

Should food production be doubled to feed the world?

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The strategies of the different actors involved in international debates have led to a shift in the concept of food security. In the wake of the 2008 food price crisis, the renewed drive to take a technological quantum leap forward to double food production by 2050 has hindered reflection and discussions on this concept.

The term ‘food security’ was coined in 1943 at the *Hot Springs Conference* in Virginia, which two years later led to the creation of the Food and Agriculture Organization of the United Nations (FAO). But the term did not truly become widespread until the World Food Conference in Rome in 1974 organized by the UN Economic and Social Council. The definition endorsed by consensus at this summit essentially sought to strike a balance between supply and demand. For any country, food security consists of the ‘availability at all times of adequate, nourishing, diverse, balanced and moderate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices’.

Food insecurity is primarily an issue of access

This definition, which places emphasis on the availability of food, should be resituated within the political and economic context of its time. Until the late 1970s, food supplies were insufficient to meet the global population’s energy needs. These supplies were below the threshold of 2,500 kilocalories per person per day (kcal/capita/d), considered the minimum average to ensure food security for all. In 1974, food prices soared on international markets as a result of the oil crisis

and several extreme climate events (droughts, floods) that affected agricultural production in several regions around the world. The population growth rate continued to climb and the stabilization of the global population still seemed like a distant prospect. Malthusian fears of an exponential increase in the world population – and therefore in the food demand despite agricultural production still growing linearly – were thus highly prevalent in debates on the subject.

To balance the equation, it was therefore necessary either to increase the food supply by boosting agricultural production while reducing post-harvest losses or to curb the rise in demand by putting strict limits on births – or both. Markets had to be regulated to mitigate the impacts of fluctuations, particularly by building up security reserves. At an institutional level, after the FAO and the World Food Programme (WFP), Rome became home to a third institution – the International Fund for Agricultural Development (IFAD). This body, which was founded in 1974, implements projects geared towards increasing food production in developing countries.

The 1980s heralded a major shift in the understanding of food security. In 1982, Amartya Sen – future Nobel Prize winner in economics – published *Poverty and Famines: An Essay on Entitlement and Deprivation*. Based on an analysis of famines in Bengal (India), Ethiopia, the Sahel and Bangladesh, he demonstrated that food insecurity is less a matter of food supply than of access. People suffer from hunger because they do not have access to sufficient food production resources (land, inputs) or to food purchasing power. Amartya Sen thus identified poverty as the cause of food insecurity. This explained why some countries that were self-sufficient or even benefited from a cereal surplus, such as Brazil and India, had not yet solved the hunger problem within their own borders. In addition to striving to produce enough, the challenge was thus to ensure that everyone had access to food production and/or consumption resources. This perspective shifted the focus from a purely agricultural question to one of land access, purchasing power and, therefore, poverty and inequality.

As a result, a new definition of food security emerged in 1986 in a report published by the World Bank – the remit of which is specifically to combat poverty (World Bank, 1986). This definition was reiterated and extended at the World Food Summit, which reconvened in Rome in 1996. Food security was defined as being met ‘when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.’ This definition clearly highlights the issue of access and, of course, still refers to food supply and its regularity. It also introduces the idea of the health and nutritional quality of food and its

cultural acceptance. The World Bank definition thus introduced what would come to be known as the four pillars of food security, namely availability, access, utilization and stability.

An intersectoral issue

This definition again reflects the novel context of its time. By the early 1980s, the average global food supply calculated by the FAO had surpassed the 2,500 kcal/capita/day threshold. There were certainly still many countries where this threshold had not been reached, and undernourishment continued to prevail in parts of countries with food surpluses, as was the case again in Brazil and India. Moreover, this new conception of food security proved compatible with the economic liberalization that had begun in the 1980s. Since the focus was now on being able to access food, why should countries try to produce it locally if others could do so more cheaply? All countries could then benefit from the lowest possible food prices.

This definition of food security was, however, criticized for overly focusing on technical issues (increasing access or availability, improving food quality etc.) and for overlooking the political dimension of food. It made no reference to the power dynamics between countries or to the influence and domination of certain countries and private actors. The definition also failed to address the risks of economic and therefore political dependence associated with increased reliance on the international market. In 1980, many African countries came together to draft the so-called Lagos Plan of Action, opposing pressure to liberalize their markets. This plan asserted these countries' desire for greater food self-sufficiency and the freedom to pursue their own development outside the liberal framework advocated by the World Bank and the International Monetary Fund (IMF). This position was later defended by the international farmers' movement Via Campesina at the 1996 World Food Summit. The movement promoted the concept of food sovereignty, which it defined as 'peoples', countries' or state unions' right to define their agricultural and food policy, without any dumping vis-à-vis third countries'.

These statements of refusal to bow to liberal dogma did not prevent the signing of international trade liberalization agreements (General Agreement on Tariffs and Trade, GATT) at the Marrakech Conference in 1994, which set the stage for the creation of the World Trade Organization. It is worth noting that global food markets had been relatively stable since the price surge of 1974. Over

the years, many countries turned to these markets as a way of securing their food supplies to supplement their often inadequate domestic production. Many of them thus began to reduce their support for the agricultural sector, encouraged by donor organizations that were increasingly turning their attention to the social, educational and health sectors at the expense of agriculture.

Viewing the issue of food security primarily as a matter of access shifted the focus of action and explains the increased involvement of international institutions such as the World Bank, which were no longer devoted solely to agricultural production but instead to economic development and combating poverty more broadly. The FAO and other agricultural institutions could no longer claim food security as their exclusive remit. It was becoming a cross-sectoral issue involving agriculture, health, economic development, trade and so on. Nevertheless, in practice, food security policies at the national level generally remained the preserve of agriculture ministries. Food security was still largely measured and monitored in terms of food balances, particularly cereal balances – each year, countries would calculate whether food production and imports would be sufficient to feed their people.

At best, in situations where the management of food aid became a significant concern, food security commissions would be set up. However, these commissions seldom mustered sufficient political clout to be able to provide cross-sectoral coordination. Brazil is a noteworthy exception. Under the impetus of President Lula da Silva and inspired by the experience of the city of Belo Horizonte since 1993, the country developed an ambitious policy to eradicate hunger – the so-called Fome Zero project, based on intersectoral coordination (Chapter 22). Food security councils were set up at both regional and national level, bringing together public policy representatives from agriculture, labour, trade, education, health and other sectors as well as civil society representatives.

The 2008 global food price crisis and the return of a productionist vision

By the early 2000s, the overall context had changed considerably compared with the 1970s and 1980s. After a long thirty-year period of stable, low agricultural prices, far fewer countries suffered from chronic food deficits, such that food insecurity was primarily viewed as a poverty issue.

Food surpluses and stocks gradually dwindled as a result of market liberalization. In 2007–8, this decline in stocks was exacerbated by several extreme climate

events, combined with occasional slowdowns in the continuous production-growth trend and a rapid rise in demand for cereals and oils to produce biofuel. The global balance of supply and demand was once again thrown off kilter, causing prices to rise. This increase was further fuelled by speculation on agricultural futures markets and export restrictions imposed by some countries. The crisis affected net food-importing countries and – despite policy efforts to curb price rises on domestic markets – hit the most vulnerable people hardest, particularly in urban areas. This food price crisis was one of the factors that sparked the so-called hunger riots in around thirty cities worldwide, raising fears of international instability.

This fear initially galvanized the international community and contributed to putting food security and nutrition back on the political agenda. In June 2008, the FAO convened a major conference in Rome, followed by a series of global and regional initiatives. The international community agreed on the common objective of doubling agricultural production, so as to be able to feed the nine billion people expected to be living on the planet by 2050. The conference's conclusions echoed this objective. This may not have solved the food crisis at hand, but it did firmly put agriculture back in the spotlight. The declaration called for 'immediate support for agricultural production and trade' and, over the longer term, investment in food production.

The 2007–8 crisis thus heralded the return of a productionist vision¹ of food security, narrowly focused on the balance between supply and demand (Bricas and Daviron, 2008). A growing number of forecasts assessed the likelihood of achieving this balance in the future based on a range of assumptions regarding population growth, increased purchasing power, urbanization and changes in agricultural land use and yields. That being said, new forecasts relating to climate change dramatically altered the outlook. Scenarios based on simulations by climatologists introduced another major constraint. Although the findings differed depending on the hypotheses chosen, many forecasts agreed. Those of the International Food Policy Research Institute (von Braun et al., 2005), the Institute of Social Ecology in Vienna (Erb et al., 2009), the French Agricultural Research Centre for International Development (CIRAD), the French National Research Institute for Agriculture, Food and Environment (INRAE) (Paillard et al., 2010), the FAO (2018a) and the World Resources Institute (Searchinger et al., 2018) highlighted the need to reform both the prevailing modes of production to take environmental issues into account

¹ Productionism can be understood as a 'philosophy that emerges when production is taken to be the sole norm for evaluating agriculture' (Thomson, 1995).

and consumption practices – particularly by reducing waste and overconsumption of animal products to alleviate pressure on demand (Even and Laisney, 2011).

The call to double (and now increase by 70 per cent) food production by 2050 has been echoed by many agricultural players. Seed companies selling GMOs and chemical manufacturers supplying fertilizers and pesticides view this as a golden opportunity, despite being widely criticized for their negative impacts on the environment (Fouilleux et al., 2021). Agricultural-exporting countries (France, Argentina, Ukraine, Australia, the United States etc.) are also vying to consolidate their positions on a competitive international market, affirming their role in feeding the world. Despite these stances, the situation in some parts of the world continues to be problematic. Faced with still rapid population growth and the risk of major waves of migration, the need to increase food production is clear. This is particularly evident in Africa, where more than a fifth of the population continues to suffer from hunger (FAO, 2018b).

Population growth projections for 2050 remain especially high for sub-Saharan Africa. The climate change outlook further compounds the already alarming prospects for the continent (Lobell et al., 2008). The regions most heavily impacted and where agricultural production will be hit the hardest are often home to the poorest and most vulnerable populations. This area of Africa, which is highly prone to food insecurity, is where the gap between actual and potential crop yields is widest (Licker et al., 2010). Increasing agricultural productivity remains essential to improve food security and enable vulnerable farming communities to escape poverty. It is important to note, however, that the solution to food insecurity cannot simply rely on a technological strategy of intensifying agricultural production in the conventional way using chemical inputs and improved varieties. In the light of past failures and proven environmental impacts, new ways of solving the food equation must be found. These include novel biodiversity-based agricultural practices as well as new forms of organization of the food system that are more favourable to farmers. Recent guidelines proposed by the High Level Panel of Experts on Food Security and Nutrition (HLPE, 2019) and stakeholder discussions on nature-based solutions at the United Nations Food Systems Summit held in 2021 may herald change in the way that future forms of support are devised.

The shroud of productionism

Most studies agree that global agricultural biomass requirements for food and energy should increase by an estimated 50–70 per cent between 2010 and 2050.

The actual increase in these needs will naturally depend on how dietary practices evolve, particularly in terms of the prevalence of meat consumption. However, some actors argue that stressing the need to increase production legitimizes the continued development of the industrial farming techniques which, over the last century, enabled food supplies to grow faster than the population in many parts of the world. It is not so much the absence of technical progress that is holding back production in countries which need to increase it. Instead, it is farmer poverty that hampers access to this 'technical progress' or the fact that these so-called technical advances are not suited to the socio-cultural or environmental characteristics of their farms. Less technology-oriented solutions also exist, based on farmers' knowledge and research, which have proven their effectiveness but are still inaccessible to the poorest farmers: hybrid varieties, crop associations, bunds, anti-insect nets and similar farming innovations (Affholder et al., 2012). One option sometimes proposed is to target the wealthiest farmers, who are in a position to adopt these techniques. Yet this option runs the risk of marginalizing disadvantaged farmers and accelerating millions of farmers' exit from agriculture. Their subsequent outmigration could lead to a swell in urban population numbers, as was the case with the Green Revolution in India (Dorin and Landy, 2009).

Changes to agriculture therefore need to be managed in conjunction with demographic changes and the job market, rather than pursuing a futile technological leap forward. In countries that have yet to complete their demographic transition, such as in sub-Saharan Africa, agriculture will continue to be the main potential source of employment in the years to come (Losch, 2016). But these jobs are also the least attractive to young people. Making them more appealing would require improving living conditions in rural areas and ensuring greater fairness in supply chains in order to ensure better incomes for farmers. New sectors (such as organic farming) could also be sources of innovation, offering new opportunities and boosting the employment chain all the way to consumers. In Africa, given that the people suffering from malnutrition are often peasants, crop diversification and certain agroecological practices could – under the right conditions – increase incomes and improve diets (directly or indirectly) (Bezner Kerr et al., 2021; Temple et al., 2022). The relationship between poverty, agricultural production and food security is nevertheless complex, and there are still many hurdles to overcome.

Productionism has also relegated key environmental issues to the background. There is a need not only to curb the negative environmental impacts of industrial agriculture but also to foster the positive effects of new forms of agriculture

stemming from the agroecological transition: biodiversity generation, carbon sequestration, landscape management and resilience to climate change. Broadly speaking, this is a matter of promoting new forms of agriculture that are conducive to healthier ecosystems. Beyond food production methods, this also involves restoring all four functions that agriculture served until the nineteenth century, producing food as well as energy, materials and fertilizers (Chapter 4). Given the need to move away from fossil fuels for reasons pertaining to climate change, the environment (pollution) and resource depletion, agriculture can no longer be reduced to the supply of food. It must (once again) be recognized as a bio-economic issue, that is, as a multifunctional issue that transcends food. The question of biofuels recently sparked this debate. Various studies have highlighted the competition between food and non-food uses of agricultural biomass (Cornelissen et al., 2012; Erb et al., 2012). Most suggest that there is a potential risk of conflict between global food security objectives and climate change mitigation targets. This perspective thus echoes the question raised by Malthus before the Industrial Revolution: how many people can agriculture feed if it has to produce food, energy, materials and fertilizers all at once?

Finally, beyond the issue of production, the key question of consumption patterns is now emerging. The balance between supply and demand can only be achieved by adjusting both sides of the equation. Current consumption patterns in rich countries cannot be replicated worldwide – several planets would be needed to satisfy this appetite. Moreover, these modes of consumption must necessarily be challenged (willingly or by force), or they risk giving rise to unmanageable social inequality. Changing consumption patterns has largely been treated as a matter of consumer goodwill and choice, in connection with a quest to enhance individual well-being. Beyond information and awareness campaigns, public policy on this issue is still scarce (Chapter 18). In terms of governance, the emphasis on the production side of the supply–demand equation inflates the power of agricultural export lobbies in addressing the food issue while minimizing the weight of impoverished food producers and consumers. Eaters themselves, especially the most disadvantaged ones, are most often conspicuously absent from debates on food security. These actors are silently bearing the brunt of food crises – with a notable exception in 2008, when they did make their voices heard through food riots. While civil society actors defending the right to food for all are increasingly well organized, they still have little political clout compared to the powerful lobbies defending the status quo.

Conclusion

While the food crises of 2008 and 2011 pushed the agricultural sector back to the top of the international political agenda for a few years, it has once again been sidelined by other priorities. Environmental and (more recently) health issues have now taken centre stage. The goal of doubling food production has not been forgotten, but the issue has become more complex – rather than just striving to feed the world population ‘globally’, the challenge is now to ensure food security ‘locally’, in the most vulnerable areas and for the most disadvantaged populations. Agriculture often remains the main source of livelihood in these circumstances.

The concept of food systems offers new ways of addressing the complex relationships between production and food, and it is central to questions of sustainable development. By articulating the agricultural sector together with the processing, distribution and consumption sectors within the same ‘system’, it provides fresh perspectives beyond the traditional frameworks of the supply–demand equation. Under this umbrella, all these areas require renewed attention given the environmental and health issues associated with them. But more needs to be done. First, agriculture should not be reduced to its function as a commodity producer – its role (sometimes vital in developing countries) in creating jobs, improving rural people’s livelihoods and protecting the environment must also be taken into account. Second, food should not be reduced to its purely material dimension – eating not only nourishes us but also weaves special relationships with ourselves, with others and with the biosphere.

This chapter largely draws on the following publications: Bricas and Daviron (2008), Bricas and Alpha (2018), Malézieux and Corbeels (2019), Malézieux and Dabbadie (2019), and Fouilleux et al. (2021).

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References

Affholder F., Bricas N., Daviron B., Fouilleux E., 2012. La faim dans le monde, alibi pour le développement des OGM. *Libération*, 18 octobre 2012.

- Bezner Kerr R., Madsen S., Stüber M., Liebert J., Enloe S., Borghino N. et al., 2021. Can agroecology improve food security and nutrition? A review. *Global Food Security*, 29: 100540.
- Bricas N., Alpha A., 2018. Une lecture politique des débats sur la sécurité alimentaire et la nutrition, in Martin-Prével Y., Maire B. (ed.), *La nutrition dans un monde globalisé. Bilan et perspectives à l'heure des ODD*, Paris, Karthala-IRD, 29–48.
- Bricas N., Daviron B., 2008. De la hausse des prix au retour du « productionnisme » agricole: les enjeux du sommet sur la sécurité alimentaire de juin 2008 à Rome. *Hérodote*, 131(4): 31–39. <https://doi.org/10.3917/her.131.0031>
- Cornelissen S., Koper M., Deng Y.Y., 2012. The role of bioenergy in a fully sustainable global energy system. *Biomass and Bioenergy*, 41: 21–33. <https://doi.org/10.1016/j.biombioe.2011.12.049>
- Dorin B., Landy F., 2009. *Agriculture and food in India. A half-century review, from independence to globalization*, Inde, Manohar Publishers and Distributors, 280 p.
- Erb K.-H., Haberl H., Plutzar C., 2012. Dependency of global primary bioenergy crop potentials in 2050 on food systems, yields, biodiversity conservation and political stability. *Energy Policy*, 47: 260–269. <https://doi.org/10.1016/j.enpol.2012.04.066>
- Erb K.-H., Helmut H., Krausmann F., Lauk C., Plutzar C., Steinberger J.K. et al., 2009. *Eating the planet: feeding and fuelling the world sustainably, fairly and humanely – a scoping study commissioned by Compassion in World Farming and Friends of the Earth UK*, Social Ecology Working Paper, Vienna, Institute of Social Ecology and PIK Potsdam, 132 p.
- Even M.-A., Laisney C., 2011. *La demande alimentaire en 2050: chiffres, incertitudes et marges de manœuvre*, Analyse du Centre d'étude et de prospective, Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du territoire, 4 p.
- FAO, 2018a. *The future of food and agriculture. Alternative pathways to 2050*, Rome, FAO, 224 p.
- FAO, 2018b. *The state of food insecurity and nutrition in the world*, Rome, FAO, 184 p.
- Fouilleux E., Bricas N., Alpha A., 2021. Produire plus pour nourrir le monde. Processus et enjeux politiques de la construction d'un mot d'ordre global, in Bernard de Raymond A., Thivet D. (ed.), *Un monde sans faim ? Gouverner la sécurité alimentaire au 21e siècle*, Paris, Presses de Sciences Po, 129–151.
- HLPE. 2019. *Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome, 163 p.
- Licker R., Johnston M., Foley J.A., Barford C., Kucharik C.J., Monfreda C., Ramankutty N., 2010. Mind the gap: how do climate and agricultural management explain the 'yield gap' of croplands around the world? *Global Ecology and Biogeography*, 19(6): 769–782. <https://doi.org/10.1111/j.1466-8238.2010.00563.x>

- Lobell D.B., Burke M.B., Tebaldi C., Mastrandrea M.D., Falcon W.P., Naylor R.L., 2008. Prioritizing climate change adaptation needs for food security in 2030. *Science*, 319(5863): 607–610. <https://doi.org/10.1126/science.1152339>
- Losch B., 2016. Youth Employment: a challenge for the continent, in Pesche D., Losch B., Imbernon J., 2016. *A new emerging rural world: an overview of rural change in Africa*, Montpellier, Cirad-Nepad, 76 p.
- Malézieux E., Corbeels M., 2019. Limited food availability, in Dury S., Bendjebbar P., Hainzelin E., Giordano T., Bricas N. (ed.), *Food systems at risk: new trends and challenges*, Rome/Montpellier/Brussels, FAO, Cirad and European Commission, 99–102. <https://doi.org/10.19182/agritrop/00080>
- Malézieux E., Dabbadie L., 2019. Resource overexploitation and running out, in Dury S., Bendjebbar P., Hainzelin E., Giordano T., Bricas N. (ed.), *Food systems at risk: new trends and challenges*, Rome/Montpellier/Brussels, FAO, Cirad and European Commission, 55–58. <https://doi.org/10.19182/agritrop/00080>
- Paillard S., Treyer S., Dorin B. (ed.), 2010. *Agrimonde. Scénarios et défis pour nourrir le monde en 2050*, Versailles, Quæ, 296 p.
- Searchinger T., Waite R., Hanson C., Ranganathan J., Dumas P., Matthews E., 2018. *Creating a sustainable food future*, Washington, DC, World Resources Institute, The World Bank, United Nations Environment Program.
- Sen A., 1982. *Poverty and famines. An essay on entitlement and deprivation*, Oxford, Oxford University Press, 276 p.
- Temple L., Malézieux E., Gauthier D., Aubry C., Pourrias J., Punete Asureros R., de Bon H., 2022. Agroecological innovations, food and nutrition security and food safety for small farmers: Africa-Europe perspectives, in Thomas A., Alpha A., Barcczak A., Zakhia-Rozis N. (ed.), *Sustainable food systems for food security. Need for combination of local and global approaches*, Versailles, éditions Quæ, 99–112.
- Thomson P.B., 1995. *The spirit of the soil: agriculture and environmental ethics*, London, Routledge, 216 p.
- von Braun J., Rosegrant M.W., Pandya-Lorch R., Cohen M.J., Cline S.A., Brown M.A., Bos M.S., 2005. *New risks and opportunities for food security: scenario analyses for 2015 and 2050*, 2020 Vision Discussion Papers, Washington, DC, International Food Policy Research Institute (IFPRI).
- World Bank, 1986. *Poverty and hunger. Issues and options for food security in developing countries*, A World Bank Policy Study in Developing Countries, Washington, DC, The World Bank, 69 p.

