



Perspective

Food, pandemics, and the Anthropocene: On the necessity of food and agricultural change

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Abstract

The COVID-19 crisis demonstrates forcefully that human health, the well-being of animals, and planetary health must not be viewed in isolation—and that they all depend to a large extent on the ways in which we produce, process, trade, and consume food. In this perspective essay, we argue for the centrality of food and agriculture to the epoch of the Anthropocene and why profound changes are needed more than ever. We close with some reflections on how the disruptions associated with the current pandemic also offer the opportunity for the necessary ecological, economic, and social transformation of our agri-food systems—toward healthy humans, animals, and a healthy and biodiverse planet.

Keywords: Agri-food; COVID-19; Anthropocene; climate crisis; planetary health; one health

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Introduction

At the time of this paper’s publication, we had already experienced over two years in a pandemic with far-reaching consequences for our health systems, our economies, and our daily lives. The last few years have shown us the vulnerability of the fabric of civilization in our globally networked contemporary world with its increasingly polarized societies. Despite the drastic changes wrought by the pandemic, we should not approach COVID-19 as a “Black Swan,” an extremely rare event that seems to have descended upon us out of nowhere. On the contrary, the COVID-19 pandemic only makes systemic problems visible and tangible in a dramatic way. These systemic problems are based on the mutually reinforcing interactions between the rapid deterioration of the global environment and social, economic, and technological dynamics.

COVID-19 demonstrates forcefully that human health, the well-being of animals, and the global ecological crisis must not each be viewed in isolation, but rather as dependent to a large extent on the ways in which we produce, process, trade, and consume food. After establishing these connections in the following two sections, we argue for the centrality of food and agriculture in understanding the ecological precarity from which systemic threats such as the COVID-19 pandemic originate. We do so through the lens of the Anthropocene concept in section four (“The global agri-food system as driver and victim of the Anthropocene”).

Anthropocene is the name for a proposed geological epoch that is spurred by the accelerating accumulation of human-industrial impacts on the global environment. It is characterized by a geologically abrupt shift in the climate system, alarmingly shrinking biodiversity, the introduction of novel materials and contaminants, and the imminent collapse of entire ecosystems—fundamental and sometimes irreversible changes of the Earth system that are of anthropogenic origin and hardly have a geological analogue in Earth’s long history. We close with some reflections about how the disruptions associated with the current pandemic also offer an opportunity for the necessary ecological, economic, and social transformation of our agri-food systems—toward healthier humans and animals, and a thriving biodiverse planet.¹

Pandemic, planetary health and our food system: Why food matters

What do we know about the relationship between the pandemic, planetary health, and our food system? Research has shown that a key driver for the increase in Emerging Infectious Diseases (EID) observed in recent decades is the increase in so-called zoonoses—that is, diseases transmitted between animals and humans (Akram-Lodhi, 2020; Cupertino et al., 2020; UNEP,

¹ This paper is in part based on Rosol & Rosol (2021).

2016). The main reason for the increase of such zoonoses is the persistent expansion of the contact zone between humans and animals, in turn caused by the rapid fragmentation and destruction of wildlife habitats.

In addition to land use change caused by urbanization and mining, this loss of habitat is being particularly driven by the destruction of forests for agricultural use—as can be observed, for example, in the Brazilian Amazon regions, where rainforests are deliberately set on fire to replace them with cattle pastures and croplands. As a result—and as seems to have happened at the wet market in Wuhan—wild animals, sometimes the last of their kind, come into direct contact with other species and ultimately with humans. Another favourable factor for the spread of zoonotic pathogens is the genetic homogeneity and spatial concentration that prevail in intensive livestock farming. Once a pathogen has been introduced, this form of factory farming is an ideal breeding ground for the spread of infectious diseases (Hollenbeck, 2016; Wallace, 2016; Weis, 2013).

The novel coronavirus has made visible these connections between human and animal health, and between planetary health and food systems in previously unknown ways and across the globe. However, it was neither the first nor the last dangerous pathogen that we will have to endure. In fact, thousands more previously unknown viruses are slumbering in the animal world, just waiting for the species barrier to be crossed. SARS-CoV-2 might not only indefinitely mutate, it may also be followed by SARS-CoV-3, threatening to overwhelm health and social systems again and putting the world into another economic and social coma.

However, understanding the cause of ongoing pandemics also provides the key to preventing the ones to come. New concepts in public health research such as “One Health” (Atlas & Maloy, 2014; WHO et al., 2019) or the demand for a “Planetary Health diet” (Willett et al., 2019; Whitmee et al., 2015) already consider the elementary relationship between animal, environmental, and human health.² These concepts rest on the premise that human health is directly related to biodiverse and largely uncontaminated ecosystems (Romanelli et al., 2015). If these are missing or permanently disturbed, it could jeopardize food security and the availability of water, lead to more deaths from extreme weather events and, as previously mentioned, result in more frequent contact with communicable diseases.

² One Health and Planetary Health are related concepts but with distinct origins and focus. One Health originates in veterinary medicine and mainly emphasizes the interconnection between human and animal health, while also acknowledging environmental health. A first One Health Initiative Task Force was set up by veterinary medicine in 2006 in response to the avian flu outbreak in the early-mid 2000s. The approach is now supported by both the World Health Organization and the FAO – the UN's Food and Agriculture Organization. The concept of Planetary Health originates in human medicine and environmental sciences and stresses the importance of intact and healthy natural systems for human health. It gained traction since the Rockefeller Foundation and The Lancet launched their Commission on Planetary Health in 2015.

Consistent climate and biodiversity protection is therefore also effective health protection. In other words, the most effective prophylaxis against pandemics of the kind we are currently experiencing globally is the consistent protection of natural diversity and the maintenance of spatial barriers between host animals and humans. The preservation of species-rich and thus resilient natural spaces for animals and plants, the stabilization of regional ecosystems and, ultimately, global climate protection are not just “nice-to-haves”—rather, such environmental efforts are essential to ensure livelihoods in the long term. More than that, there are indispensable and comparatively cheap measures to prevent further ruinous pandemics.

Food insecurity, social determinants of health, and multifunctionality of agriculture

As shown, our current industrial—or capitalist (Akram-Lodhi, 2020; Holt-Giménez, 2017)—agricultural and food systems must be seen as a major cause of the spread of new infectious diseases. In addition to the medical-biological relationship just described, the central influence of agriculture and food on human health extends much further. From a global perspective, most premature deaths are not caused by infectious diseases, but rather by hunger, malnutrition, and unhealthy diets. Worldwide, at least 900 million people are still undernourished. In addition, all so-called diseases of civilization—such as diabetes, cardiovascular diseases, high blood pressure, or weakened immune systems—are related to our diet (Afshin et al., 2019; Development Initiatives, 2020; Rockström et al., 2020; Willet et al., 2019).

COVID-19 is now exacerbating already existing food insecurity. The UN World Food Programme—which later in 2020 won the Nobel Peace Prize—had already predicted in the summer of that year that more people would die of hunger caused by the social and economic consequences of the pandemic than of the infectious disease itself (Oxfam, 2020; for a recent update see FAO, 2021). The pandemic also poses a threat to food security in highly developed countries, such as the USA, both directly, because of the absence of school meals during the lockdown, and indirectly, because of pandemic-induced income losses, particularly affecting women as well as low-income and racialized households (Kinsey et al., 2020; Akram-Lodhi, 2020).

The COVID-19 pandemic once again shows the crucial importance of social protection systems and functioning public welfare services—including a reliable public health sector—for effective health care. After all, in addition to biological and environmental factors, health is essentially determined by socio-economic factors (rather than by “lifestyle choices”), such as income, poverty, social status, and social inequality—the “social determinants of health.” These socio-economic conditions are heavily influenced by government action and public policy—or by its absence, by government inaction (Marmot & Wilkinson, 2005; CSDH, 2008; Raphael, 2016).

The importance of socio-economic conditions also relates to the often-neglected multifunctionality of agriculture. In addition to its responsibility for intact ecosystems and for securing food and preserving cultural heritage, agriculture also provides livelihoods (IAASTD, 2009; Holt-Giménez, 2017, 2018). According to the International Labour Organization (ILO), in 2017, almost 30 percent of all employees were still working in agriculture alone (70 percent in the poorest countries), in addition to almost half a billion people in subsistence agriculture. The food sector as a whole continues to employ most people on the planet (Böhm et al., 2020, p. 198).

But in this sector in particular—from food production to processing, distribution, consumption, and waste management—fair wages and good working conditions are rare (Gottlieb & Joshi, 2013; Alkon & Guthman, 2017). It is no coincidence that the most serious COVID-19 outbreaks are found in the meat industry in Canada, the USA, or other countries like Germany (Garcés, 2020; Ramos et al., 2020; Parks et al., 2020). These are precarious forms of employment, substandard working conditions, limited workers' rights, especially for migrant workers who are often on temporary and restrictive work visas, and yet a limited number of powerful multinational companies such as Cargill dominate the food and agriculture sector (Akram-Lodhi 2020; Clapp et al., 2022; Haley et al., 2020; Hendrickson 2020). The COVID-19 outbreaks in the meat industry and among farm workers again underscore the importance of the social determinants of health, especially living and working conditions, which are very unequal in our capitalist societies.

The global agri-food system as driver and victim of the Anthropocene

Beyond the actual food sector, the central importance of agriculture and food is also shown in the assessment of leading sustainability scientists, who argue that without a far-reaching agricultural and food transformation, neither the sustainable development goals of the UN nor the goals of the Paris Climate Agreement will be met (Rockström et al., 2020, p. 3). These scientists refer to the increasingly visible direct connection between the current dominant agricultural and food system and the climate and biodiversity crisis. In a high-profile contribution to the discussion by Rockström et al. (2020), our agricultural and food system has been characterized as a central *driver* as well as the first *victim* of the Anthropocene.

What is the Anthropocene? The Anthropocene is the proposed geological epoch in which human activities exert a formative influence on the geochemical and biological composition of the various Earth spheres, such as the atmosphere, hydrosphere, or biosphere. According to current investigations in the geological community (Zalasiewicz et al., 2017), our planet is said to have entered this epoch during the middle of the last century, albeit anthropogenic changes to regional-scale environments date back millennia and are particularly tied to agricultural practices

developed in different parts of the world since the Neolithic Revolution. However, the rapid industrial and agro-industrial development of the late twentieth- and early twenty-first century has led to massive changes on a planetary level, which in their clarity and irreversibility are on par with earlier climatic or evolutionary changes or events in the history of the Earth that have marked the start of geological epochs and eons. Human industrial activities are thus actively pushing planetary conditions out of the Holocene—and therefore out of the last 11,700 years of relatively stable climatic and ecological conditions, from which our current civilization was able to develop gradually (Steffen, Richardson et al., 2015).

As a short form for the current ecological mega crisis, the Anthropocene is not an uncontested concept. We agree with some of the important critiques it has faced outside the geosciences itself, such as its totalizing tendencies that have obscured structural inequalities, capitalist relations of production, and the very unequal contribution of different human groups to global environmental change, potentially leading to depoliticizing the ecological crisis (Reisman & Fairbairn, 2021; Swyngedouw & Ernstson, 2018; Moore, 2017 and 2018). Nonetheless, we see the Anthropocene concept as instrumental in dimensioning and communicating the severe, interconnected, and often irreversible effects of human impacts on the entirety of the Earth system.

In view of this fundamental disruption of planetary conditions, the current COVID-19 pandemic marks only one symptom among many of the highly dynamic changes and elementary risks associated with the transition into the Anthropocene. The focus on the mid-twentieth century gives an indication of this dynamic that now threatens to overwhelm ecosystems and human societies. Earth system scientists speak of the “Great Acceleration”: the exponential increase in many socio-economic and terrestrial system indicators of planetary change since around 1950. Most of these factors are directly related to agriculture, for example the increase in the use of fertilizers and freshwater, the rise in methane, nitrous oxide, and carbon dioxide emissions, the loss of tropical forests as a result of expanding croplands and pasture, the general deterioration in the biosphere on land and in marine ecosystems due to overfishing and shrimp aquaculture, and the expansion of marine dead zones due to the increasing nitrogen levels in coastal waters caused by overfertilization and intensive livestock farming. It is no coincidence that the accelerating use of the biosphere is co-original with the massive increases in agricultural production due to the Green Revolution, the rise of molecular genetics, the industrial use of antibiotics, but above all the general mechanization and industrialization of agriculture favoured by the availability of cheap crude oil—decisive developments that started after the end of World War II (Steffen, Broadgate et al., 2015).

For all these reasons, our agri-food system has been identified as a major *driver* of crossing the series of nine indicators that mark the previous area of stability of the Holocene, the so-called “planetary boundaries.” The crucial role of agriculture is evident in all areas in which these limits have already been exceeded (such as the rapid loss of biodiversity and the fundamental change in the nitrogen and phosphorus cycles), and also in those areas in which such an overshoot is imminent unless decisive countermeasures are taken (greenhouse gas

emissions, freshwater consumption, changes in land use, and, in particular, deforestation) (Rockström et al., 2020; cf. also Crippa et al., 2021; B. M. Campbell et al., 2017; Clapp et al., 2018; Shattuck, 2017; Williams et al., 2015).

At the same time, more than other economic sectors, the agricultural sector especially is suffering directly from the consequences of climate and global change: from increased frequency and severity of extreme weather events, especially droughts and floods; from depleted and eroded soils; and from a rapid decline in biodiversity characterized by shrinking insect and bird populations, as pests and climate-migrating species overburden weakened ecosystems. These changes do not only affect the livelihoods of farmers, they also endanger global food security in the medium and long term. Agriculture has therefore been called a *victim* of the Anthropocene (Rockström et al., 2020; cf. also Willett et al., 2019).

Ways forward

Nonetheless, aside from being driver and victim, the agri-food sector also has much potential for providing solutions. Here, many innovative approaches and trail-blazing efforts to counteract these trends may already be found. In fact, the agri-food system has become a prominent site of individual and collective agency and a vibrant context for the imagination of more sustainable alternatives (cf. also Reisman & Fairbairn, 2021).

First of all, climate and environmentally compatible agriculture is not only possible, it may also play a crucial role in enhancing biodiversity and in efforts toward achieving net zero CO₂ through carbon sequestration in soils and plants (remember, agriculture for a long time was a *source* of biodiversity). More generally speaking, agroecology, as an integral agricultural approach, offers possibilities and instruments to improve environmental, animal, and human health decisively and to withstand, mitigate, or prevent future crises such as epidemics and climate crises (Altieri & Nicholls 2020). An important promoter of agroecology, food sovereignty, and political changes to trade and food regimes, La Via Campesina, which has around 200 million members comprised of mostly small farmers, is currently the largest social movement in the world (Anderson et al., 2019; Martínez-Torres & Rosset, 2010).

Second, especially in the food sector, new (and certainly old) economic approaches are being experimented with, which can be ground-breaking for a post-fossil society. These include, for example, food sharing initiatives and community supported agriculture (CSA) as well as agricultural, worker, restaurant, and consumer cooperatives. A socio-ecological transformation must inevitably also be based on changed forms of economic activity. It is no coincidence that the food sector is cited as a key field of learning and intervention in debates around post-growth, sufficiency, and alternative economies (Braun et al., 2018; Čajka & Novotný 2022; Gerber, 2020; Rosol, 2020; Rosol & Barbosa Jr., 2021; Schneidewind & Zahrnt, 2016).

An agricultural transition, however, is still in its infancy and its necessity seems little understood in public perception. The intrinsic connection between agriculture and the environment is still mostly ignored and short-term thinking dominates. In an economic sector characterized by small margins and unreliable earnings, environmental goals such as water, species, and climate protection are often perceived as threatening the livelihood of farmers. As a consequence, although agricultural production depends more than other sectors on healthy environments, farmers are easily pitted against environmentalists in political debates and mainstream media (van der Ploeg, 2020). Moreover, small advances in one area (for example, increasing demand for organically produced food in western industrialized nations) are wiped out by major setbacks in other areas (for example, deforestation in Asia, Africa, and South America).

The global threats and challenges, the urgency of our actions, but also the horizons of the possible have become clearly visible during the COVID-19 pandemic. Structural problems of the current agri-food systems as well as alternatives offered (C. Campbell, 2021) have received more attention. This increased attention, holding the potential for more lasting change, should now be mobilized. The COVID-19 pandemic as a monstrous—although certainly not a singular—incident underscores the need for a comprehensive socio-ecological transformation, which aims to halt the trend toward the deterioration of the foundations of life and health and to reverse it in the medium term—before catastrophic tipping points are reached.

We are still in the middle of the pandemic and the trauma of a disruption to social interaction has yet to be overcome. As known from many other crises, however, after a phase of acute escalation, social oblivion quickly sets in again, and, in this instance, is fostered by the “back to normal” attitude of western governments that accompanied the vaccine roll-out. It is important to break from this mental and political mechanism and act with foresight. The COVID-19 crisis is a fundamental crisis, and it will take years to overcome—time that we will not have again to implement the necessary transformations.

How agriculture and food should and could be transformed to make it sustainable and fair has long been studied and known. There are countless practical examples and scientific studies that range from very concrete recommendations—for example, specific farming methods—to more fundamental, systemic considerations (not least detailed already in the UN world agricultural report, IAASTD, 2009). The concepts and technologies have long existed—even if they could, of course, benefit immensely from increased investment in research and practical support of farmers—what we need now, is to implement them, to put them into practice.

The above approaches, like food sovereignty, agroecology, and alternative economic organizations of our food systems ensuring livelihoods, decent work, and liveable wages, offer a glimpse of what needs to be done. Also sought and supported by this journal, we observe an increasing interest to detail what a food systems transformation might look like as well as the barriers preventing or at least hindering such changes. However, the aim of this short perspective piece is not to attempt to fix what such a transition should precisely look like. This will invariably change through collective efforts to understand and change material conditions. We also recognize that discussion and actions toward transformative change are always situated

and partial, historically and geographically specific, and informed by particular experiences and social locations. Rather, we argue that the pandemic has once again demonstrated the centrality of food and agriculture in our current, crisis-laden transition into the Anthropocene and why profound changes are thus needed more than ever. Thus, the aim of this intervention is not to detail the “how” of the changes, but rather to stress the fundamental level at which the “why” occurs.

Overall, our social and economic response to this crisis must take both the current knowledge and the already extensively developed solutions seriously. Public money, which is now being spent, is wasted if it does not serve to create resilience and regeneration in the fragile human-earth system. The comprehensive government measures in response to the pandemic have shown us that it is entirely possible to act quickly and decisively, supported by the necessary public investments. Let us use this opportunity to set the necessary course for the long demanded agricultural and food transition.

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