NEGOTIATING CLIMATE CHANGE IN CRISIS

EDITED BY STEFFEN BÖHM
AND SIAN SULLIVAN

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2. From Efficiency to Resilience: Systemic Change towards Sustainability after the COVID-19 Pandemic

M. Halme, E. Furman, E.-L. Apajalahti, J. J. K. Jaakkola, L. Linnanen, J. Lyytimäki, M. Mönkkönen, A. O. Salonen, K. Soini, K. Siivonen, T. Toivonen and A.Tolvanen

The COVID-19 pandemic has revealed the vulnerability of current socio-economic systems and thrown into question the dominant global paradigm geared towards short-term financial efficiency. Although it has been acknowledged for several decades that this paradigm has detrimental impacts on the climate, the environment and global welfare, the pandemic has now offered a grim 'rehearsal round' for more serious crises that are to come with the accelerating climate emergency, loss of biodiversity and growing human inequalities. Along with worsening climate change, there are looming risks for mass migrations and armed conflicts as habitats capable of supporting human wellbeing become scarce, such as through the loss of potable water, an increasing lack of suitable land for agriculture, or the rise of unliveable temperatures. Although the COVID-19 pandemic has temporarily decreased some of the climate impacts, e.g. in the energy and transportation sectors, it has at the same time accelerated several global welfare problems. In this chapter, we claim that the way out of the crisis scenario is to replace

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the dominant efficiency paradigm with a resilience paradigm. Against the backbone of the key societal systems outlined in the *Global Sustainable Development Report* (GSDR 2019), we show how the pursuit of narrowly-defined efficiency hampers present and future sustainability, and chart some key actions on the path to transforming these systems towards resilience.

The Problem of Extreme Efficiency

The efficiency paradigm ruling global business has led to the dominance of global trade and supply networks, in which a British citizen is dependent on medicine manufactured only in China, or in which a citizen of the Nordic countries, in the barren midwinter, buys tulips grown in Kenya by Dutch companies, and Brazilian farmers depend on seeds supplied by multinational corporations. Efficiency has become a taken-for-granted organising principle for the global economy (Martin 2019), meaning we seldom pause to think about the 'costs'—widely defined—accompanying the efficiency of the current global economy. Many times, efficiency actually refers to low cost—cheap clothes, electronics, food—but often not to better products with lower overall costs. Efficiency often generates what in economics are called 'externalities'—uncosted costs or benefits for third parties, including 'the environment'—and has limited capacity to bring about a reduction in use of natural resources and accumulation of waste on a global scale (also see Lankford, this volume). Furthermore, gains in efficiency leading to lower prices are likely to be offset by increased consumption, which in turn has led to increased overall emissions and resource use (Heindl and Kanschik 2016; Alcott 2005), and compromised the resilience of economic and ecological systems (Martin 2019) (recognising that these 'systems' are also interconnected).

The Socio-Ecological Price of Efficiency

On the social side, the efficiency paradigm has led to the exploitation of those that have weak negotiating power in the (global) marketplace. Despite the benefits that international trade has brought to a number of people, trade also comes with externalities, such as salaries pushed below

a living wage, human rights violations in supply chains, and increasing economic inequality (GSDR 2019, authored by Independent Group of Scientists appointed by the Secretary-General, Global Sustainable Development Report 2019; Shorrocks et al. 2016). The sharpening inequalities indicate that efficiency currently disproportionately benefits those in power: executives and shareholders of global firms or local elites in developing countries.

On the ecological front, efficiency as the organising principle externalises costs related to climate change, pollution, biodiversity loss, and dwindling natural resources. One of the key enablers of efficiency is incomprehensible and weak environmental legislation that allows these externalities to exist, creating possibilities for companies and consumers to avoid paying the costs of environmental damage such as carbon emissions that will be borne by society as a whole, and making the slow response to climate change "the biggest environmental market failure in human history" (Auffhammer 2018). This dynamic is exacerbated by global supply chains, in which a company headquartered in a country with stronger environmental legislation can take advantage of lax environmental laws in supplier countries.

Towards Resilience

The COVID-19 pandemic has made visible the vulnerabilities of current efficiency-based systems, and generated an urgent need to create more resilient societies. Resilience can be defined as a symbiosis of human and natural systems that can support one another to survive and transform through natural and manmade shocks (Walker et al. 2004; Elmqvist et al. 2019). This means that the processes of natural systems are sustained by supportive societal actions, and social systems are sustained by well-functioning natural systems. The *Global Sustainable Development Report* (GSDR 2019) proposes a universal framework for transforming six connected dimensions of societal organisation towards sustainability. In the rest of this essay, we provide a rough idea of how extreme efficiency hampers these six systems and how they could be organised so as to lock-in greater resilience.

1. Economy

Current global trade has been widely extolled as a prime example of efficiency, but its efficiency gains do not materialise at the whole system level. Mainstream business models are based on selling high volumes of easily breakable products and many externalities follow from low-cost sourcing in countries with lax regulations and old technologies. Further, global freight shipping, one of the cornerstones of global trade, comes with an ecological price: its CO_2 emissions would make it the ninth biggest country in the world (EU Edgar database) and its NOx emissions make thousands of people ill annually.

The COVID-19 pandemic has revealed the vulnerability of global supply chains: when one part of the chain is disabled, negative impacts are felt by many (O'Rourke 2014). When China closes down factories that manufacture up to 70% of ingredients of common drugs, or India limits exports of drugs like paracetamol or popular antibiotics, those in need of medicines in the Global South, but also in the US or Europe, suffer the consequences. Further, the efficiency quest has made us believe that labour is an expense that should be minimised. At its extreme, the low-wage trend has meant that employees cannot make a living with their wages, and need social benefits. As a result, the wider economy suffers when taxpayers end up paying employers' costs. In societies with no social benefits available, the low-wagers suffer from unfulfilled basic needs. In a resilient economy firms would focus on long-term productivity. Means to avoid the above negative impacts include curbing the excess concentration of ever larger firms, re-deploying smart trade barriers and reducing the widening wealth gaps that breed social unrest and populism (Edelman Trust Barometer 2020). Curbing the size of firms would leave room for smaller, often innovative, competitor firms and, through firm diversity and genuine competition, build resilience at the system level (Martin 2019). Reducing the dominance of large corporations would pave the way for a resilient economy where other stakeholders could bargain for institutions, which in turn could divide economic benefits more justly (Piketty 2013).

2. Food

The efficiency-driven agricultural system, based on large monoculture farming, commercial fertilisers, chemical pest control, fossil fuels and global logistics, comes with underlying problems of loss of fertile top soils and biodiversity, large-scale use of antibiotics in meat production and the subsequent threat of antibiotic resistance in humans, and the lack of affordable, healthy food. As a result, the number of people suffering from severe food insecurity is about 750 million, and about two billion people lack regular access to nutritious and sufficient food, whereas at the same time, about two billion people suffer from obesity and related illnesses, including thirty-eight million children (FAO, IFAD, UNICEF, WFP and WHO 2020). Resilience can be built instead by localising food production (as also argued by Sandover, this volume), switching to organic farming and agroforestry to provide alternatives to monocultures, increasing the organic matter content in soils, and carbon sequestration through the agroecological practices adapted to local conditions. Ensuring land property rights and other support for the 600–750 million smallholder farmers that are likely to be operating in 2030 will be a key component of a resilient food system (Thornton et al. 2018). The COVID-19 pandemic may have led to 83–132 million more undernourished people in 2020 (FAO, IFAD, UNICEF, WFP and WHO 2020). Acknowledging that modern agriculture and food production cannot escape the realities of ecological food chains is key for preventing the emergence and spread of vector-borne diseases. A shift toward plant-based diets adds resilience by reducing the high demand for land for livestock, the climate impacts of meat production, and the overuse of antibiotics, and also supports innovations against food loss in local production chains by enhancing the viability of local businesses.

3. Energy

The COVID-19 pandemic has demonstrated the weaknesses of the current centralised fossil fuel paradigm. During the first quarters of the pandemic, coal demand fell by 8% and oil demand fell by 5%, leading to serious financial crises for fossil fuel-based energy producers (Global Energy Review 2020). At the same time, the demand for renewable energy continued to grow due to a larger installed capacity and priority

dispatch[1] (Global Energy Review 2020). Three persistent structural vulnerabilities were revealed in our fossil fuel-dependent economy and energy systems. First, declining system efficiency is a result of decreases in Energy Return on Investment (EROI) of fossil fuels. This means that, although oil deposits exist, extracting oil is becoming increasingly costly and difficult with larger environmental damage. Second, the rebound effects of improving energy efficiency have decreased emissions per unit, but the absolute amount of emissions continues to increase. Third, indirect energy use, i.e. energy embedded in products and services, continues to grow due to increasing consumption and global trade. Moving from a centralised fossil fuel-based structure toward distributed renewable energy systems will be key to enabling more resilient energy systems. Resilience provided by off-grid technologies and localising energy production and consumption (O'Brien and Hope 2010) will be critical for mitigating the poor infrastructure in large urban centres, extending the grid to rural areas and enhancing just, secure, and affordable energy for all. Furthermore, reducing consumption-based carbon footprints with new sufficiency measures will be important in order to reach climate targets (see Linnanen et al. 2020).

4. Urbanisation

COVID-19 has hit the 4.2 billion people living in cities around the world particularly hard. Dense urban structures have made urban areas hotspots of virus spread. This situation highlights the need to rethink urban structures from a new, more local perspective, embracing resilience over efficiency. Maximising urban efficiency from the viewpoint of infrastructure and economics easily leads to urban environments with fewer green areas, sparse service networks, long commutes and distant food production. Cities that have emphasised human scale in their planning are likely to be more resilient, not only during crises like pandemics but also when confronting disturbances from climate events. Furthermore, diversity in urban structure and flexible use of buildings and open areas are beneficial for cities and citizens in general (Jacobs 1961), because neighbourhoods with high social capital are able to provide a support network and social resilience. Well-functioning,

1 Editors' note: wherein the dispatch of energy from renewable generators is prioritised ahead of other generators.

locally connected administrations equipped with up-to-date data and analytical practices are also considered crucial for increasing the resilience of cities and their populations. Planning cities for people goes hand-in-hand with building more sustainable and resilient cities that are also better prepared for future crises.

5. Human Wellbeing and Capabilities

From the perspective of extreme efficiency seeking, the main roles for humans are top-performing professionals, cheap labour and consumers constantly buying new products and services. Individuals who do not meet these standards become framed as 'friction' in an otherwise efficient system. In organisational contexts, performance measurement, with its roots in industrial efficiency, has penetrated to all sectors, including healthcare and education. Each societal actor assesses their actions based on the efficiency and profitability of only their own sector. Maximisation of efficiency in the short run, however, leads to inefficiency in the long term, as well as to a lack of holistic wellbeing. The illusion of efficiency contributes to the crises of our time and risks reducing the capabilities of humanity in total. The COVID-19 pandemic has revealed the lack of resilience also in societies with substantial material wealth. It has widened inequalities that affect wellbeing, e.g. between different categories of labour: some people can work from home, others, often in low-paid jobs and more vulnerable positions based on their socio-economic income levels, cannot. This has resulted in situations where people working in low-paid jobs either lost their income completely or were exposed to the virus. Resilience can be strengthened by supporting the agency and diversity of human capabilities, sustaining cultural practices connected to identities, raising awareness about ecological problems connected to remediating practices, as well as by fostering global belonging and ecological citizenship (Duxbury et al. 2017). Instituting lower pay differentials and a basic income for all would also increase human wellbeing and create space for capability building. A holistic view of health and wellbeing is needed to complement specialised healthcare and contribute to a substantial shift from curative to preventive action and to increase preparedness, so as to improve the resilience of communities, societies and humanity in the face of grand challenges.

6. Global Environmental Commons

Economic growth has been largely enabled through intensive and wide-scale exploitation of resources in terrestrial and ocean ecosystems. Thus, global environmental commons provide 'source material' for the efficiency paradigm and are also where the consequent externalities are most visible. Despite relative efficiency gains, since 1970 global material extraction has more than tripled (Oberle et al. 2019) to fulfil the needs of the growing population and higher economic growth. Species loss, habitat destruction, pollution, the spread of invasive species, and climate change reflect the overexploitation of Earth's resources, which constitutes a threat to human health and wellbeing (Montanarella et al. 2018). By threatening the environmental commons, we are also enabling emerging zoonotic[2] diseases. The COVID-19 pandemic has emphasised how human wellbeing is intimately connected with the wellbeing of the natural environment. Increasing resilience in this system calls for active measures aimed at a putative 'no-net loss' in biodiversity and other environmental commons. Proposals include the conservation of large parts of the Earth (Wilson 2016), and the restoration of certain degraded habitats to fully compensate for the loss and degradation of habitats elsewhere (Moilanen and Kotiaho 2018). These bold conservation objectives, however, conflict with other demands for land use.[3] Thus, even though it is likely that increased resilience in the five other systems will have positive impacts on global environmental commons, resilience requires concerted cross-sectorial action, e.g. tackling the drivers of land-use change. For example, without the above outlined transformation of the food system, the protection of global biodiversity will be in conflict with affordable food provision (Leclère et al. 2020).

2 Zoonotic diseases are diseases that "pass from an animal or insect to a human. Some don't make the animal sick but will sicken a human" (see https://www.healthline.com/health/zoonosis).

3 Editors' note: such proposals also require caution since they can act to devalue land-use practices and modes of production by communities who may have sustained biodiversity over the long term.

Conclusions: Towards a Resilience Transformation

The COVID-19 pandemic has revealed the fundamental problems in current efficiency-driven, global socio-economic systems. A way out is to promote radical changes in the six key systems discussed in this chapter (GSDR 2019), so as to foster a transition towards resilience. Mitigating climate change is not simply a case of reducing emissions, but rather requires parallel changes in all of the six global systems discussed here. Despite posing a major threat to humanity, the COVID-19 crisis also paradoxically gives us hope that this kind of change is possible. First, the forced economic slowdown has demonstrated that considerable and rapid changes in emissions and pollution levels to reduce climate impacts are possible, but require considerable alteration and transformation of the current efficiency paradigm to make the impact durable. Second, and more importantly, the reactions to COVID-19 in many countries have shown that it is possible to change behaviours fast when the evidence shows that current paths are unsustainable. This may create new hope and invigorate our belief in the possibility of transformation through evidence-informed decisions. Simply put, the economy is governed not by natural laws, but by routines, conventions, rules, and policy decisions made by human individuals and communities that can be adjusted. This experience has shown the power of the crisis and supports the idea of declaring a climate emergency as a global climate crisis.

The COVID-19 pandemic shines a light on the co-benefits for humanity and nature that can be achieved by a series of interconnected activities aimed at resilience. Moving aspects of production processes closer to where consumption takes place reduces dependency on long supply networks. It would also provide a 'face' to production workers, making extreme forms of labour exploitation more difficult. A transition toward more plant-based diets is not only healthier, but also reduces CO_2 emissions and helps maintain biodiversity, as less space is needed for feeding livestock. Renewable-based distributed energy production creates more jobs and opportunities for income amongst local communities and households who produce wind and solar energy (although see Dunlap's critique of industrial-scale renewable energy, this volume). The resilience transformation could also be called 'the transformation to a globally informed, but more localised economy'.

Removing externalities, which are the main economic drivers of unsustainable development, requires more comprehensive and global environmental governance. Localised economies with globally coherent environmental governance would not harm the economy as a whole, but would rather give more opportunities and hope to those who have been losers in the extreme efficiency paradigm. To raise hope, it is this aspect of the resilience story that we must first start talking about, so that we can then start walking the talk.

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