the knowledge and adaptability of small farmers, but it runs the risk of deepening vulnerability to distant input markets as well as conspicuously failing to appreciate changing local environmental circumstances. Above all, these globalizing forces fail to recognize that food security should, at least in part, be embedded in local ecosystems managed by local people for some proportion of local needs.

The logic of productivism, then, is to raise output and trust in the power of markets to enable people to get access to food. Yet the multiplicity of challenges – such as those regarded as drivers of the food price spikes of 2008 and beyond – demonstrate the increasing vulnerability of the food system. Indeed, there are particular anxieties around the impacts of climate change, freshwater depletion, impairment of ecological services, and the consequences of tightening energy markets that are leading many to believe that we need to move away from the productivist model. While policy analysts may argue over the rank ordering of drivers, it is clear to many that the global food system has become increasingly sensitive to a variety of short-term episodic shocks and lacks the resilience to cope effectively with such events. The task now facing us, therefore, is to optimize production across a far more complex landscape involving environmental sustainability, social justice, and nutritional security.

Sustainability, Sovereignty, Security

With the stability of the global food system buffeted by energy prices, the effects of climate change and other environmental challenges, as well as by social change, it is unsurprising that food security would become entangled with the notion of sustainability. This, too, is a term subject to multiple framings such that it eschews a comfortable singular definition. However, sustainability generally conveys the need to balance social, economic and environmental goals and to do so with regard to the needs of future generations while recognizing the dynamics of complex, coupled human, natural and technological systems. When applied to food security sustainability highlights the use and management of natural resources in order to maintain agricultural production over the long-term and ensure availability of supply. Yet the overwhelming evidence is that industrial methods of production, despite their claims to 'feeding the world sustainably', have not paid sufficient care to maintaining endowments of soil, water and biodiversity or ecological services. Moreover, there are growing anxieties over the vulnerability of the food system to the effects of climate change (heat, drought, storms, pests). Consequently, a 'sustainable food security' approach invites interrogation of production systems distinguishing between those agri-commodities and farm practices that are less environmentally harmful.

On the one hand this has served to advance the concept of sustainable intensification (SI), which means producing more food from the same amount of land but with less environmental impact. SI is therefore concerned with halting and even reversing the continued expansion of agricultural land, recognizing the "new fundamentals" associated with climate change, freshwater depletion, and other resource limits. Hence its emphasis rests on the intensification of existing agricultural land, although this should not be pursued without due regard for other multifunctional benefits such as carbon sequestration and biodiversity conservation. It has been argued that SI is consequently a necessary but not sufficient component of food system transformation best considered at the farm and landscape level (Pretty et al 2018) and which may yet contribute to strengthening future food security.

In contrast, there is growing interest in the much broader notion of 'sustainable diets' as a way of drawing together many different elements of the food system including the role of consumption practices. Sustainable

diets have been defined as diets with “low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing human and natural resources” (Berry et al. 2015: 2300). This definition would arguably serve as an effective surrogate for food security, too, insofar as it establishes the vital importance of good nutrition as the basis of human health. This was not a conspicuous feature of supply-side food security concerns long preoccupied with delivering protein-energy sufficiency.

When lacking a holistic food systems perspective, food security has increasingly found itself confronted by a process of nutrition transition around the world marked by rising intakes of energy-dense, often nutrient-poor, highly processed foods. This has contributed to an estimated 2.1 billion people becoming overweight or obese with dietary shifts linked to increased global incidences of chronic non-communicable diseases, especially type II diabetes, coronary heart disease and some cancers (Tilman and Clark 2014). A key feature of these ‘westernized’ diets now common in middle-income countries is the growing share of animal-based foodstuffs. With global meat consumption continuing to climb, recent research has served to highlight the considerable environmental footprint of livestock rearing with 30 percent of the world’s land area now utilized for this purpose. Given that 74 percent of all cropland protein is used to feed livestock - with only 26 percent directly consumed by humans – questions are being asked about environmental limits to the world’s appetite for meat and dairy products. Moreover, with clinical evidence demonstrating that diets rich in red and processed meats are injurious to public health, the case for a shift to more plant-based diets that will yield a double dividend is becoming more convincing. In other words, not only will a plate comprising more fruit and vegetables and less meat improve health outcomes, it will also require less cropland, place less pressure on freshwater resources, and create more opportunities for co-existence with nature. Besides, evidence suggests that current levels of meat consumption in high-income countries (>80kg/cap/yr) cannot be maintained if we are to feed a world of 9.7 billion by 2050 and, besides, there is no nutritional case for feeding the current 34 percent of human edible crops to animals (Berners-Lee et al 2018).

If the development of a reinvigorated global debate about food security over the past decade or more has revealed a sharply fractured

consensus, it has also enabled a strong counterhegemonic discourse to be heard. Emerging from a highly heterogeneous constituency – from peasant movements in the South to food activists in the North, together with some very eminent global policy experts and leaders – this alternative discourse encompasses many divergent aspirations but shares a rejection of the technology-centered, business-as-usual approach. Rather, it argues for an agri-food system that is not only more sustainable but also more resilient and which aspires to achieving greater social justice.

Among the most important claims proposed by this broad and diverse movement is that of *food sovereignty*. Closely associated with the international peasant movement, La Via Campesina, food sovereignty has been defined as "the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems" (Declaration of Nyéléni, Mali, 2007). Food sovereignty has been widely proclaimed and reaffirmed, and in 2012 the FAO's Committee on World Food Security agreed to its adoption. Indeed, the ascendancy of food sovereignty as a potential policy proposition has helped it to move from being regarded as an entirely oppositional term associated with an antiglobalization agenda to one that is now entangled with food security. By insisting on the relational and rights dimensions of food, the notion of food sovereignty has begun to establish not only the human right *to eat* but also the right *to produce*. In this respect it challenges the existing food system built on the disembedded production of tradable commodities and transformed by large-scale manufacturing into cheap, processed, global brands. For, as diets worldwide become more homogeneous, they also appear to be less healthful, with a higher consumption of processed and convenience foods rich in saturated fats, sodium, and sugar.

That these changing dietary practices are contributing to rising morbidity amongst the global population presents new challenges for our understanding of food security. As demonstrated by Goal 2 of the United Nations Sustainable Development Goals, ending hunger (by 2030) and achieving food security has to ensure that everyone everywhere has access to enough *good-quality* food to lead a healthy life. Moreover, as Goal 2 makes clear, this will also require widespread promotion of sustainable agriculture. Consequently, aspirations to food security are now bundled together with a host of diverse but interlocking policy objectives including climate change, energy, resource management, dietary health and social justice (Sage 2013). Making measurable progress in each of these areas at both local and global levels will be required if we are to find ways to enable

everyone to eat sustainably, healthily, equitably, and securely into the future.

SEE ALSO: Agriculture; Environmental (in)security; Famine; Food security; Global environmental change: human dimensions; Security; Sovereignty; Water and climate change

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