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## 1AC

### 1AC---Food ADV

#### The sole contention is Food.

#### The present nature of merger policy over the agriculture sector threatens both the access to AND availability of food---there are two internal links:

#### 1. SYSTEM RESILIENCE.

#### There are imminent threats to food supply chains---that risks cascading destruction. BUT, building in system resilience through an innovative process mitigates shocks.

Dr. Ika Darnhofer 21, Associate Professor, Economic & Social Sciences, University of Natural Resources and Applied Life Sciences, Vienna, "Resilience or How Do We Enable Agricultural Systems to Ride the Waves of Unexpected Change?" Agricultural Systems, Vol. 187, February 2021, ScienceDirect.

The COVID-19 pandemic is the most recent example of an unexpected event with far reaching impact. Earlier examples include the collapse of the Soviet Union, the BSE crisis, the terrorist attacks of 9/11, the 2008 financial crisis, the Fukushima Daiichi nuclear disaster, Brexit, as well as the string of extreme weather events linked to the climate crisis. The processes that unfold after such an event tend to be unpredictable, as they result from the interplay of objective facts, how various actors make sense of these facts, and how the economic, institutional and social relationships link the various actors in a complex web of interdependencies (Jasanoff, 1997; Law, 2006; Law and Mol, 2010; Lang, 2010; Leach et al., 2010; Biggs et al., 2011; Rosin et al., 2012; Béné, 2020; Enticott and Maye, 2020; Marchant-Forde and Boyle, 2020; Thorsøe et al., 2020).

Unexpected events remind us of a key message of resilience thinking1: that agricultural systems not only face slow, predictable change, but also rapid, unpredictable change (Fig. 1). I would argue that much research on change in agricultural systems has focused on slow, predictable, controlled, planned, managed change, with much less attention to their ability to face the unexpected, to navigate surprises, to benefit from unpredictable events. Accordingly, the methodological tools available to assess risk are in much wider use than those that allow to ponder uncertainty.2 Similarly, many approaches to studying resilience focus on the ability of the system under consideration to ‘bounce back’ after a shock, thus implicitly contributing to maintain the status quo, possibly with some marginal adjustments. This has been heavily critiqued by social scientists, as the current situation is often fraught with social inequities, so that maintaining the status quo implicitly supports the powers-that-be (see Cote and Nightingale, 2012; Brown, 2014; Olsson et al., 2015). Much rarer are studies of resilience that focus on the ability to ‘bounce forth’ (Davoudi, 2012), i.e. for an agricultural system to implement major adaptations or even transform, not least in response to an unexpected event. It thus seems that we like to ‘tame’ real-world issues, rather than accepting their ‘wicked’ nature (see Rittel and Webber, 1973).

[Figure omitted]

I argue that it would be helpful to redress this imbalance, acknowledging that unexpected events are ubiquitous. This means not only accepting that ‘change is the only constant’, but also that often enough change is of the unexpected, surprising kind. Instead of assuming that the future is known (i.e. can be extrapolated from past trends) consider that it might well be very different from what we expect. Rather than a one-sided focus on stability – not least because it allows planning for increases in efficiency and productivity through standardization, rationalisation, and optimization – assume that there will be surprises, that the system will need to change and adapt. Given the lack of sustainability of many agricultural systems (IAASTD, 2009; IPES-Food, 2017; TEEB, 2018; IPCC, 2020), and the lock-in that hamper transitions to sustainability (Grin et al., 2010), unexpected events may even offer valuable openings for change (Taleb, 2012).

This does not mean that we should give up on planned, directed and purposeful transitions, based on assessing trends, their expected impacts, and associated risks. However, we need to be aware that with their focus on predictability, such efforts are based on an underlying assumption that agricultural systems develop along a stable trajectory, their essential dynamics known.3 This assumption may underestimate the complexity of agricultural systems, the unpredictable interplay between their natural, technological and social elements. Thus, when trying to understand how agricultural systems change over time and how they respond to surprises, we need to capture the interactions between all these elements, including the subjective perception of actors (e.g. Herman, 2015; Shah et al., 2017; Perrin et al., 2020; Posch et al., 2020). Indeed, an event may transform the future possibilities perceived by the farmer, without it being immediately visible in the farm's activities. In other words: even if a system seems stable, there may be diverse changes underlying this outward stability, that may erupt suddenly; possibly using the opening created by an unexpected event.

If we take into consideration that agricultural systems will face unexpected surprises, then focusing solely on developing recipe-like recommendations meant to ensure optimal crop or farm management is one-sided, as these recommendations are efficient only as long as the context (e.g. soil, weather, markets, labour availability) remains stable and broadly complies with the assumptions underlying the model. This is an engineering mindset (see Jacob, 1977), where the farmer is expected to work according to a preconceived plan, striving solely for efficiency, using specialized inputs and machines. Yet, in real life, farmers are also tinkerers, engaged in an unfolding, open-ended process, reorganising their resources to explore new ideas, adjusting their system based on new information, transforming it in response to opportunities as they emerge. As such, an agricultural system is not a perfect product of engineering, but the provisional achievement of a tinkering process, reflecting a historical becoming replete with contingencies.

For an agricultural system to be resilient, it must balance the ability to be efficient in the current context with the ability to re-organise, to adapt in response unforeseen (and unforeseeable) change (Fig. 1). While much research has focused on developing efficient processes and increasing productivity, much less research effort has gone into understanding what enables agricultural systems to navigate unexpected change. For that, it may be helpful to explore designs that ensure buffers, maintain redundancies, privilege modularity, promote diversity. Such design strategies can strengthen adaptability by enabling bricolage and tinkering, i.e. processes where available resources are reconfigured and used in novel ways in response to emerging opportunities (Jacob, 1977; Coquil et al., 2014; Feyereisen et al., 2017; Grivins et al., 2017; Caves and Phelan, 2020; Zagata et al., 2020). Recognizing and shaping these opportunities is enabled by processes such as experimenting, learning, networking, collaborating (Percy, 2005; Levidow and Oreszczyn, 2012; Chantre and Cardona, 2014; Bédart and Stassart, 2017; Klerkx and Begemann, 2020). In these processes, the impact of a surprising event, the outcome of every trial and every failure provide valuable information that is used to better understand shifts in the system and its dynamics, thus guiding the next adaptive step (see Taleb, 2012:181ff).

Adaptive processes may rely on new inputs, but they may also rely on the ability to mobilise and reorganise available resources in creative ways. Thus, rather than just only focusing on assessing whether the ‘right’ elements (e.g. technology, knowledge, policies, institutions) are present, it is also important to consider how they are assembled (see e.g. Legun, 2015; Jones et al., 2019), what relations have been built between elements in a system, and how much flexibility and manoeuvrability these relations offer.

As the above conceptual exploration shows, understanding change might be more about processes than objects, more about flows than states. To capture what enables adaptation in a dynamic world, a process-relational perspective can be helpful. This perspective is akin to systems thinking, but emphasises relations over elements4 (Walsh et al., 2020). Importantly, as these relations are not seen as static ‘things’ but as dynamic and unfolding, the focus is on the processes involved in building, maintaining, and changing relations (Emirbayer, 1997; Powell, 2013; Dépelteau, 2018).

#### Market concentration stifles attempts to develop AND implement new technologies and processes.

Jennifer Clapp 21, Professor & Canada Research Chair, Global Food Security & Sustainability, University of Waterloo, "The Problem with Growing Corporate Concentration and Power in the Global Food System," Nature Food, Vol. 2, Issue 6, June 2021, pg. 404-406. edited for clarity.

A relatively small number of transnational firms have come to wield a high degree of influence within the global food system. Recent years have seen firms all along agrifood supply chains merge and acquire one another, to form giant ‘mega-companies’ that are central players in what can only be described as a profound reconfiguration of the world food economy. This process is happening in markets for farm inputs, agricultural commodity trading, and food processing and retail1–3. In parts of the global food system where just a few giant firms control a large share of the marketplace, these firms can influence the types of seeds farmers plant, what crops are grown, what breeds of livestock are raised and in what types of facilities, working conditions for food system workers, and the types and prices of food items that appear on grocery store shelves, to name just a few examples.

There is long-standing concern that powerful firms in concentrated markets are more incentivized to advance the short-term interests of their shareholders rather than the public good4,5 , a concern that extends to food systems. Civil society groups worry that concentrated agrifood firms might pursue profit maximization strategies in ways that undermine the livelihoods of small-scale producers, push up prices, limit product choices and damage the environment. As preparations are underway for the 2021 UN Food Systems Summit (UNFSS), which has goals of making food systems more equitable, healthy and sustainable, civil society groups have expressed concern that the Summit agenda does not sufficiently focus on the implications of corporate power in food systems6 . This relative neglect is especially puzzling in the context of growing global concern about the potential harm from concentrated markets in other sectors, such as Big Tech. Because food systems are so important for multiple reasons—food is a basic need as well as a basic human right, food systems provide livelihoods for nearly a third of humanity, and food systems are intimately connected to ecosystems—it is imperative that we have a better understanding of the potential consequences of corporate concentration and power in the sector.

This Perspective examines the implications of corporate power in one highly concentrated sector—the global seed and agrochemical industry—that has become more consolidated in recent years7,8 . The merger of Dow and DuPont in 2015, which spun out a new agricultural input firm, Corteva Agriscience, was one of three major mergers that the agricultural seed and chemical industry saw in the 2015–2018 period. ChemChina purchased Syngenta in early 2016, shortly after the Dow–DuPont deal was announced, and in 2018 Bayer purchased Monsanto. What was already a highly concentrated industry dominated by what were known as the Big Six firms since the early 2000s is now dominated by just four large firms: Bayer, Corteva, ChemChina-Syngenta and BASF (which grew by purchasing assets the other firms sold to get their merger deals approved by regulators).

Closer examination of this sector reveals that there are multiple ways in which concentrated firms can exert power—both directly and indirectly—that matter for food system outcomes: by shaping markets, by shaping technology and innovation agendas, and by shaping policy and governance frameworks. Without policies in place to keep corporate power in check, there is a risk that concentrated markets can undermine key goals for food systems, such as the provision of equitable livelihoods, sustainability and broad-based participation in food system governance. Policies to rein in corporate power in food systems will require efforts on multiple fronts, and a focus on these efforts should be prominent on the agenda of the UNFSS.

Shaping market dynamics

When only a few firms dominate within a market, those firms at the top tend to have power to shape how that market functions. The desire to have more power over market dynamics is in fact a big reason why firms engage in mergers and acquisitions in the first place—to expand their market share and deliver higher returns to their shareholders. Economists have long been concerned about ‘market power’ associated with highly concentrated sectors because it can stifle competition and potentially lead to higher prices that can harm consumers9 . For this reason, most regulatory attention is paid to the potential impact of market power, and in particular, its impact on consumer prices.

The recent mergers in the global seed and agrochemical sector generated enormous concern about the potential impact of greater corporate concentration on markets7,10. In 2009, the share of the global market held by the top four firms at the global level for seeds was 54%, and 53% for agrochemicals, up significantly from 21% and 29%, respectively, in 1994, prior to several rounds of mergers in the sector11. This level of concentration was approaching the threshold of what most economists consider to be a highly concentrated market, where anything over a 40% share for the top four firms is considered moderately concentrated, and over 60% is highly concentrated. In 2018, after the most recent mergers, the top four firms controlled even more of the market—around 70% of the global pesticides market12 and around 60% of the global seed market13.

Some analysts warn against reading too much into these aggregate global market share figures regarding concentration levels because there are differences in specific crop seed market shares at the domestic level14. However, even those data show that in many domestic markets, just a few firms dominate sales of key staple crop seeds in a wide range of countries, in many cases with market shares above 80%, including the USA, the UK, Turkey, South Africa, Thailand, Italy, Denmark, Indonesia and Brazil. In Brazil, for example, the top four firms controlled 97% of the maize seed market by value in 201610. Such high levels of concentration usually are red flags for regulators who seek to ensure that markets remain competitive.

Concentration at these levels can impact seed prices through weakened competition, especially in cases where there are significant barriers to entry facing new firms due to high costs for research and development (R&D), as is the case in the seed and agrochemical sector. There are relatively few studies that examine this question empirically in the sector, given difficulties in accessing data that are held behind paywalls by the private sector. The peer-reviewed studies that do exist looked at time-series data for key crop seed markets in the USA and found that market concentration is at least one significant factor contributing to higher seed prices15–17. A recent [OECD] Organisation for Economic Co-operation and Development study10 that analysed proprietary cross-country seed price data also found a linkage between concentration and seed prices, but only at levels of market concentration above 80% (although this study was limited by the fact that it looked at data from only one year, 2016). The finding of the link between concentration and seed prices in these studies raises concern about the potential implications for equity, making this area worthy of further study. If farmers are paying more than they would otherwise for their inputs due to market concentration, they are likely absorbing these costs in the form of lower compensation for their work. The reason is that it is difficult for farmers to pass on those higher costs to consumers because they are often selling their products to concentrated intermediary firms who demand lower prices.

Influence over pricing is not the only way in which concentrated firms can shape market dynamics. Fewer firms controlling a market can also limit choice by making certain products more available than others. In some markets in the USA, for example, it is becoming increasingly difficult for farmers to access non-transgenic varieties of seeds, as the big firms with more market share can exert influence over product availability18 and incentivize distributors to focus on sales of genetically modified versions of seeds that deliver higher profits and the sale of other products, such as associated herbicides19. Intellectual property protection that transnational seed companies hold over hybrid and genetically modified varieties also limits the ability of farmers to save seeds for replanting20. This kind of market control is intensified when there is vertical integration of businesses across different parts of the agrifood value chain21. The seed and agrochemical businesses were once distinct industries but have now morphed into one because genetically modified seeds are designed to work with specific inputs (such as certain herbicides), in an integrated way.

Giant firms that dominate markets also typically have more bargaining power over working conditions and labour compensation22,23. Recent research indicates that labour’s share of income in the economy in the USA and many other countries drops as firms become more concentrated24. Mergers among dominant firms can also contribute to job losses, especially if the resulting firm seeks to make its operations more ‘efficient’ by combining key functions. The merger of Dow and DuPont, for example, resulted in 1,700 job losses, while Bayer cut 12,000 jobs in the wake of its purchase of Monsanto25,26.

Shaping technology and innovation pathways

When just a few concentrated firms dominate within a sector, those firms can influence technological innovation trends in important ways27. Firms pursuing mergers and acquisitions often make the case to regulators that they need to consolidate into larger entities to put more funds towards R&D that can result in breakthrough innovations that promise wide-scale benefits, including the possibility of lowering costs for consumers. However, at the same time, concentrated markets can also work to impede innovation, especially when they result in higher barriers to entry for other firms28,29. A key question for regulators is to tease out which force is likely to prevail, if any. Untangling the implications of these competing dynamics for innovation in the seed and agrochemical sector is not an easy task14

It is important to consider how the impact of concentration on innovation can change over time, as technological changes emerge and settle, and as markets become more concentrated and potentially shut out new entrants due to high R&D costs. There was a boost in seed innovation that followed mergers among seed and chemical firms in the 1970s–1990s period, for example11, when firms were consolidating to invest huge sums into R&D operations for the development of agricultural biotechnology that resulted in new seed varieties. However, as the sector became more highly concentrated in the late 1990s and early 2000s, innovation in the agricultural biotechnology sector slowed29. Moreover, throughout the entire period, herbicide R&D languished at the big firms because their innovation agenda focused almost exclusively on the relatively less costly strategy of modifying seeds to work with existing herbicides30–32.

Simply focusing on whether firms ‘innovate’ in general gives an incomplete picture of the power of concentrated firms to shape food systems. We must also pay attention to the kinds of innovation dominant firms promote and whom that innovation serves. In other words, what matters is not whether new seed varieties and herbicides are introduced at all, but rather, what types of seed varieties and other related technologies are being developed (or not developed) and whether end users were consulted and social and environmental implications were taken into account33. In concentrated sectors such as seeds and agrochemicals, the firms that hold the most market share have tended to focus on very narrow innovation pathways that privilege high-tech and relatively high-cost proprietary technologies, such as genetically modified seed and agrochemical packages, over other less capital-intensive and more accessible innovations, such as agroecology34. In other words, firms tend to invest in innovation pathways that are good for their own bottom lines, rather than developing more accessible and low-cost technologies for the world’s farmers, especially small-scale producers in the developing world.

A narrow focus on certain technologies over others can also foster technological ‘lock-ins’ for users that can have undesirable environmental and social consequences. The technological innovations that came with the agricultural biotechnology revolution, for example, locked farmers growing certain crops into using genetically modified seeds that were designed to work only with certain chemical herbicides. Furthermore, glyphosate, which was once just one of many non-selective herbicides in the 1970s, rose to become the world’s most widely used herbicide due to the fact that most genetically modified seeds were altered to be resistant to it35. As we are becoming more aware of the potential risks associated with widespread glyphosate use, including growing weed resistance to the chemical, its environmental effects, and still-debated health-related concerns, some firms are engineering seeds to be resistant to older, more toxic chemicals that bring their own risks36.

The high-tech innovation agenda in the seed and agrochemical industry has become especially pronounced in recent decades due to the general trend towards privatization of agricultural R&D, where governments have stepped back from their earlier strong role in sponsoring agricultural research37. This trend leaves much of the technological agenda setting in the sector to the largest firms whose primary goal is short-term profit maximization to satisfy shareholders.

The latest round of consolidation in the agrifood sector is already shaping the technological landscape for farming in new ways. The dominant firms are seeking to establish leading positions in emerging digital platforms for agriculture and in computer-assisted genome editing7,38. When Bayer purchased Monsanto, for example, it also acquired the digital agriculture start-up that the latter had already purchased39,40. If the same firms that dominate seed and agrochemical development also dominate digital farming platforms, they can integrate their products in ways that drive additional types of technological lock-in and extend their market power. Such an outcome could result in further constraints to farmer choices and raises questions about farmers’ rights over and access to data, including that generated on their own farms41–43.

#### 2. INDUSTRIAL AGRICULTURE.

#### A flood of chemical use AND other industrial practices make food systems terminally unsustainable.

Kimberly White & Julian Cribb 10-13, Founder & CEO, The Planetary Press; Adjunct Professor, University of Technology, Sydney, "Julian Cribb- Earth Detox: Charting The Path Toward A Safer, Cleaner World," The Planetary Press, 10/13/2021, <https://www.theplanetarypress.com/2021/10/julian-cribb-the-planetary-podcast/>.

Kimberly White

That is unnerving. Now, you’ve written quite extensively about food security. What threats do chemical pollution pose to food security?

Julian Cribb

Five million tonnes of pesticides are used to grow the world’s food at the moment. This is ten times more than when Rachel Carson warned us about them back in the 1960s. Those pesticides don’t just disappear. They go into the soil. They go into the ecology around us. They are wiping out bees, birds, and others that pollinate crops. About a third of the human food supply here requires pollination. So if we kill off all the pollinators, then we’re going to be down about a third of our food if we’re not careful. Basically, 98 percent of agricultural chemicals hit a non-target organism; that is, a bumblebee, a farmworker, a consumer, something like that, something that wasn’t intended. Now, levels are not high in the food that you buy in the supermarket, but they are there. And a lot of these chemicals, because they’re not water-soluble, they’re very hard to get rid of. So when you buy your fresh vegetables, no matter how hard you wash them, you cannot get rid of the chemicals. Basically, washing doesn’t work very well. So, this is a real dilemma. You can’t avoid these things. They’re coming at you. Even if you shop for organic food, to some degree, it’s getting contaminated by farmers on the farm next door and things like that. So we have to get off this growing food with poisons kick; it’s just not a future. There are a lot of farmers who are becoming organic farmers or regenerative farmers who are trying to minimize or eliminate their use of poisons, and that is a very important development.

Kimberly White

Absolutely. There’s often talk about avoiding specific produce like strawberries or apples- produce listed as the “dirty dozen”- because of the amount of pesticide residue. For farmers producing organic crops, it is becoming increasingly difficult due to pesticide drift from neighboring conventional farms.

Julian Cribb

Yes, the United Nations Food and Agriculture Organization produced a report which basically said that most of the world’s arable farmland is now contaminated. Most of it. So even if you’re an organic farmer, if you want to set up a farm on a place that’s been farmed by conventional methods before, you’re gonna find your soil is almost permanently polluted. It’s very hard to clean soil once it’s been poisoned. So, these things are everywhere; they’re out of control. It’s basically death by a thousand cuts because we’re talking about thousands of different chemical companies producing thousands of different chemicals. Very, very hard to regulate. A lot of these chemicals now come from developing countries where there is no regulation or control over their manufacture, distribution, or use. They’re coming into foodstuffs that are in circulation worldwide. So this is a very disturbing dimension of it. Another one that many farmers point to is that, of course, these things are killing the biosphere in which agriculture exists. They’re poisoning the water supply. They’re affecting, as I say, the ecology in which agriculture survives. So we’re actually taking down our future ability to grow food by doing these things. Now, we have to move away from this highly toxic mode of food production to a far less toxic mode. I’m not saying do away with all farm chemicals, but I’m saying we have to use softer, safer chemicals if we’re going to use them at all.

But as I’ve warned in my earlier books, agriculture itself is under tremendous threat. Its soils are running out, its water is running out, and the stable climate that it once enjoyed is gone. So we may not be doing agriculture very much longer; it’s going to start to break down in the mid-century. We need to find other ways to produce food that are low in toxins, which uses very little water and land but which produce highly nutritious, clean, safe healthy food. Such systems do exist. Urban food production systems can be made to do this, for example. Deep ocean aquaculture can also be made to do this. So there are alternatives to the traditional 10,000-year-old technique of putting plants in soil and growing them outdoors.

Kimberly White

You’re right. There are so many different options. Things are changing every single day due to new innovations. Meat production, for example. We see a lot of new research and development go towards lab-grown meat—the same with plant-based alternatives. There are so many options. There’s not going to be one silver bullet solution; it is going to be many different solutions. Different ideas from people coming together from around the world.

Julian Cribb

That’s correct. I mean, farmers are very inventive people. They have to be to stay afloat. Basically, they’re coming up with all these new ideas for ways of producing food, both agriculturally and non-agriculturally. There’s a huge opportunity. Probably the biggest global opportunity that exists today is not renewable energy. It’s renewable food. Why? Because every single person on the earth needs food, two or three times a day. We are going to consume something like 11 trillion meals a day by the middle part of the century. They’ve got to come from somewhere. Now, growing them in cities by recycling water and recycling nutrients is one very sensible pathway for this to take. And it’s already starting to happen. Bio-cultures, hydroponics, aquaponics, all of these intensive techniques, which often involve very little or no chemical use, are all coming down the line at the moment. It’s early days, a lot of those companies are going to go broke, but some of them aren’t, and they’re going to make a huge success. And we can feed everybody on earth well if we go to this new system of food production. That’s the point. We don’t need to have starvation. And indeed, if you do that, you’re actually going to get rid of two-thirds of the world’s wars. Why? Because two-thirds of wars are generated by disputes over food, land, and water. So if we feed everybody adequately, we’ve got rid of a lot of the reasons for conflict that exists in our world. We will have a much more peaceful world. So food really holds the key to solving a lot of problems that humans now face.

Kimberly White

That’s a great point. We’re also really seeing the level of awareness increase when it comes to climate change. So, it is an exciting time right now because more people are focused on solving this huge challenge. It is bringing forth a lot of innovative solutions that are not just beneficial for climate but are more sustainable, use fewer chemicals, and are less water-intensive. We’re seeing people discuss regenerative agriculture a lot more fervently- which is fantastic.

Julian Cribb

If we put the same amount of intellectual effort and the same amount of financial investment into regenerative farming and urban food production that we have put into chemical farming, for example, then we’ve got this problem licked. We will solve this problem in no time at all. We just need to get the scientists into this. The scientists are still working for the chemical companies at the moment, for the most part. And that’s a disgrace, really. We need to get them focused on how you do regenerative agriculture safely, cleanly, healthily and how you repair the landscape. If we go to this new system of food production, regenerative farming, plus urban food production, and deep-sea aquaculture, that will feed the world quite adequately, and it will end the sixth extinction, as well as stopping about two-thirds of wars.

Kimberly White

I am glad you mentioned that because one of the leading causes of deforestation is our consumption of agricultural commodities. Palm oil is a great example because it is in about half of everything on our grocery store shelves here in the U.S. We’re having this huge impact on countries like Indonesia, and specifically in the area of Borneo. But because it is imported from a faraway place and does not impact our local environment, it’s out of sight and mind.

Julian Cribb

It is having an impact on all countries and all human beings. Because if you clear the Amazon or you clear-fell Borneo, you’re increasing the rate of carbon emissions into the atmosphere; you’re accelerating climate change. Land clearing, after coal burning, is the next most dangerous thing that humans can do if they want to destroy a habitable earth. So we’re destroying a habitable earth for Americans, Australians, as well as people living in Indonesia or Borneo or the Amazon basin. So, these things now are on such a large scale that they affect every single one of us. This is why I’m drawing attention to the chemical issue because humans have just unleashed this torrent of chemicals worldwide. You can find them everywhere you look. You can find them on the peak of Mount Everest, at the bottom of the Marianas Trench, in squid three kilometers down in the North Atlantic, in polar bears in the Arctic. These are human industrial chemicals. You can find them in the blood of every single American, European, Chinese. We are all absolutely glutted with these things at the moment. And we don’t even know the problems that are coming down at us. The medical literature contains quite a lot of warning signs, but this is really bigger and much worse for us, even than climate change. I mean, climate change is bad enough, heaven knows, but this one is just slipping under the radar. We are ignoring it. Governments worldwide are ignoring it. It’s got to be fixed, and it can be fixed.

Kimberly White

I agree. And I think an important part of the conversation is that we can’t just get so focused, and I think that’s happened a lot of times. We start to work in a silo; we get focused on one issue and one issue only, and that does happen with climate and the biodiversity space. But, as you have said, we can’t solve one without solving the other. And we have to make sure that the solutions to one don’t exacerbate the problem of the other, especially as we’re trying to come up with all of these solutions to these converging crises we have. We have to take those blinders off and look at all of the issues we’re facing, not just a singular view.

Julian Cribb

Absolutely. And at the moment, there is no government on the planet, except possibly Bhutan, that has a policy for human survival. Right? There is no government in the world that is committed to human survival. No government has a policy for dealing with all ten of the threats. Now, some of them have sort of a half policy for dealing with climate change. And a couple of them have policies for dealing with nuclear weapons and things like that. But they’ve not got an answer to this complex of ten huge threats that are bearing down on us that constitute the human existential emergency, the biggest threat that humans have ever faced. So it’s time we got real about these things, and we start to think about the solutions, and as you say, make sure those solutions do no harm. We have to make sure that however good the solution is, we don’t just replace one dirty chemical with another dirty chemical. We have to think ahead and analyze the consequences of our actions and come up with much safer solutions.

#### Despite momentum for a transition, the highly concentrated market crowds out AND disincentives any possibility for its actual implementation.

Kristen Tam & Olivia Bielskis 21, BA, Environmental Science Policy, University of California, Los Angeles; BA, Political Science & Human Biology and Society, University of California, Los Angeles, "Stimulating Antitrust Enforcement to Expand the Regenerative Agriculture Movement," UCLA Library, 2021, pg. 11-14.

C. Consolidation Threatens the Growth of Regenerative Farming

I. Regenerative Farming is Reducing Emissions, Bolstering Biodiversity, and Increasing Food Security, a Critical Practice to create a Climate Resilient Future

The United Nations IPCC report calls for a rapid greenhouse gas reduction to limit temperature rise to 1.5 degrees celsius by 2050.33 Given that agriculture and forestry accounted for 10.5 percent of greenhouse gas emissions in 2018,34 farming practices can play a crucial role in meeting these goals. Farming the land in ways that build healthy soil, maintain biodiversity, and sequester carbon dioxide are critical measures that will help America cultivate a sustainable food system, protect the land for generations to come, and meet greenhouse gas emission reduction goals.

Currently, the practices that dominate the American agricultural landscape often till the soil, plant only one to two crops at a time, and input large sums of fertilizer, herbicides, pesticides, and other chemicals to streamline production. Industrialized agriculture values efficiency, maximizing yield, and decreasing labor input. In contrast, regenerative agriculture practices maintain soil health for long term benefit by applying compost as fertilizer, planting cover crops, implementing diverse crop rotation, rotating livestock grazing, limiting fertilizer and pesticide use, and eliminating tillage practices.35 Although opponents highlight that regenerative practices yield less products per acre and require more labor input, they neglect the significance of their energy input being 30-60 percent less than traditional methods because they do not use machines, fertilizer, and herbicides.36 This practice ultimately increases the long term productivity and stability of food production because it doesn’t rely on the continuous purchasing and application of chemicals into the soil. Instead, it builds soil health by increasing nutrient and water retention, both of which increases land productivity.37

II. Small Farms are More Likely to Implement Regenerative Fertilization Practice

One of the defining regenerative agriculture practices is applying compost and manure as fertilizer. There are three different types of fertilization methods that the USDA measures every few years, manure, organic, and commercial that help replenish soil nutrients. Manure is the application of animal bio excretions,38 organic fertilizer is the use of organic matter, compost, animal manures or green manures and does not include any chemical fertilizers,39 and commercial fertilizer is the application of chemically derived fertilizers such as nitrogen, phosphate and potash.40 For these figures, manure and organic fertilizers are categorized as “regenerative fertilizers” because they represent methods that replenish soils with naturally derived as opposed to chemically manufactured nutrients.

Small farms, 10.0 to 49.9 acres, are more likely to implement regenerative fertilizer methods than medium sized, 260 to 499 acres, and large sized, 1,000 to 1,999 acre farms. In 2017, 32.74 percent of small farms used regenerative fertilizer, compared to 27.27 percent of medium and 21.63 percent of large farms.41 Small farms are also transitioning away from commercial fertilizer to regenerative fertilizer methods at a faster rate than medium and large farms. From 2012 to 2017, small farms had the greatest percent decrease in number of farms using commercial fertilizers, 6.50 percent, and the largest percent increase for regenerative practices, 6.47 percent. Medium farms experienced a 2.28 percent decrease in the number of farms implementing commercial fertilizers, while a 2.57 percent increase in regenerative fertilizers. Large farms experienced a 2.31 percent decrease in the number of farming implementing commercial fertilizers, while a 2.32 percent increase in regenerative fertilizers.42 This demonstrates that smaller farms are more willing and better suited to implement regenerative practices.

Industrial agriculture firms, on the other hand, highly prioritize efficiencies and maximizing profit, thus, are less likely to invest the time and money into learning about and switching to regenerative fertilization practices. While small farms are making the most rapid transition to regenerative fertilization practices that would benefit the market and planet in the long run, the increased market and resource dominance of the largest farms, which have the slowest rates of transition to regenerative fertilization practices, is ultimately hindering the growth of regenerative agriculture in the United States.

D. Consolidation Negatively Affects Farmers

This disproportionate market power gained by a few agriculture conglomerates allows them to reduce prices in order to drive out competition.43 While large farms lack the will to invest in more regenerative farming techniques, small farms that do not employ regenerative practices are primarily hindered by their lack of economic means to do so. As previously stated, individual farmers make less than 15 cents per dollar and, according to a study conducted by the USDA in 2001, 71 percent of poultry growers live below the poverty line.44 Such subpar circumstances are not conducive to having the freedom to invest time and money into switching practices to plant cover crops, not till, and use animal fertilizer.

E. Consolidation Negatively Affects Consumers

In addition to harming farmers, agricultural consolidation has also resulted in increased food prices for consumers, largely disproving the claims of Bork’s “consumer welfare standard.” In 2014, economist John Kwoka published a book Mergers, Merger Control, and Remedies: A Retrospective Analysis of U.S. Policy where he analyzed 200 mergers from 1976 to 2006 and found that post-merger prices on average increased by 4.3 percent.45 In addition, evidence has shown that market self-correction has not occurred as a result of antitrust underenforcement.46

#### Food insecurity sparks AND drives conflict in numerous hotspots.

Julian Cribb 19, Adjunct Professor, University of Technology, Sydney. Principal, Julian Cribb & Associates. Author, Journalist, Editor & Science Communicator, "Hotspots for Food Conflict in the Twenty-first Century," in Food or War, Chapter 5, 2019, pg. 141-173.

The mounting threat to world peace posed by a food, climate and ecosystem increasingly compromised and unstable was emphasised by the US Director of National Intelligence, Dan Coats, in a briefing to the US Senate in early 2019. ‘Global environmental and ecological degradation, as well as climate change, are likely to fuel competition for resources, economic distress, and social discontent through 2019 and beyond’, he said. ‘Climate hazards such as extreme weather, higher temperatures, droughts, floods, wildfires, storms, sea level rise, soil degradation, and acidifying oceans are intensifying, threatening infrastructure, health, and water and food security. Irreversible damage to ecosystems and habitats will undermine the economic benefits they provide, worsened by air, soil, water, and marine pollution.’ Boldly, Coats delivered his warning at a time when the US President, Trump, was attempting to expunge all reference to climate from government documents.23

Based upon these recent cases of food conflicts, and upon the lessons gleaned from the longer history of the interaction between food and war, several regions of the planet face a greatly heightened risk of conflict towards the mid twenty-first century.

Food wars often start out small, as mere quarrels over grazing rights, access to wells or as one faction trying to control food supplies and markets. However, if not resolved quickly these disputes can quickly escalate into violence, then into civil conflagrations which, if not quelled, can in turn explode into crises that reverberate around the planet in the form of soaring prices, floods of refugees and the involvement of major powers – which in turn carries the risk of transnational war. The danger is magnified by swollen populations, the effects of climate change, depletion of key resources such as water, topsoil and nutrients, the collapse of ecosystem services that support agriculture and fisheries, universal pollution, a widening gap between rich and poor, and the rise of vast megacities unable to feed themselves (Figure 5.3).

Chart

Description automatically generated

Each of the world’s food ‘powderkeg regions’ is described below, in ascending order of risk.

United States

In one sense, food wars have already broken out in the United States, the most overfed country on Earth. Here the issue is chiefly the growing depletion of the nation’s mighty groundwater resources, especially in states using it for food production, and the contest over what remains between competing users – farmers, ranchers and Native Americans on the one hand and the oil, gas and mining industry on the other. Concern about the future of US water supplies was aggravated by a series of savage droughts in the early twentyfirst century in the west, south and mid-west linked to global climate change and declining snowpack in the Rocky Mountains, both of which affect not only agriculture but also the rate at which the nation’s groundwater reserves recharge.

‘Groundwater depletion has been a concern in the Southwest and High Plains for many years, but increased demands on our groundwater resources have overstressed aquifers in many areas of the Nation, not just in arid regions’, notes the US Geological Survey.24

Nine US states depend on groundwater for between 50 per cent and 80 per cent of their total freshwater supplies, and five states account for nearly half of the nation’s groundwater use. Major US water resources, such as the High Plains aquifers and the Pacific Northwest aquifers have sunk by 30–50 metres (100–150 feet) since exploitation began, imperilling the agricultural industries that rely on them. In the arid southwest, aquifer declines of 100–150 metres have been recorded (Figure 5.4).

[Figure omitted]

To take but one case, the famed Ogallala Aquifer in the High Plains region supports cropping industries worth more than US $20 billion a year and was in such a depleted state it would take more than 6000 years to replace by natural infiltration the water drawn from it by farmers in the past 150 years. As it dwindles, some farmers have tried to kick their dependence on groundwater – other users, including the growing cities and towns of the region, proceeded to mine it as if there was no tomorrow.25 A study by Kansas State University concluded that so far, 30 per cent of the local groundwater had been extracted and another 39 per cent would be depleted by the mid century on existing trends in withdrawal and recharge.26

Over half the US population relies on groundwater for drinking; both rural and urban America are at risk. Cities such as New Orleans, Houston and Miami face not only rising sea levels – but also sinking land, due to the extraction of underlying groundwater. In Memphis, Tennessee, the aquifer that supplies the city’s drinking water has dropped by 20 metres.

Growing awareness of the risk of a nation, even one as large and technologically adept as the USA, having insufficient water to grow its food, generate its exports and supply its urban homes has fuelled tensions leading to the eruption of nationwide protests over ‘fracking’ for oil and gas – a process that can deplete or poison groundwater – and the building of oil pipelines, which have a habit of rupturing and also polluting water resources. The boom in fracking and piping is part of a deliberate US policy to become more self-reliant in fossil fuels.27 Thus, in its anxiety to be independent of overseas energy suppliers, the USA in effect decided to barter away its future food security for current oil security – and the price of this has been a lot of angry farmers, Native Americans and concerned citizens.

The depletion of US groundwater coincides with accelerating climate risk, which may raise US temperatures by as much as 4–5 C by 2100, leading to major losses in soil moisture throughout the US grain belt, and the spread of deserts in the south and west. Food production will also be affected by fiercer storms, bigger floods, more heatwaves, an increase in drought frequency and greater impacts from crop and livestock diseases. In such a context, it is no time to be wasting stored water.

The case of the USA is included in the list of world ‘hot spots’ for future food conflict, not because there is danger of a serious shooting war erupting over water in America in the foreseeable future, but to illustrate that even in technologically advanced countries unforeseen social tensions and crises are on the rise over basic resources like food, land and water and their depletion. This doesn’t just happen in Africa or the Middle East. It’s a global phenomenon.

Furthermore, the USA is the world’s largest food exporter and any retreat on its part will have a disproportionate effect on world food price and supply. There is still plenty of time to replan America’s food systems and water usage – but, as in the case of fossil fuels and climate, rear-guard action mounted by corporate vested interests and their hired politicians may well [freeze] ~~paralyse~~ the national will to do it. That is when the US food system could find itself at serious risk, losing access to water in a time of growing climatic disruption, caused by exactly the same forces as those depleting the groundwater: the fossil fuels sector and its political stooges. The probable effect of this will, in the first instance, be a decline in US meat and dairy production accompanied by rising prices and a fall in its feedgrain exports, with domino effects on livestock industries worldwide.

The flip-side to this issue is that America’s old rival, Russia, is likely to gain in both farmland and water availability as the planet warms through the twentyfirst century – and likewise Canada. Both these countries stand to prosper from a US withdrawal from world food markets, and together they may negate the effects of any US food export shortfalls.

Central and South America

South America is one of the world’s most bountiful continents in terms of food production – but, after decades of improvement, malnutrition is once more on the rise, reaching a new peak of 42.5 million people affected in 2016.28 ‘Latin America and the Caribbean used to be a worldwide example in the fight against hunger. We are now following the worrisome global trend’, said regional FAO representative Julio Berdegué.29

Paradoxically, obesity is increasing among Latin American adults, while malnutrition is rising among children. ‘Although Latin America and the Caribbean produce enough food to meet the needs of their population, this does not ensure healthy and nutritious diets’, the FAO explains. Worsening income inequality, poor access to food and persistent poverty are contributing to the rise in hunger and bad diets, it adds.30

‘The impact of climate change in Latin America and the Caribbean will be considerable because of its economic dependence on agriculture, the low adaptive capacity of its population and the geographical location of some of its countries’, an FAO report warned.31

Emerging food insecurity in Central and Latin America is being driven by a toxic mixture of failing water supplies, drying farmlands, poverty, maladministration, incompetence and corruption. These issues are exacerbated by climate change, which is making the water supply issue worse for farmers and city people alike in several countries and delivering more weather disasters to agriculture.

* Mexico has for centuries faced periodic food scarcity, with a tenth of its people today suffering under-nutrition. In 2008 this rose to 18 per cent, leading to outbreaks of political violence.32 In 2013, 52 million Mexicans were suffering poverty and seven million more faced extreme hunger, despite the attempts of successive governments to remedy the situation. By 2100 northern Mexico is expected to warm by 4–5 C and southern Mexico by 1.5–2.5 C. Large parts of the country, including Mexico City, face critical water scarcity. Mexico’s cropped area could fall by 40–70 per cent by the 2030s and disappear completely by the end of the century, making it one of the world’s countries most at risk from catastrophic climate change and a major potential source of climate refugees.33
* The vanishing lakes and glaciers of the high Andes confront montane nations – Bolivia, Peru and Chile especially – with the spectre of growing water scarcity and declining food security. The volume of many glaciers, which provide meltwater to the region’s rivers, which in turn irrigate farmland, has halved since 1975.34 Bolivia’s second largest water body, the 2000 square kilometres Lake Poopo, dried out completely.35 The loss of water is attributed partly to El Niño droughts, partly to global warming and partly to over-extraction by the mining industries of the region. Chile, with 24,000 glaciers (80 per cent of all those in Latin America) is feeling the effects of their retreat and shrinkage especially, both in large cities such as the capital Santiago, and in irrigation agriculture and energy supply. Chile is rated by the World Resources Institute among the countries most likely to experience extreme water stress by 2040.36
* Climate change is producing growing water and food insecurity in the ‘dry corridor’ of Central America, in countries such as El Salvador, Guatemala and Honduras. Here a combination of drought, major floods and soil erosion is undermining efforts to raise food production and stabilise nutrition.
* Food production in Venezuela began falling in the 1990s, and by the late 2010s two thirds of the population were malnourished; there was a growing flood of refugees into Colombia and other neighbouring countries. The food crisis has been variously blamed on the Venezuelan government’s ‘Great Leap Forward’ (modelled on that of China – which also caused widespread starvation), a halving in Venezuela’s oil export earnings, economic sanctions by the USA, and corruption. However, local scientists such as Nobel Laureate Professor Juan Carlos Sánchez warn that climate impacts are already striking the densely populated coastal regions with increased torrential rains, flooding and mudslides, droughts and hurricanes, while inland areas are drying out and desertifying, leading to crop failures, water scarcity and a tide of climate refugees.37 These factors will tend to deepen food insecurity towards the mid century. Venezuela’s climate refugees are already making life more difficult for neighbouring countries such as Colombia.
* Deforestation in the Brazilian Amazon has, in recent decades, removed around 20 per cent of its total tree cover, replacing it with dry savannah and farmland. At 40 per cent clearance and with continued global warming, scientists anticipate profound changes in the local climate, towards a drying trend, which will hammer the agriculture that has replaced the forest.38 Brazil has already wiped out the oncevast Mata Atlantica forest along its eastern coastline, and this region is now drying, with resultant water stress for both farming and major cities like São Paulo. Brazil’s outlook for 2100 is for further drying – tied to forest loss as well as global climate change – increased frequency of drought and heatwaves, major fires and acute water scarcity in some regions. Moreover, as the Amazon basin dries out, it will release vast quantities of CO2 from its peat swamps and rainforest soils. These are thought to contain in excess of three billion tonnes of carbon and could cause a significant acceleration in global warming, affecting everyone on Earth.39

Latin America is the world capital of private armies, with as many as 50 major guerrilla groups, paramilitaries, terrorist, indigenous and criminal insurgencies over the past half century – exemplified in familiar names like the Sandanistas (Nicaragua), FARC (Colombia) and Shining Path (Peru).40 Many of these drew their initial inspiration from the international communist movement of the mid twentieth century, while others are right-wing groups set up in opposition to them or else represent land rights movements of disadvantaged groups. However, all these movements rely for oxygen on simmering public discontent with ineffectual or corrupt governments and lack of fair access to food, land and water generally. In other words, the tendency of South and Central America towards internal armed conflict is supercharged significantly by failings in the food system which generate public anger, leading to sympathy and support for anyone seen to be challenging the incumbent regimes. This is not to suggest that feeding every person well would end all insurgencies – but it would certainly take the wind of popular support out of a lot of their sails. In that sense the revolutionary tendency of South America echoes the preconditions for revolution in France and Russia in the eighteenth and twentieth centuries.

Central Asia

The risk of wars breaking out over water, energy and food insecurity in Central Asia is high.41 Here, the five main players – Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan and Kyrgyzstan – face swelling populations, crumbling Soviet-era infrastructure, flagging resource cooperation, a degrading landscape, deteriorating food availability and a changing climate. At the heart of the issue and the region’s increasingly volatile politics is water: ‘Without water in the region’s two great rivers – the Syr Darya and the Amu Darya – vital crops in the downstream agricultural powerhouses would die. Without power, life in the upstream countries would be unbearable in the freezing winters’, wrote Rustam Qobil.42

Central Asia’s water crisis first exploded onto the global consciousness with the drying of the Aral Sea – the world’s fourth largest lake – from the mid 1960s43, following the damming and draining of major rivers such as the Amu Darya, Syr Darya and Naryn. It was hastened by a major drought in 200844 exacerbated by climate change, which is melting the ‘water tower’ of glacial ice stored in the Tien Shan, Pamir and Hindu Kush mountain ranges that feed the region’s rivers. The Tien Shan alone holds 10,000 glaciers, all of them in retreat, losing an estimated 223 million cubic metres a year. At such a rate of loss the region’s rivers will run dry within a generation.45 Lack of water has already delivered a body blow to Central Asia’s efforts to modernise its agriculture, adding further tension to regional disputes over food, land and water.

‘Water has always been a major cause of wars and border conflicts in the Central Asian region’, policy analyst Fuad Shahbazov warned. This potential for conflict over water has been exacerbated by disputes over the Fergana valley, the region’s greatest foodbowl, which underwent a 32 per cent surge in population in barely ten years – while more and more of it turned to desert.46

The Central Asian region is ranked by the World Resources Institute as one of the world’s most perilously water-stressed regions to 2040 (Figure 5.6). With their economies hitting rock bottom, corrupt and autocratic governments that prefer to blame others for their problems and growing quarrels over food, land, energy and water, the ‘Stans’ face ‘a perfect storm’, Nate Shenkkan wrote in the journal Foreign Policy. 47 Increased meddling by Russia and China is augmenting the explosive mix: China regards Central Asia as a key component of its ‘Belt and Road’ initiative intended to expand its global influence, whereas Russia hopes to lure the region back into its own economic sphere. Their rival investments may help limit some of the problems faced by Central Asia – or they may unlock a fresh cycle of political feuding, turmoil and regime change.48

A 2017 FAO report found 14.3 million people – one in every five – in Central Asia did not have enough to eat and a million faced actual starvation, children especially. It noted that after years of steady improvement, the situation was deteriorating. This combination of intractable and deteriorating factors makes Central Asia a serious internal war risk towards the mid twentyfirst century, with involvement by superpowers raising the danger of international conflict and mass refugee flight.

The Middle East

The Middle East is the most water-stressed region on Earth (see Figure 5.5 above). It is ‘particularly vulnerable to climate change. It is one of the world’s most water-scarce and dry regions, with a high dependency on climate-sensitive agriculture and a large share of its population and economic activity in flood-prone urban coastal zones’, according to the World Bank.49

The Middle East – consisting of the 22 countries of the Arab League, Turkey and Iran – has very low levels of natural rainfall to begin with. Most of it has 600 millimetres or less per year and is classed as arid. ‘The Middle East and North Africa [MENA] is a global hotspot of unsustainable water use, especially of groundwater. In some countries, more than half of current water withdrawals exceed what is naturally available’, the Bank said in a separate report on water scarcity.50

[Figure omitted]

‘The climate is predicted to become even hotter and drier in most of the MENA region. Higher temperatures and reduced precipitation will increase the occurrence of droughts. It is further estimated that an additional 80–100 million people will be exposed by 2025 to water stress’, the Bank added.

The region’s population of 300 million in the late 2010s is forecast to double to 600 million by 2050. Average temperatures are expected to rise by 3–5 C and rainfall will decrease by around 20 per cent. The result will be vastly increased water stress, accelerated desertification, growing food insecurity and a rise in sea levels displacing tens of millions from densely populated, low-lying areas like the Nile delta.51 The region is deemed highly vulnerable to climate impacts, warns a report by the UN Development Programme. ‘Current climate change projections show that by the year 2025, the water supply in the Arab region will be only 15 per cent of levels in 1960. With population growth around 3 per cent annually and deforestation spiking to 4 per cent annually... the region now includes 14 of the world’s 20 most water-stressed countries.’ 52

The Middle East/North Africa (MENA) region has 6 per cent of the world’s population with only 1.5 per cent of the world’s fresh water reserves to share among them. This means that the average citizen already has about a third less water than the minimum necessary for a reasonable existence – many have less than half, and populations are growing rapidly. Coupled with political chaos and ill governance in many countries, growing religious and ethnic tensions between different groups – often based on centuries-old disputes – a widening gap between rich and poor and foreign meddling by the USA, Russia and China, shortages of food, land and water make the Middle East an evident cauldron for conflict in the twentyfirst century.

Growing awareness of their food risk has impelled some oil-rich Arab states into an international farm buying spree, purchasing farming, fishing and food processing companies in countries as assorted as South Sudan, Ethiopia, the Philippines, Ukraine, the USA, Poland, Argentina, Australia, Brazil and Morocco. In some food-stressed countries these acquisitions have already led to riots and killings.53 The risk is high that, by exporting its own food–land–water problems worldwide, especially to regions already facing scarcity, the Middle East could propagate conflicts and government collapses around the globe. This is despite the fact that high-tech solar desalination, green energy, hydroponics, aquaponics and other intensive urban food production technologies make it possible for the region to produce far more of its own food locally, if not to be entirely self-sufficient.

Dimensions of the growing crisis in the Middle East include the following.

* Wars have already broken out in Syria and Yemen in which scarcity of food, land and water were prominent among the tensions that led to conflict between competing groups.
* Food, land and water issues feed into and exacerbate already volatile sentiment over religion, politics, corruption, mismanagement and foreign interference by the USA, China and Russia.
* The introduction of cheap solar-powered and diesel pumps has accelerated the unsustainable extraction of groundwater throughout the region, notably in countries like Libya, Egypt, Saudi Arabia and Morocco.54
* Turkish building of new dams to monopolise waters flowing across its borders is igniting scarcity and potential for conflict with downstream nations, including Iraq, Iran and Syria.55
* Egypt’s lifeline, the Nile, is threatened by Ethiopian plans to dam the Blue Nile, with tensions that some observers consider could lead to a shooting war.56
* There are very low levels of water recycling throughout the region, while water use productivity is about half that of the world as a whole.
* There is a lack of a sense of citizen responsibility for water and food scarcity throughout the region.
* Land grabs around the world by oil-rich states are threatening to destabilise food, land and water in other countries and regions, causing conflict.
* A decline in oil prices and the displacement of oil by the global renewables revolution may leave the region with fewer economic options for solving its problems.
* There is a risk that acquisition of a nuclear weapon by Iran may set off a nuclear arms race in the region with countries such as Saudi Arabia, Syria and possibly Turkey following suit and Israel rearming to stay in the lead. This would translate potential food, land and water conflicts into the atomic realm.

Together these issues, and failure to address their root causes, make the Middle East a fizzing powder keg in the twentyfirst century. The question is when and where, not whether, it explodes – and whether the resulting conflict will involve the use of weapons of mass destruction, including nuclear, thus affecting the entire world.

China

China is the world’s biggest producer, importer and consumer of food. Much of the landmass of the People’s Republic of China (PRC) is too mountainous or too arid for farming, but the rich soils of its eastern and southern regions are highly productive provided sufficient water is available and climate impacts are mild. Those, however, are very big ‘ifs’.

In 1995, American environmentalist Lester R. Brown both irked and aroused the PRC Communist Party bosses with a small, hard-hitting book entitled Who Will Feed China? Wake-Up Call for a Small Planet. 57 In it he posited that Chinese population growth was so far out of control that the then-agricultural system could not keep up, and China would be forced to import vast amounts of grain, to the detriment of food prices and availability worldwide. His fears, so far, have not been realised – not because they were unsoundly based, but because China managed – just – to stay abreast of rising food demand by stabilising and subsidising grain prices, restoring degraded lands, boosting agricultural science and technology, piping water from south to north, developing high-intensity urban farms, buying up foreign farmland worldwide and encouraging young Chinese to leave the country. What Brown didn’t anticipate was the economic miracle that made China rich enough to afford all this. However, his essential thesis remains valid: China’s food supply will remain on a knife-edge for the entire twentyfirst century, vulnerable especially to water scarcity and climate impacts. If the nation outruns its domestic resources yet still has to eat, it may well be at the expense of others globally.

Some western commentators were puzzled when China scrapped its 35-year ‘One Child Policy’ in 2015, but in fact the policy had done its job, shaving around 300 million people off the projected peak of Chinese population. It was also causing serious imbalances, such as China’s huge unmarried male surplus. Furthermore, rising urbanisation and household incomes meant Chinese parents no longer wanted large families, as in the past. Policy or no policy, China’s birthrate has continued to fall and by 2018 was 1.6 babies per woman – well below replacement, lower than the USA and nearly as low as Germany. Its population was 1.4 billion, but this was growing at barely 0.4 per cent a year, with the growth due at least in part to lengthening life expectancy.58

For China, female fertility is no longer the key issue. The critical issue is water. And the critical region is the north, where 41 per cent of the population reside. Here surface and groundwaters – which support not only the vast grain and vegetable farming industries of the North China Plain but also burgeoning megacities like Beijing, Tianjin and Shenyang – have been vanishing at an alarming rate. ‘In the past 25 years, 28,000 rivers have disappeared. Groundwater has fallen by up to 1–3 metres a year. One consequence: parts of Beijing are subsiding by 11 cm a year. The flow of the Yellow River, water supply to millions, is a tenth of what it was in the 1940s; it often fails to reach the sea. Pollution further curtails supply: in 2017 8.8 per cent of water was unfit even for agricultural or industrial use’, the Financial Times reported.59 On the North China Plain, annual consumption of water for all uses, including food production, is about 27 billion cubic metres a year – compared with an annual water availability of 22 billion cubic metres, a deficit that is made up by the short-term expedient of mining the region’s groundwater.60

To stave off disaster, the PRC has built a prodigious network of canals and pipelines from the Yangtse River in the water-rich south, to Beijing in the water-starved north. Hailed as a ‘lifeline’, the South–North Water Transfer Project had two drawbacks: first, the fossil energy required to pump millions of tonnes of water over a thousand kilometres and, second, the fact that while the volume was sufficient to satisfy the burgeoning cities for a time, it could not supply and distribute enough clean water to meet the needs of irrigated farming over so vast a region in the long run, nor meet those of its planned industrial growth.61 Oft-mouthed ‘solutions’ like desalination or the piping of water from Tibet or Russia face similar drawbacks: demand is too great for the potential supply and the costs, both financial and environmental, prohibitive.

China is already among the world’s most water-stressed nations. The typical Chinese citizen has a ‘water footprint’ of 1071 cubic metres a year – three quarters of the world average (1385 cubic metres), and scarcely a third that of the average American (2842 cubic metres).62 Of this water, 62 per cent is used to grow food to feed the Chinese population – and 90 per cent is so polluted it is unfit to drink or use in food processing. Despite massive investment in water infrastructure and new technology, many experts doubt that China can keep pace with the growth in its demand for food, at least within its own borders, chiefly because of water scarcity.63 Adding to the pressure is that China’s national five-year plans for industrialisation demand massive amounts more water – demands that may confront China with a stark choice between food and economic growth. ‘The Chinese government is moving too slowly towards the Camel Economy. It has plans, incentives for officials; it invests in recycling, irrigation, pollution, drought resistant crops; it leads the world in high voltage transmission (to get hydro, wind and solar energy from the west of China). None of this is sufficient or likely to be in time’, the Financial Times opined.64

As the world’s leading carbon emitter, China is more responsible for climate change than any other country. It is also, potentially, more at risk. The main reason, quite simply, is the impact of a warming world on China’s water supply – in the form of disappearing rivers, lakes, groundwater and mountain glaciers along with rising sea levels. To this is coupled the threat to agriculture from increasing weather disasters and the loss of ecosystem services from a damaged landscape.65

China is thus impaled on the horns of a classic dilemma. Without more water it cannot grow its economy sufficiently to pay for the water-conserving and food-producing technologies and infrastructure it needs to feed its people. Having inadvertently unleashed a population explosion with its highly successful conversion to modern farming systems, the challenge for China now is to somehow sustain its food supply through the population peak of the mid twentyfirst century, followed by a managed decline to maybe half of today’s numbers by the early twentysecond century. It is far from clear whether the present approach – improving market efficiency, continuing to modernise agricultural production systems, pumping water, trying to control soil and water losses and importing more food from overseas – will work.66

China has pinned its main hopes on technology to boost farm yields and improve water distribution and management. Unfortunately, it has selected the unsustainable American industrial farming model to do this – which involves the massive use of water, toxic chemicals, fertilisers, fossil fuels and machines. This in turn is having dreadful consequences for China’s soils, waters, landscapes, food supply, air, climate and consumer health. Serious questions are now being asked whether such an approach is not digging the hole China is in, even deeper. Furthermore, some western analysts are sceptical whether the heavy hand of state control is up to the task of generating the levels of innovation required to feed China sustainably.67

Plan B, which is to purchase food from other countries, or import it from Chinese-owned farming and food ventures around the world, faces similar difficulties. Many of the countries where China is investing in food production themselves face a slow-burning crisis of land degradation, water scarcity, surging populations and swelling local food demand. By exporting its own problems, China is adding to their difficulties. While there may be some truth to the claim that China is helping to modernise food systems in Africa, for example, it is equally clear that the export of food at a time of local shortages could have dire consequences for Africans, leading to wars in Africa and elsewhere. How countries will react to Chinese pressure to export food in the face of their own domestic shortages is, as yet, unclear. If they permit exports, it could prove catastrophic for their own people and governments – but if they cut them off, it could be equally catastrophic for China. Such a situation cannot be regarded as anything other than a menace to world peace.

Around 1640, a series of intense droughts caused widespread crop failures in China, leading to unrest and uprisings which, in 1644, brought down the Ming Dynasty. A serious domestic Chinese food and water crisis today – driven by drought, degradation of land and water and climate change in northern China coupled with failure in food imports – could cause a re-run of history: ‘The forthcoming water crisis may impact China’s social, economic, and political stability to a great extent’, a US Intelligence Assessment found. ‘The adverse impacts of climate change will add extra pressure to existing social and resource stresses.’ 68

Such events have the potential to precipitate tens, even hundreds, of millions of emigrants and refugees into countries all over the world, with domino consequences for those countries that receive them. Strategic analysts have speculated that tens of millions of desperate Chinese flooding into eastern Russia, or even India, could lead to war, including the risk of international nuclear exchange.69

Against such a scenario are the plain facts that China is a technologically advanced society, with the foresight, wealth and capacity to plan and implement nationwide changes and the will, if necessary, to enforce them. Its leaders are clearly alert to the food and water challenge – and its resolution may well depend on the extent of water recycling they are able to achieve. As to whether the PRC can afford the cost of transitioning from an unsustainable to a sustainable food system, all countries have a choice between unproductive military spending and feeding their populace. A choice between food or war. It remains to be seen which investment China favours.

However, it is vital to understand that the problem of whether China can feed itself through the twentyfirst century is not purely a Chinese problem. It’s a problem, both economic and physical, for the entire planet – and it is thus in everyone’s best interest to help solve it. For this reason, China is rated number 3 on this list of potential food/war hotspots.

Africa

Food wars – that is, wars in which food, land and water play a significant contributing role – have been a constant in the story of Africa since the mid twentieth century, indeed, far longer. In a sense, the continent is already a microcosm of the world of the twentyfirst century as climate change and resource scarcity combine with rapid population growth to ratchet up the tensions that lead competing groups to fight, whether the superficial distinctions between them are ethnic, religious, social or political.

We have examined the particular cases of Rwanda, South Sudan and the Horn of Africa – but there are numerous other African conflicts, insurgencies and ongoing disturbances in which food, land and water are primary or secondary triggers and where famine is often the outcome: Nigeria, Congo, Egypt, Tunisia, Libya, Mali, Chad, the Central African Republic, the Maghreb region of the Sahara, Mozambique, Cote d’Ivoire and Zimbabwe have all experienced conflicts in which issues of access to food, land and water were important drivers and consequences.

The trajectory of Africa’s population in the first two decades of the twentyfirst century implies that the number of its people could quadruple from 1.2 billion in 2017 to 4.5 billion by 2100 (Figure 5.6). If fulfilled, this would make Africans 41 per cent of the world population by the end of the century. The UN Population Division’s nearer projections are for Africans to outnumber Chinese or Indians at 1.7 billion by 2030, and reach 2.5 billion in 2050, which represents a doubling in the continent’s inhabitants in barely 30 years.70 While African fertility rates (babies per woman) remain high by world standards – 4.5 compared with a global average of 2.4 – they have also fallen steeply, from a peak of 8.5 babies in the 1970s. Furthermore, the picture is uneven with birthrates in most Sub-Saharan countries remaining high (around five to six babies/woman), while those of eight, mainly southern, countries have dropped to replacement or below (i.e. under 2.1). As has been the case around the world, birth rates tend to drop rapidly with the spread of urbanisation, education and economic growth – whereas countries which slide back into poverty tend to experience rising birthrates. Food access is a vital ingredient in this dynamic: it has been widely observed that better-fed countries tend to have much lower rates of birth and population growth, possibly because people who are food secure lose fewer infants and children in early life and thus are more open to family planning. So, in a real sense, food sufficiency holds one of the keys to limiting the human population to a level sustainable both for Africa and the planet in general.

[Figure omitted]

Forecasting the future of Africa is not easy, given the complexity of the interwoven climatic, social, technological and political issues – and many do not attempt it. However, the relentless optimism of the UN and its food agency, the FAO, is probably not justified by the facts as they are known to science – and may have more to do with not wishing to give offence to African governments or discourage donors than with attempting to accurately analyse what may occur. Even the FAO acknowledges however that food insecurity is rising across Sub-Saharan Africa as well as other parts.

In 2017, conflict and insecurity were the major drivers of acute food insecurity in 18 countries and territories where almost 74 million food-insecure people were in need of urgent assistance. Eleven of these countries were in Africa and accounted for 37 million acutely food insecure people; the largest numbers were in northern Nigeria, Democratic Republic of Congo, Somalia and South Sudan

the agency said in its Global Report on Food Crises 2018.71

The FAO also noted that almost one in four Africans was undernourished in 2016 – a total of nearly a quarter of a billion people. The rise in undernourishment and food insecurity was linked to the effects of climate change, natural disasters and conflict according to Bukar Tijani, the FAO’s assistant director general for Africa.72

Even the comparatively prosperous nation of South Africa sits on a conflict knife-edge, according to a scientific study: ‘Results indicate that the country exceeds its environmental boundaries for biodiversity loss, marine harvesting, freshwater use, and climate change, and that social deprivation was most severe in the areas of safety, income, and employment, which are significant factors in conflict risk’, Megan Cole and colleagues found.73

In the Congo, home to the world’s second largest tropical forest, 20 years of civil war had not only slain five million civilians but also decimated the forests and their ecological services on which the nation depended. Researchers found evidence that reducing conflict can also help to reduce environmental destruction: ‘Peace-building can potentially be a win for nature as well, and... conservation organizations and governments should be ready to seize conservation opportunities’. 74

As the African population doubles toward the mid century, as its water, soils, forests and economic wealth per capita dwindle, as foreign corporations plunder its riches, as a turbulent climate hammers its herders and farmers – both industrial and traditional – the prospect of Africa resolving existing conflicts and avoiding new ones is receding. The mistake most of the world is making is to imagine this only affects the Africans. The consequences will impact everyone on the planet.

A World Bank study has warned that 140 million people will have to leave just three regions of the world as climate refugees before 2050 – and the vast majority of these, some 86 million, would be displaced from their homes in Sub-Saharan Africa.75 The second decade of the twentyfirst century has already witnessed a blow-out in the number of Sub-Saharan Africans fleeing north, across the desert into the already dangerously overstressed region of North Africa. From there many have headed by boat for Europe, with shocking loss of life on the way – up to 5000 deaths due to drowning in a single year. The number of Africans fleeing across the Mediterranean has fluctuated, climbing as high as a third of a million people (in 2016) with most of them headed for Italy, followed by Greece, Cyprus and Spain. By this time Europe already had a population of five million Sub-Saharans.76

It is worth recalling, for a moment, that a food failure in the North African grainbowl in the third and fourth centuries was a primary factor in the collapse and demolition of the Roman Empire, from Britain to Asia Minor.

The risk of a tsunami of people attempting to escape Africa for Europe, and to a lesser degree the Middle East, in coming decades is building with ominous intensity. The stress in SubSaharan Africa is already forcing conditions in North African countries closer to crisis point. Were their food systems to fail in domino-succession, the scale of potential movement of desperate people into Europe can only be guessed – but is certainly in the range of tens to hundreds of millions. Large enough, in other words, to swamp the nations of Italy, Spain and Greece and eliminate their governments altogether, forcing many of their own people in turn to flee into northern Europe. Given the crisis caused by a million Syrians fleeing into Europe in 2013, the consequences for European stability and the world economy of an African eruption tens or hundreds of times the size can only be imagined.

The good news is that, in the view of the World Bank, up to 80 per cent of Africa’s climate refugees could be prevented from leaving their homes in the first place by timely climate and development (i.e. food, land and water) action taken by the rest of the world. The bad news, however, is that most of the world’s large oil and coal companies and their climate-denying puppet governments remain implacably opposed to the sort and scale of action necessary, preferring to pull the global house down on their own heads.

Canadian ecologist Paul Chefurka argued in a far-sighted paper that the outlook for Africa by 2040 was grim, even if the continent were able to lock in a 1 per cent year-on-year increase in farm yields. Even then Africa might still be forced to spend half its wealth – an almost impossible proportion – on food imports by 2050, assuming sufficient affordable food was available globally to supply them. Chefurka argued the solutions were:

First, the developed world must get its act together when it comes to foreign aid. Our lack of performance with regard to the Millennium Development Goals is beyond contemptible. A minuscule sliver of the GDP of the richest nations could help prevent a catastrophic outcome for hundreds of millions of people and scores of countries. That we have failed our African brothers and sisters so egregiously is a shame that should follow all of us into the afterlife.

Second, and most importantly, we must develop an immediate crash program of education and contraception in all the regions at risk from this gathering storm. Africa may be the first, but the conditions are ripe for much of South Asia to follow in their footsteps. We must blanket Africa with schools and family planning clinics.77

There is substance to both points. Unfortunately expanding conventional farming with a view to feeding all the Africans in 2050 and 2100 is unlikely to succeed. It is a twentieth-century solution to a twentyfirst-century problem, even with more advanced farming technologies added. It would unleash cataclysmic soil and water loss, gross pollution, the spread of deserts and animal, plant and human diseases, accelerate climate change (through land clearing and the use of fossil fuels and fertilisers) and extinguish the last of Africa’s wildlife. The combined outcome of this would be war, potentially on a continent-wide scale – and it is for this reason Africa ranks second on this list of world food and war hotspots.

Where the true solutions to Africa’s and the world’s food challenges may lie is dealt with in the concluding chapters of this book.

South Asia

The constellation of burgeoning food demand, water scarcity, degrading land, a turbulent climate, social, political and religious feuding and rampant militarisation make the region of South Asia – India, Pakistan, Bangladesh and Sri Lanka – the most dangerous of all for civilisation during the twentyfirst century.

The population of the region has more than tripled since the 1960s. India alone is looking at a population of 1.73 billion by 2050, Pakistan at 306 million, Bangladesh 202 million and Sri Lanka at 23 million – a combined total approaching 2.3 billion.78 The Indo-Gangetic Plain is the bread-basket of the three largest countries and currently feeds more than 900 million from both surface and groundwater.

‘India is facing a perfect storm in managing water. Centuries of mismanagement, political and institutional incompetence, indifference at central, state and municipal levels, a steadily increasing population that will reach an estimated 1.7 billion by 2050, a rapidly mushrooming middle class demanding an increasingly protein-rich diet that requires significantly more water to produce – together, these are leading the country towards disaster', says Professor Asit Biswas of the National University of Singapore.79 ‘India is now facing a water situation that is significantly worse than any that previous generations have had to face. All Indian water bodies within and near population centres are now grossly polluted... Not a single Indian city can provide clean water that can be consumed from the tap on a 24x7 basis’, he adds. This was underlined by a warning from the Indian Supreme Court in 2018 that the capital, New Delhi – population 25 million – was on track to run out of groundwater completely.80 Facing similar water scarcity were 20 other Indian cities, including Bangalore and Hyderabad – heartbeat of the Indian high-tech boom – menacing the lives and jobs of 600 million Indians.81

Free electricity and cheap diesel pumps led to an explosion in the extraction of groundwater across the Indo-Gangetic plain. ‘The best estimate is that at present India uses 230–250 cubic kilometres of groundwater each year. This accounts for about one-quarter of the global groundwater use. More than 60% of irrigated agriculture and 85% of domestic water use now depends on groundwater.’ Over large areas, India’s groundwater levels have been falling precipitously, in places at rates of a metre or more a year, since the start of the twentyfirst century and scientists fear its reserves will be largely exhausted by 2050.82

The World Resources Institute, which keeps a hawk-like gaze on global water issues, notes that more than half of India is already water stressed, affecting more than 600 million people – and the situation will become extremely grave towards 2040 (Figure 5.7).83

Climate change is only making matters worse for South Asia – the rising intensity of droughts, floods and heatwaves threatens to undermine the region’s fragile ability to feed itself. Indeed, according to some projections, parts will be so hot as to become uninhabitable and unfarmable.84 Recent climate modelling identified India as the world’s second most vulnerable country for climate-related hunger, and Bangladesh third, with the situation worsening towards 2 C of global warming.85 The Indian Ministry of Finance concurs, warning that climate could shrink agricultural incomes by as much as 25 per cent in unirrigated farmland and 18 per cent in irrigated areas by 2100.86

[Figure omitted]

South Asia’s main water reserve, the glacial ice of the Hindu Kush and Himalaya which supports two billion people, is in dire straits, according to a study by 210 scientists. A third of it will be gone by 2100, in a ‘climate crisis you haven’t heard of’, said lead author Philippus Wester. Its loss due to global warming holds catastrophic consequences for rivers, groundwater, food production and the cities that rely on it.87

‘Climate change is likely to have a detrimental effect on South Asia out to 2030 and beyond, mainly because of its ability to exacerbate one of South Asia’s biggest challenges: an expanding population and the challenge of feeding, housing, clothing, watering and employing it’, wrote analyst Benjamin Walsh.88 Melting glaciers, increased evaporation and swelling cities are all intensifying existing food and water insecurity and, since climate change cannot be prevented in the short run, governments had better prepare for it, he said. In this sense, Walsh and Biswas tender similar advice: whether or not South Asia can ride out the ‘perfect storm’ will depend on the competence and determination of hitherto somewhat inept governments in taking the essential steps to conserve water and find new ways to produce food. The subcontinent’s existing food and water model is broken and cannot survive the mid century.

On the positive side is the enthusiasm with which South Asia has embraced renewable energy and the IT revolution, expressed in the region’s strong economic growth. These demonstrate that vast and rapid national and regional changes are possible. Water, land and food, however, present far more intractable problems – social, political and technical – on which age-old disputes over religion, ethnicity and caste lie like a pall.

Since India and Pakistan partitioned in 1947, there has been ongoing low-level conflict over the waters of the Indus and the territory of Kashmir. Pakistan considers India is stealing its water and trying to assert hegemony through dam-building, while India claims Pakistan is losing water due to climate change: the scarcer water becomes for either country, the more the tensions escalate. Both sides are heavily armed: India has 2.1 million soldiers under arms, and Pakistan 644,000. Both nations have 120+ nuclear warheads. Between them, they spend US$65 billion a year on their militaries.89 How close they have been to open war is highlighted by legal expert Dr Waseem Quereshi: ‘The tension over water conflicts between India and Pakistan has been soaring. India has threatened that it will scrap the IWT [Indus Waters Treaty] entirely. In response, Pakistan has stated that such a revocation of a bilaterally agreed treaty would be considered an act of war’. 90

Large-scale food, land and water failures anywhere on the Indian subcontinent could spark immense refugee movements in the tens or hundreds of millions, capable of obliterating neighbour countries and igniting wars. They are liable to be on a scale that dwarfs the Syrian refugee problem into insignificance, with worldwide repercussions. For example, some 130 million people on the subcontinent inhabit low-lying coastal regions that will be under the sea by 210091, and that is but a single dimension of the climate–water crisis. The World Bank rates the Indian subcontinent the world’s second most vulnerable region for enforced climate migration, with 40 million climate refugees alone in India by 2050.92 These estimates take no account of the scale of migration that could result from major failures in food or water, or people fleeing resulting conflicts.

The scenario of major collapse in the South Asian food and water system is so appalling that no government or agency, as yet, seems prepared even to contemplate its possibility, or to risk the displeasure of South Asian governments and peoples by speaking openly about it. As a result, the world at large is doing little to forestall or prevent it. However, for whatever the vox populi is worth, when the website Debate.org asked readers to vote on the question “Will India Collapse?”, 76 per cent of respondents (mostly Indians) were of the view that it would.93 The Oslo Peace Research Institute, in a rather more structured attempt to predict the likelihood of future conflicts based on past behaviour, rated Pakistan, India, Afghanistan and Sri Lanka among the countries more likely to face wars up to 2050.94

The great issue for humanity is South Asia’s combined arsenal of 250+ nuclear weapons. Though many of these are thought to be ‘battlefield’ or tactical nukes (as opposed to city busters), there are enough of them to cause a worldwide famine affecting everybody and lasting several years. This insight arises out of the increasing sophistication of global climate models, which can now describe the impact of nuclear release on the global climate system with far greater precision than ever before. Meteorologist Alan Robock from Rutgers University and physicist Brian Toon from the University of Colorado have devoted 30 years to projecting the effects of nuclear war. They estimate that a limited nuclear exchange between India and Pakistan would throw up at least five million tonnes of dust and smoke from burning forests and incinerated cities, lofting it into the high atmosphere where it will linger for up to 20 years. In climatic terms, this would be the equivalent of an asteroid impact on Earth or a large volcanic eruption, they said – enough to unleash a worldwide ‘nuclear winter’. 95

‘We put it into a NASA climate model and found it would be the largest climate change in recorded human history’, Brian Toon told a journalist. ‘The basic physics is very simple. If you block out the Sun, it gets cold and dark at the Earth’s surface’. 96

He continued: ‘We hypothesized that if each country used half of their nuclear arsenal, that would be 50 weapons on each side. We assumed the simplest bomb, which is the size dropped on Hiroshima and Nagasaki – a 15 kiloton bomb. The answer is the global average temperature would go down by about 1.5 degrees Celsius. In the middle of continents, temperature drops would be larger and last for a decade or more’. The effects of this snap cooling on agriculture worldwide were then calculated. The answer was equally chilling: harvests would crash by 20–40 per cent for five years, and for the next five years, linger 10–20 per cent below the pre-war norm. This would result in malnourishment, if not outright starvation, for most of the world’s population (Figure 5.8).

Diagram, engineering drawing

Description automatically generated

Such an event would be more severe than the Little Ice Age of the eighteenth century – which was, it may be recalled, a likely contributing factor in the hunger that led to the French Revolution – or the cool period that brought down the Roman Empire in the fourth century. In today’s overcrowded world it would unleash global hunger, reducing the average daily caloric intake from 2900 to 1900–2000 calories or fewer, which is borderline malnutrition. For people already hungry, such an outcome would be fatal.

Yet that is not the worst of it. A report by International Physicians for the Prevention of Nuclear War (IPPNW) concluded that China, lying immediately downwind of India/Pakistan, would be worst affected by the nuclear winter effects of even a limited atomic war in South Asia. Chinese winter wheat production would fall by up to half, and the rice crop by 21 per cent.

Two billion people in India and China would starve within months, government in both countries would probably disintegrate and, in an echo of their own and Roman histories, the remnants of society would doubtless be riven among local warlords. Most of the nations of Southeast, West, North and Central Asia on their borders would be swept away before the tide of people fleeing the catastrophe.97

How such events would play out for the rest of the world are not easy to predict – but, in all likelihood, the panic occasioned by rising global hunger, soaring global food prices and the loss of two of its largest traders would crash the world economy, toppling more governments and igniting further civil and international conflict, some of it potentially nuclear.

Thus, even a relatively limited nuclear exchange, such as between India and Pakistan, could bring civilisation as we know it to an end. From this brief assessment it can be seen that the Indian subcontinent, more than any region on Earth, holds the key to the future of world food security and hence, the fate of civilisation in this century. For this reason, the South Asian region is rated as the Number One Risk on this list, in terms of food, land and water insecurity and conflict risk, above all others.

The Human Tide

Since lack of food, or fear of it, is a primary motive for people to leave their homes, the number of refugees and displaced people worldwide offers stark testimony to the increasing pressures facing human civilisation and its food supply, as we bang up against the finite limits of the planet we inhabit.

The actual number of refugees and internally displaced people more than doubled in the first two decades of the twentyfirst century, from 32 million in the late 1990s to 68.5 million in 2018.98 Furthermore, the proportion of the world population in flight rose nearly tenfold, from 0.1 per cent to almost 1 per cent, meaning – as the World Economic Forum pointed out – that around one person in every hundred has fled their home.99 In 2018, the UN High Commissioner for Refugees noted these were ‘the highest levels of displacement on record’, that nearly half of all refugees were children under 18 and that, on average, 20 people were being displaced every minute.

On top of this the UN reported 258 million ‘economic migrants’ in 2017,100 mostly from Asia and mainly educated people who had foreseen potential trouble in their homelands, including China and India, and had the resources to move themselves and their families out of harm’s way and to other more secure parts of the globe. Together, then, almost a third of a billion human beings now roam the planet every year in search of new homes and opportunities, freedom from war or hunger. Such a vast number of people already on the road – equivalent to the entire population of the USA – gives some inkling of the colossal people movements which could eventuate from large scale conflicts over food, land and water as the century advances.

It is time to face the fact that movements of a billion humans or more are now entirely possible over a comparatively short time – even though many may die in the process.

In case anyone should consider such vast movements to be impossible, the World Bank notes that the number of global tourists alone already exceeds 1.25 billion a year – which simply goes to illustrate the capacity of modern transport systems.101 Most of those tourists travel by air, road, rail or passenger vessel – however, it should be noted the world also has 52,000 merchant ships, 312,000 general aviation aircraft, 4.6 million fishing boats and tens of millions of larger recreational craft102 capable of being commandeered by fleeing people, should their needs be fierce enough.

As mentioned before, the Bank anticipated that at least 140 million ‘climate refugees’ may be forced to quit just three highly vulnerable regions by the mid twentyfirst century: SubSaharan Africa, South Asia and Latin America.103 In the Bank’s analysis, the main drivers for these immigrants, it should be noted, are factors such as water scarcity, crop failure, sea-level rise and storm surges – not the wars these impacts may also ignite. They would make the exodus much larger. Furthermore, the Bank’s analysis does not include other at-risk regions such as China, Central Asia and the Middle East/North Africa.

The FAO, in its report on the state of world food security,104 commented as follows.

* ‘The number of conflicts is... on the rise. Exacerbated by climate-related shocks, conflicts seriously affect food security and are a cause of much of the recent increase in food insecurity.’
* ‘Conflict is a key driver of situations of severe food crisis and recently re-emerged famines, while hunger and undernutrition are significantly worse where conflicts are prolonged and institutional capacities weak.’

It is important to understand that such disasters are preventable, with sufficient forward recognition of the driving factors, early implementation of suitable preventative strategies and with the co-operation of the global community. At present this cooperation is fragmentary, and few countries feel responsible for preventing the kinds of events described in this chapter, especially those taking place in distant, overseas countries. Yet it is increasingly in their own interests to do so, in view of unavoidable consequences for themselves, both physical and economic.

In the twentyfirst century the risk of mass migration and conflict driven by insecurity of food, land and water is higher than in any previous age of human history. The World Economic Forum (WEF) rated enforced mass migration as the sixth most likely of its top 30 global risks in 2018 and the second worst in terms of its societal impact. It identified ‘profound social instability’ as the risk factor most highly connected to the prevailing range of global trends.105 Furthermore, the ominous and destabilising rise of right-wing populism and renascent fascism in western countries, especially, is in part a direct response to rising fears of mass immigration.106

Eight out of the WEF’s top ten risks of 2018 related to global food security. Furthermore, the World Food Programme (WFP), in its report At the Root of Exodus: Food Security, Conflict and International Migration, drew a direct line between food, war and mass migration: ‘The WFP study found that countries with the highest level of food insecurity, coupled with armed conflict, have the highest outward migration of refugees. Additionally, when coupled with poverty, food insecurity increases the likelihood and intensity of armed conflicts; something that has clear implications for refugee outflows’, it said.107

Food, land and water must therefore now be viewed as strategic components of defence and international security as elemental as naval fleets, air power, armies or weapons. There is no logic to arming ourselves against the possibility of global conflict if, by ignoring its causes, we inadvertently set in motion the very machinery that drives it. Neglecting the strategic importance of food, land and water will deliver increased risk of war and mass migration – while the opposite is also true: attending to them can yield a vital peace dividend by extinguishing or damping down an important casus belli. This issue is developed in Chapter 7.

#### That goes nuclear, causes extinction, AND has disparatesocietal impacts---BUT current public discourse is desensitized to nuclear threats. Only by analyzing scenarios for conflict reinvigorates concern.

Andrew Futter et al. 20, Professor of International Politics at the University of Leicester; Samuel I. Watson, Associate Professor at the University of Warwick; Peter J. Chilton, Research Fellow at the University of Birmingham; Richard J. Lilford, Professor of Public Health at the University of Birmingham, “Nuclear War, Public Health, The COVID-19 Epidemic: Lessons for Prevention, Preparation, Mitigation, and Education,” Bulletin of the Atomic Scientists, Vol. 76, No. 5, pg. 271-276, 2020, T&F.

It may seem tactless, even perverse, to write about other sorts of disasters that might befall our planet in the middle of a pandemic. But write we must. For the current crisis is a harbinger of crises to come, whether humanmade or natural. While many of the lessons to be learned from the COVID-19 outbreak are specific to communicable disease, they may also provide insight into a broader set of challenges that the world may face if nuclear weapons were ever to be used again.

Dealing with a pandemic is trivial compared to dealing with the aftermath of a nuclear incident or attack. Thermal injury, followed by radiation illness, not to mention the disruption to society and the impact on the environment, would dwarf the effect of COVID-19. The basic infrastructure of government, the criminal justice system, finance, telecommunications, and food supply could be severely disrupted, whereas they have remained largely intact during the current pandemic. But public concern over nuclear weapons has faded from a high point a generation ago. In part, this may be because of psychological biases that do not properly weight the impact of an event by its probability of occurring. Consequently, the public must once again be educated about and sensitized to nuclear risk.

The task of prevention and preparation cannot be left to governments alone. As with climate change, the whole of society must be engaged in pushing to transform how humans think about and manage our nuclear world. Only then will governments have the incentive to reduce systemic risk and plan for the unthinkable.

It is paradoxical that the prevention of nuclear war, so prominent in the public mind during the 1980s, has almost faded from view despite the continued proliferation of nuclear weapons and the means to deliver them; despite the unraveling of the nuclear arms control edifice that has undergirded international order since the 1960s; despite rising political tensions across the world; despite well-documented near misses resulting from accidents and miscalculation; and despite the risk that nuclear materials could fall into terrorist hands. During the Cold War, governments and civil society groups planned extensively for the impact of nuclear weapons, and the general public was encouraged to read or watch a series of “duck and cover” or “protect and survive” pamphlets and TV programs explaining what to do in the event of a nuclear war. Today that seems strange, even slightly comical. It should not be.

A sober analysis of the risks and consequences of nuclear catastrophe reveals that they are unacceptably high. But by learning lessons from the COVID-19 pandemic and applying them to the nuclear realm, engaged citizens can help to reduce those risks.

The consequences of nuclear attacks

The consequences of nuclear use depend on the size, number, and types of weapons, the altitude at which the explosion occurs, and population density. Alex Wellerstein’s NUKEMAP is an online tool that allows users to calibrate the gruesome effects of nuclear strikes of different magnitudes over any part of the world (Wellerstein 2020). As the tool makes clear, nuclear weapons destroy human life in three zones radiating out from the epicenter: the fireball; the shock wave; and the area of a residual radiation, whose direction depends on prevailing winds. As an example, the 455- kiloton W88 warhead currently deployed on missiles inside US nuclear-powered submarines, if detonated above London, would kill an estimated 675,000 people and injure over a million more, not taking into account radiation damage and subsequent fallout. The Tsar Bomba, a 50-megaton bomb released into the atmosphere by the Soviet Union in 1961 and the most powerful bomb ever to be tested, could have killed up to 7.6 million people and injured a further 4 million if detonated over New York City. During the Cold War, experts estimated that the use of just 1 percent of the world’s nuclear stockpile could kill about 56 million people and injure another 61 million (Daugherty, Levi, and Von Hippel 1986).

The medical effects of nuclear war are summarized in a report of that title, published by the British Medical Association’s Board of Science and Education in 1983 (British Medical Association 1983). Its conclusions derive from the generic effects of blast, thermal, and radiation injury, as well as from observations made following the bombings of Hiroshima and Nagasaki in 1945 and from over 2,000 nuclear tests (Simon and Bouville 2015). The fireball destroys everything at close hand, while at a greater distance thermal radiation causes flash burns and fires. A blast wave follows. Traveling at 90 meters per second, it wreaks havoc, crushing people in buildings, injuring them with flying debris, or choking them with dust. Survivors of thermal and blast injury, and those at greater distance from ground zero, are exposed to nuclear radiation and fallout. In the short term, they are at risk of radiation sickness, the main features of which are bone marrow suppression, gastro-intestinal symptoms, and skin damage. The severity of the disease depends on the radiation dose. Longer-term effects of radiation include reduced fertility, congenital abnormality (especially microcephaly), and cancer (especially of the thyroid).

However, just as the impact of a pandemic does not end with health effects, the impact of a nuclear strike would also go beyond the immediate death toll. Supply chains, including those for food and medicine, would be severely disrupted. Law and order would probably break down on a massive scale. There are also risks that are theoretical and controversial, but which would be cataclysmic if they occurred. Prominent among these is the risk of a so-called nuclear winter resulting from particles released into the high atmosphere (Sagan 1983; Scouras 2019).

Another theoretical risk is that of electromagnetic pulse disruption of electronic systems. Such an effect caused satellites in low orbit to fail following the high-altitude Starfish Prime nuclear test, carried out by the United States in 1962 (Plait 2012). Many writers have tried to imagine life in the aftermath of a nuclear strike, and the descriptions make the reader wonder if those killed immediately are not the fortunate ones (Whitcomb 2019; Witze 2020).

How might a nuclear incident arise?

Although the major nuclear powers have reduced stockpiles from their peaks in the 1980s, there are still over 13,000 nuclear weapons in the world today (Ploughshares Fund 2020). The bombs released in Japan in August 1945 relied entirely on fission, while in modern warheads fission is merely the detonator for an immensely more powerful fusion reaction. Several hundred of these weapons are held at high states of readiness for an attack. What might trigger their deployment? There are four main risks.

First is a planned attack. The 1945 attack on Japan is the only example to date. During the Cold War, potential belligerents were ostensibly restrained under the condition of mutual assured destruction, which itself relies on retaliation, rationality, and uncertainty about how the other side would act. Such gamesmanship may have been successful while there were only two actors, the United States and the Soviet Union, but it has become more complex and arguably more fragile in a world where nine states can deploy nuclear weapons, and where new flashpoints have emerged in East Asia, South Asia, and possibly the Middle East.

Second is miscalculation. There have been numerous nuclear near misses in our past: most famously, the near launch from a Russian nuclear submarine during the Cuban Missile crisis in 1962, and as a result of the NATO military exercise, code-named Able Archer, which led to a nuclear war scare in 1983. But also, more recently during the India–Pakistan Kargil war of 1999, just a year after both had conducted nuclear tests.

Third is an accident. It is at least conceivable that nuclear weapons could be used by accident, possibly through a computer malfunction or human error. Perhaps the best example of this would is the so-called “Petrov incident” in 1983, when scattered rays of sunlight tricked a Soviet alert system into thinking a US nuclear attack was incoming (Lewis et al. 2015).

Fourth is by non-state actors, such as terrorist groups. The chance of a nuclear detonation by a terrorist group may be limited; but perhaps more worrying is the possibility that by simulating an attack from one country they could provoke retaliation from another, or from some other interference that leads to nuclear use.

Most commentators think that miscalculation or accident is the most likely progenitor of a nuclear strike, by a considerable margin; if that is true, then nonuse of nuclear weapons for 75 years has been the result mostly of luck rather than judgment (Pelopidas 2017).

Quantifying the risk of nuclear events

The magnitude of the risk of a nuclear event is hard to estimate. The risk of a single incident, leading to the death of, say, one million people, might be as high as 50 percent over the next 50 years, according to one model (Barrett, Baum, and Hostetler 2013). Another widely cited figure is a 2 percent chance per year (Hellman 2008). A survey of experts found a wide range of estimates of the probability of nuclear war over a 10- year period; only one of the 79 respondents put the risk at zero percent, and 60 put it at over 10 percent (Lugar 2005).

The expected loss from a future event is the product of its probability and its impact, both of which could themselves be assigned probability distributions to represent the associated uncertainties. The impact could be calibrated in disability adjusted life years or even just life years lost. As a simple illustration, a 5 percent probability of an event with 50 million causalities results in an expected loss of 2.5 million (0.05 x 50 m) lives.

However, the skewed distribution of impact means the probability of losses that are orders of magnitude larger than this cannot be ignored. Figure 1 provides an example of the expected life years lost from a nuclear conflict by providing probability distributions based on estimates from the literature. In this example, the expected number of lives lost is 29 million, even though the median probability of a nuclear conflict is “only” 10 percent and the median number of lives lost is 1 million. By way of comparison, the World Health Organization estimated that climate change would be responsible for around 241,000 additional deaths each year to 2030 (or about 2.5 million over ten years) (World Health Organization 2014). Neither of these calculations take into account loss of life due to indirect economic effects. Nor do they include suffering caused by chronic illness and disability. In the case of nuclear exposure, this also includes terrible effects on unborn children. However, even without taking these considerations into account, it is clear that both nuclear war and climate change are huge threats to public health and wellbeing. But there is little reason to conclude that climate change is a greater hazard. The effects of nuclear war are immediate, whereas climate change provides plenty of warning, allowing infrastructure to be preserved, even if at high cost.

Public perceptions and social concern

A generation ago, nuclear risk was at the forefront of the public debate. Citizens across the globe were genuinely worried that a nuclear war might break out between East and West, and this spurred huge public protests and a strong anti-nuclear movement. However, today, the appreciation of nuclear risk appears much lower, with far less public concern beyond elite-level discussion and civil society activism. Notwithstanding the work of the International Physicians for the Prevention of Nuclear War (an international federation of medical groups), the International Campaign to Abolish Nuclear Weapons, the recent Humanitarian Initiative on Nuclear Weapons, and the 2017 Nuclear Ban Treaty, nuclear risks appear to have fallen below other global societal risks, such as climate change, and, following the outbreak of COVID19, global pandemics. Why has the risk of nuclear war almost dropped out of popular concern when there is little or no objective reason for citizens to lower their guard? There are four main reasons.

First is a failure to consider both the probability and magnitude of nuclear events. As the above calculations show, probability should not be considered in isolation from the magnitude of an event if it occurs. The expected loss should be kept in mind when assessing threats.

Second is the general public’s bandwidth for giving attention to important issues. There appears to be a limit to the number of issues that can rise to prominence at any one time; issues must compete for public and journalistic attention (Hilgartner and Bosk 1988). But other issues, important as they may be, should not crowd out the nuclear risk.

Third is the availability heuristic. People are more engaged by things they have experienced than things they must imagine. Expect public support for investment to prevent and prepare for pandemics in the near future. However, the hidden danger is often the greater danger, in part because it is hidden and less tangible.

Fourth is a sense of futility. Challenges such as climate change and pandemic prevention are perceived to be more “doable” in the sense that people feel they can influence the course of events. Such a sense of powerlessness may induce a nihilistic attitude. However, citizens are not powerless to reduce nuclear risk.

Learning nuclear lessons from COVID-19 and preparing for the unthinkable

The current COVID-19 crisis, in addition to serving as a timely reminder of the very personal nature of global catastrophic risk, can also shine light on the ongoing nuclear challenge that global society faces.

The first objective when dealing with global catastrophic risks, such as that posed by nuclear weapons, is the importance of prevention. It is easy to think that nuclear prevention differs from pandemic prevention in the sense that pandemics arise from the natural world while nuclear events are entirely human made. However, pandemics involve human actions at all levels, from the way the environment is managed (Brulliard 2020), through containment in facilities that experiment with modification of the viral genome, and through the nations and international agencies that respond to emerging threats. Both viral and nuclear risks can be mitigated by international co-operation. The risk of pandemics can be reduced through international agreement covering early reporting of communicable disease outbreaks. Delayed reporting resulted in delayed action in the case of COVID-19.

Worryingly, similar bilateral and multilateral agreements, supported by trust building, are eroding in the nuclear arena. Ensuring that the current global arms control architecture – including the Nuclear NonProliferation Treaty agreed in 1968 and the New START agreement between the United States and Russia that is due to expire next year – survives into a new era is essential. Likewise, continued international efforts to reduce the risks posed by nuclear terrorism through securing nuclear facilities and accounting for all fissile materials are also vital.

Genuine political commitment to nuclear disarmament would of course be the ultimate prevention mechanism, but whether nuclear disarmament is possible in our lifetimes is a moot point. Indeed, global engagement with nuclear disarmament appears to be on the wane even after the high point of agreement of the 2017 Nuclear Ban Treaty. Nevertheless, if the world cannot disarm, at least it could create a regime where all, or the great majority, of armaments are taken off high alert and various confidence building and risk reduction mechanisms are put in place, given the well-documented risks of accident or miscalculation. All these measures require strengthening international bodies that can carry out inspections and help overcome suspicion through increasing transparency. For example, governments will be more confident to reduce the high alert status of nuclear weapons if they can be assured that other governments are doing likewise.

If prevention is not possible, then attention must turn toward preparation. It has been argued that the world was not properly prepared for the current pandemic, from a lack of personal protective equipment to economic planning for lockdown, meaning that decisions had to be made on the fly. However, if governments were not prepared for the pandemic, then they are likely not prepared for other global disasters either, the most significant of which would arguably be a nuclear disaster.

Duncan Campbell’s 1982 book War Plan UK gives an unnerving insight into the limitations of planning for life after a nuclear attack even in an age where such an event was taken seriously (Campbell 1982). And it is not clear that much societal contingency planning beyond the continuity of government exists in most states today (see Graff 2017). COVID-19 has highlighted the enormous pressures on the health service, police officers, and other essential workers, and has shown that these workers can become ill or even die. Moreover, even if just one city was attacked by a nuclear weapon, it would be necessary for other parts of the country to come to its aid, and the government would have to step in to put emergency measures in place for the distribution of food and water, shelter, and healthcare.

Policy makers cannot just wring their hands and say how catastrophic it would be and hope for the best. The fact that it would be difficult to manage such a scenario is the very reason why the plans should be made. Such plans would have to involve the whole of society, just as they did in the 1960s. Citizens need to persuade their governments to spend money and energy on difficult questions. How to maintain food supplies? How to get money to people who need it? Who is an essential worker? Which industries or parts of society should be prioritized? What is the correct balance between state and private industry in the response? How much should the population be allowed to know? How far should human rights be suspended? What should the parts of the country that are functioning do to help those that are not?

The current COVID-19 crisis also provides insight into the challenges that citizens would face in the event of a nuclear attack (whether small or large in scale, or indeed just threatened). A nuclear crisis is likely to create far greater levels of panic, hoarding, and shortages of medical supplies than has COVID-19. There would be a rush to stockpile iodine, for example, to counter the effects of radiation on the thyroid, but also of the equipment necessary to treat burns or gain access to clean water. A nuclear attack would also almost certainly mean the curtailment of civil liberties, as well as lockdowns and restrictions on travel (both domestically and abroad). Rather than to prevent the spread of illness, this would be done to allow the authorities to try to manage the crisis and prevent lawlessness. It may even include martial law and possibly a restriction of citizens’ ability to access reliable information. To some extent, this is easier today with 24-hour television news reporting and myriad online resources to keep everyone up to date (assuming TV and radio transmission is still possible), but the flip side of this is that knowing what is real or believable is difficult (Lazer et al. 2018). This also highlights the importance of clear and unequivocal messaging on the part of trustworthy governments (another significant challenge highlighted by the response to COVID-19).

Perhaps the most important pieces of the nuclear risk puzzle are education and engagement. Notwithstanding the excellent work by organizations such as the Nuclear Threat Initiative, the public is probably less familiar with the basics of nuclear weapons and nuclear risks than at any point since the 1940s, so it is essential that more be done to educate the public about them, perhaps in a similar way to what has happened with climate change. With respect to engagement, a nuclear disaster, and certainly a nuclear war, would be a catastrophe that extended beyond borders, and while an immediate reaction might be to close borders and look inward, it is clear that any response would have to be global.

A nuclear wake-up call

In 1966 the BBC docudrama The War Game depicting a hypothetical nuclear attack on the United Kingdom was deemed so upsetting that it was initially banned from being broadcast. Two decades later, the films The Day After and Threads portrayed the harrowing impact of nuclear attacks on towns in the US Midwest and on Sheffield, England, respectively. Upsetting as these films may have been, they nevertheless played an important role in educating the public about nuclear risks. A generation later, in the midst of the challenges and politics of the modern world, people seem to have forgotten the dangers posed by nuclear weapons or are at best blissfully ignorant. It is essential, however unpleasant it may seem, that citizens think about the unthinkable and make a concerted effort to hopefully prevent, but in a worst-case scenario mitigate and manage, the threats posed by nuclear weapons. The world has survived for 75 years without the use of nuclear weapons in war, but this does not automatically mean that the same will be true in the future. That governments have avoided catastrophe thus far is, at least in part, due to luck. There is no reason to assume that this luck will hold out indefinitely.

There is a limit to how far governments are prepared to move without the support of their citizens. As was the case in the abolition of the slave trade two hundred years ago or with climate change today, the causal chain is often from citizen to government, rather than the other way around (Jennings 2013). Citizens should hold politicians to account. It is crucially important that scientists and other experts are humble about how much is known – or how much can be known. However, the gradual awakening to the dangers of climate change, and more recently virulent disease, shows that the public can absorb abstract ideas and incorporate them in their worldview beyond just reciting empty slogans. But a societal movement requires engagement from a broad swath of groups including the press, teachers, the judiciary, and humanitarian and religious groups to ensure that the issue of nuclear risk is placed at the center of the public agenda in a sober but serious way.

#### Even initially small-scale disputes have an unpredictable multiplier effect. It proves food conflicts are extremely complex and have overlapping drivers.

Dr. Birgit Kemmerling et al. 21, Professor, Plant Biochemistry, University of Tübingen; Dr. Conrad Schetter, Senior Research Fellow, Center for Development Studies, University of Bonn; Lars Wirkus, Head, Research Infrastructure & Data, Center for Development Studies, University of Bonn, "Addressing Food Crises in Violent Conflicts," Food Systems Summit Brief, Prepared by Research Partners of the Scientific Group for the Food Systems Summit, April 2021, pg. 4-6.

2. Multiple dimensions of food crises and violent conflicts

Over the past decade, a growing body of research has examined the mutual impact between violent conflicts and food insecurity (for an overview, see Brück et al., 2016; Martin-Shields & Stojetz, 2019) and indicated strong correlations on multiple layers. However, food insecurity, as well as violent conflicts, are characterised by a high degree of complexity and contextualisation. Thus, discussions about the state of food insecurity and the typology of violent conflicts tend to become objectives in themselves. Criteria for determining the state of food insecurity are usually based on the four dimensions of availability, access, stability and utilisation and encompass a range of variables covering different sectors such as health, food prices and agricultural production. Analyses of food security range from the individual to the global level, and are classified by severity (FSIN, 2020).

Typologies of violent conflict differentiate between the duration and intensity of violent conflicts, between root causes, key drivers, or ways of mobilisation as well as between domestic, regional and inter-state constellations (for an overview, see Demmers, 2016). 3 Each of these typologies entails a certain interpretation of violent conflicts. However, a categorisation of violent conflicts which centres on food (in)security is missing so far. To narrow this gap, we will link the logics of war to food (in)security. We will identify three dimensions of how violent conflicts have an impact on food (in)security.

2.1 Destruction and food insecurity

The general principle of violent conflicts is that belligerent parties aim to harm, defeat or even eliminate their 'enemy'. Consequently, the emergence of frontlines, battlefields and war zones is an inevitable effect of violent conflicts, even if the current technological upgrading of modern armies and warfare (e.g. drones) aims to increase the accuracy of military attacks (Prinz & Schetter, 2017). This is why by and large, violent interactions go hand in hand with physical destruction, affecting people's vulnerabilities in various ways.

In general, Collier (1999) finds that the gross domestic product (GDP) per capita declines at an annual rate of 2.2 per cent during civil wars.

Since in many of today's conflict-affected countries, the majority of people depend on small-scale farming to provide food and income for their households, small-scale agriculture is particularly affected: The destruction (e.g. bombing) or contamination (e.g. land mines, chemical weapons) of agricultural areas, as well as infrastructure (irrigation networks, roads, bridges, buildings, etc.), might force farmers to abandon agriculture altogether. Farmers may also no longer be able to cultivate their fields for lack of access to seeds and fertiliser, credits and capital, due to the uncertainty of access to buyers and markets and the displacement or killing of people (Baumann & Kuemmerle, 2016).

Especially when the expansion of war zones provokes forced migration on a large scale, the impacts on food security are direct and severe—not only in the short term but often also in the long term. Forced migration not only leads to the collapse of agricultural production and infrastructure but also disrupts or interrupts local and regional supply chains and increases food prices on local markets. At the same time, displaced people have to give up their livelihoods as producers of food (farmers, pastoralists etc.) and are thus exposed to food insecurity themselves (Brück et al., 2016), especially if they become dependent on food aid from humanitarian organisations and cannot restart agricultural activities.

The rehabilitation of war zones for food production and food supply takes decades. Clearing battlefields (de-mining), re-building physical infrastructure and establishing operational governance structures is costly and takes time. Moreover, such phases of post-war reconstruction are overshadowed by fierce disputes over access to and ownership of land and water, as property rights often change hands in times of war (Van Leeuwen & Van Der Haar, 2016). Thus, food insecurity, for poor populations in particular, often persist beyond the end of a violent conflict.

2.2 Food (in)security and warring factions

Food supply is of strategic importance to any armed group—from large-scale armies to vigilant gangs (Justino & Stojetz, 2016). This is why armed groups' presence and rule directly impact local food security and the control of production areas. Historically, the supply of large armies with food went hand in hand with the plundering of food storages and the looting of civilian households and markets. Although looting is still a common strategy, the links between armed groups' presence and food security are more complex: Armed groups might show a strong interest in local food production and other goods. Combatants can take direct control over agricultural resources and livestock for sustenance or levy taxes on these products. For example, in Syria and Iraq, the agrarian zones seized by Islamic State were maintained to a large extend, despite massive forced displacement (Eklund et al., 2017).

People in conflict-affected contexts also adjust their practices to changing politics and (local) political actors. To protect their livelihoods and food security, people might (voluntarily or coerced) cooperate with armed groups (Martin-Shields & Stojetz, 2019). On the one hand, individuals participate in and support armed groups because they may benefit from the conflict through improved economic opportunities, such as access to food, looting and appropriation of agricultural land or livestock (Keen, 1998). On the other, people, such as farmers in agricultural off-seasons, might be recruited as parttime fighters.

2.3 Hunger as a weapon

When violent conflicts are directed against certain social segments, food insecurity can become "a weapon of war" (Messer & Cohen, 2015)—either as a direct strategy or as a by-product. The goal is either to deprive a particular warring party of the population's support or to eliminate entire population groups (ethnic cleansing, genocide). Direct strategies include cutting off food supplies to harm hostile armies and the population supporting them (De Waal, 2018). Similarly, blocking food access and destroying food infrastructure ("scorched earth") are calculated military techniques not only to ignite mass starvation, malnutrition and hunger among the population but also to foster forced migration. Although the number of victims of mass starvation has declined in the past decades, it is still a widely-used military strategy in ongoing conflict zones such as Yemen, Syria, South Sudan or the Central African Republic.

Strategies may also include preventing humanitarian access. In recent food crises, Al-Shabaab in Somalia, Islamic State in Syria or commanders in South Sudan refused aid from humanitarian agencies. Governments themselves often violate the humanitarian principle and reject international relief operations, especially if they form part of the conflict, as could be witnessed in Syria and Yemen. The bypassing of humanitarian principle can also extend to donor governments; one reason for the delayed response to the food crisis in Somalia in 2011 was the US anti-terrorist legislation, which made it difficult for humanitarian organisations to provide assistance to areas controlled by Al-Shabaab (De Waal, 2018).

We have shown how the three interrelated dimensions of war logics—destruction, rule of armed groups and hunger as a weapon—have multiple effects on people's food insecurity. However, other factors, such as (conflict-related) increases in food and seed prices as well as (changing) climatic conditions, often amplify the exposure to conflict and food insecurity (Martin-Shields & Stojetz, 2019).

In many of today's conflict-affected countries, smallholder farmers, who are already vulnerable in the absence of conflicts (natural hazards) present a large part of the population. Conflict is an additional 'shock' that affects these populations' livelihoods and well-being (Brück et al, 2016). In times of war, natural hazards affect the population much harder and increase the difficulty of access to food dramatically. As the most severe natural hazards, droughts exacerbate the effect of food (in)security. Droughts as 'creeping' or slow-onset disasters usually affect larger land areas than other types of disasters and make mitigation and adaptation strategies difficult to implement. Many of the adverse effects of drought often accumulate slowly and may persist for years after the event has ended (Wirkus & Piereder, 2019).

What is less clear is whether food insecurity in turn sparks, intensifies or perpetuates conflict. While food insecurity alone is not likely to cause violent conflicts, it can increase social grievances in combination with socio-economic and political inequalities. These exclude parts of the population (particularly youth) from economic activities and participation in political decision-making processes, which ultimately can fuel civil unrest or conflicts (Brinkman & Hendrix, 2011; Vestby et al., 2018). Besides structural conditions, rising food prices have been found to exacerbate the risk of political unrest and conflicts, particularly in urban settings. The dominant explanation for the vicious circle of price and violent conflict are consumer grievances: Higher prices create or increase economic constraints and/or sentiments of (perceived) relative deprivation, which activate grievances that, in turn, can lead to conflict (whereas conflict is likely to increase food prices again) (Raleigh et al., 2015). These grievances can be directed against the state if it fails to secure food for the population in the face of rising global food prices. In Africa, rising food prices and unrest were associated with more political repression (Berazneva & Lee, 2013).

#### Independently, food insecurity is a risk magnifier---it locks in numerous existential threats. Err against complacency wedded in the Global North.

John Hewson et al. 20, Honorary Professorial Fellow, Australian National University. PhD, Economics, Johns Hopkins University; Bob Douglas, Emeritus Professor, National Centre for Epidemiology and Population Health, Australian National University; Robyn Alders, Senior Fellow, Chatham House Global Health; Julian Cribb, Adjunct Professor, University of Technology, Sydney, "Food is at the Heart of Our Future," Commission for the Human Future, Round Table on Global Food Security, June 2020, pg. 11-16. language edited.

1.7 Adverse economics

The global food system is [subject] ~~slave~~ to a productionist paradigm that focuses on producing more food, for monetary profit rather than nutritional purposes. This outmoded system rewards the volume of food produced rather than its dietary virtues or quality.

It is dominated internationally by a small number of extremely large agribusiness, food processing and retail corporations and their relentless drive to increase both production and consumption. These punish farmers by paying them less and less for producing more and more. This has devastating impacts on rural communities, on people, animals and on the farming environment. Effectively, the current agribusiness system drives farmer to become miners of their soils, water, landscapes and biodiversity, degrading the very ecological system and climate that sustain healthy food production.

Increasing concentration of corporate ownership has corrupted the goal of sustainable food production and captured control of regulation intended to protect the agroecosystem and consumer health. It gives preference to high-fat, high-sugar, high-salt, high-chemical and heavily processed foods that defy sound nutritional advice. It invests in large-scale land clearing and the slaughter of wildlife, such as the orangutan. Furthermore, corporate funding of scientific research has sullied science, causing it to lose consumer and government confidence.

Food producers worldwide are now locked into a competitive spiral to produce food at the lowest possible prices to meet the needs of supermarkets promoting cheap food while creating profits for a handful of transnational corporates, using systems that take no account of our ability to sustain the human food supply in the longer term. The industrial farming model unfairly advantages large corporate and company farms over smaller family farms. Consequently, millions of smallholders and farmers who can no longer compete are being forced off their land. The corporate model aggregates land and water holdings then, when it has extracted its rent, re-sells them to realise capital gain. This transforms the farming landscape and society forever as it sheds skills, degrades natural capital and bars young farmers from entering the industry.

Consumers everywhere now eat food that does not reflect the real cost of producing it. They are disconnected, almost completely, from the people who originally produced the food, and how it was produced, leading to wide-scale public ignorance about which foods are healthy, safe and sustainable and which are the opposite. Food consumption patterns are now extensively determined by advertising agencies rather than by nutritionists or sustainable farmers, leading to growing health problems and rising death rates. Consumers have been trained by corporates to expect ‘cheap’ food, with disastrous consequences for the environment that produces their food and their own health. The reality is that today’s food is too cheap to last.

A new way to value food is imperative. There is room for far more involvement by consumers, farmers, dieticians and nutritionists in the human diet than the industrial system permits today.

Food chains, typically extending for thousands of kilometres, undermine the capacity of local food producers to supply their own markets, and the contact between producers and consumers so necessary to a healthy, sustainable diet. They cause massive waste and muffle market signals to producers. They are responsible for a large part of the food sector’s climate emissions and high costs. For all these reasons the world urgently needs solutions that shorten supply chains, notably a return to locally produced foods.

A complex web of political economy factors drives today’s food systems. Dominant market-based approaches to food governance prioritise economic over social and environmental interests and have led to hyper-concentration in the market and political power of transnational corporations across the entire food chain. Concentration of ownership of food processing, marketing, transport and supply is dominated by around 20 global mega-corporates. Four companies now control more than 60 percent of global proprietary seed sales; this is causing large-scale agricultural biodiversity loss and threatens future food security.

Of equal concern is corporate dominance of the supply chain that provides farmers with chemicals, fertiliser, machinery and other inputs, and its effect on rural communities. Corporate agribusiness argues we need to intensify agricultural production to meet future food demands, using disruptive digital, chemical and genetic technologies; however, these will further entrench their control of the food chain. In the words of one farmer, “These corporate players don’t recognise the importance of social and community values in their balance sheets or their reporting to their shareholders.”

Oceans should not be forgotten. Corporatisation and increased scale of fishing has intensified the emptying of the world’s oceans as fishery after fishery disappears, through over-allocation and ineffective quota enforcement. While aquaculture is presented as a solution, often it depends on unsustainable use of both agricultural and marine feed sources.

Individualism, a cornerstone of Western identity, is a major obstacle to a global shift to mindsets that value collective goals, such as food security, health, safety and sustainability, over private ambitions. Changing this may be a critical step in achieving true global transformation towards food security.

Consequently, the global, industrialised and commodified food system is deeply unsustainable and grossly unfair. Its failures and fragilities have been apparent for decades and have been brought into sharp relief in the current pandemic. The case for transformative change is urgent and overwhelming. Addressing power asymmetries between corporations, governments, farmers and consumers within and surrounding food systems represents a core challenge for any transformation agenda.

Among others, the Eat-Lancet Commission, Lancet Obesity Commission, the High-Level Panel of Experts on Food Security and Nutrition, IPCC, IPES-Food, FAO and IFPRI have all highlighted the parlous state of the world food system and the need to reinvent it.

1.8 Food chain failures

The coronavirus pandemic has highlighted the systemic fragility of just-in-time chains that are a feature of the world commodity food system – and the risk this poses to reliable food supplies in future. Covid-19 clusters in meatworks, food processing plants, produce markets and other concentration points caused breakdowns in demand and supply and extensive food waste when farmers in many countries were forced to plough their crops under.

Food security has four key components: production, storage, distribution and food safety. In many parts of the world, none of these are fit for purpose, as revealed by the Covid-19 chaos.

A widely neglected issue is that no major city, anywhere on Earth, can feed itself. All rely for their food from transport, processing, storage and supply chains extending for thousands of kilometres. This makes them highly susceptible to fragmentation, oil shocks, transport failures, supply shortages, climate and weather impacts, conflicts, trade disputes, industrial strikes, health lockdowns and other forms of disruption.

Countries reliant on food imports are especially at risk. Unfair trade and investment terms, combined with a broken system of aid, has entrenched food import dependency in low-income countries.

The chief goal of global food chains is profit for the corporations and shareholders that control them, not assured supply, good nutrition or health. Being privately held, increasingly outside of national jurisdiction, they lack both transparency and accountability to the public. They limit the choice of foods to those which are most profitable to transport and process, or which meet narrow marketing aims such as eyeappeal. They foster the incorporation of toxic chemistry, mostly derived from petroleum and coal, as preservatives, colourings and additives and the leaching of packaging materials, into the food supply.

Corporate dominance means there is a lack of independent ‘public good’ research into food production, food systems, logistics, novel foods, nutrition and health, serving the needs of humanity, rather than agribusiness. Instead research tends to be focussed on corporate food chain needs.

1.9 Population

The issue of a sustainable food supply for humanity through the 21st Century is inseparable from the question of the human population, at what level it may peak and how it can be brought down to a number capable of living within the Earth’s resources. Nor can these two be separated from the issue of climate change.

At present, humans and their livestock account for 97 per cent of the biomass of all vertebrate land animals on Earth – an almost complete reversal of the situation barely a century ago. Population growth is the great driver of unsustainable use of water, food and other vital resources.

Underpinning all 10 catastrophic threats to the human future is our failure to contain human numbers, to address how they are to be constrained and brought back into balance with the Earth’s capacity to support us. Indeed, many governments are still bribing their citizens with subsidies and tax breaks to produce more babies on the misguided assumption that this leads to economic growth. These short-sighted policies increase the scale of catastrophic risk faced by all.

While population growth tends to be strongest in developing regions, reckless overconsumption of resources is strongest in the wealthy world. Both issues need to be controlled if human civilisation is to survive. The Commission will discuss this issue in more detail in future reports.

1.10 Links to global risks

Food insecurity is intimately linked with the 10 catastrophic risks with which the Commission for the Human Future is concerned (scarcity of key natural resources, collapse of ecosystems, overpopulation, global warming, nuclear conflict, global poisoning, uncontrolled technologies, food insecurity, failure to act, etc)

Food insecurity is a prime impeller of societal upheaval, civil conflict and international wars. The protection of national borders enclosing food production resources constitutes the chief justification for defence spending. The world presently spends $1.8 trillion a year on new weapons – but only $70 billion a year on improving food and its production, an imbalance ratio of 25 to 1.

Competition and disputes over increasingly scarce food, land and water resources in a shifting climate have the potential to ignite local, regional and global conflicts, including nuclear.

Food failures, whether combined with conflict or not, have the potential to unleash mass refugee tsunamis out of afflicted regions, with domino-like destabilization of neighbouring lands, their governments and even whole continents. This was foreshadowed in the Syrian refugee crisis and its impact on Europe and West Asia.

The combination of industrialised agriculture and an increasingly unstable climate is leading to rapid hyper-urbanization as hundreds of millions of rural people are driven off their farms and into cities. This in turn can destabilise urban societies, cause governments to fall, with global economic repercussions.

Food production today is a key contributor to an avalanche of human chemical emissions which are polluting the entire planet and affecting all life. It is a primary driver of climate change, loss of biodiversity and extinction. It is a major factor in the rise of pandemic disease, both infectious and noncommunicable. It is an underlying factor in about two thirds of human conflicts. It is a major user of disruptive new technologies, including biotechnology and nanotechnology, with unknown and unregulated consequences for humanity.

The appearance of well-stocked supermarkets in wealthy societies feeds the illusion that the food problem is ‘solved’, leading to overwhelming complacency on the part of government, industry and society and a lack of preparedness for future global food crises.

#### Plan: The United States federal government should restrict anticompetitive mergers in the agriculture sector.

#### The plan inaugurates a strict scrutiny of mergers in the agriculture sector. That effectively resolves and deters anticompetitive behavior.

Kristen Tam & Olivia Bielskis 21, BA, Environmental Science Policy, University of California, Los Angeles; BA, Political Science & Human Biology and Society, University of California, Los Angeles, "Stimulating Antitrust Enforcement to Expand the Regenerative Agriculture Movement," UCLA Library, 2021, pg. 15-29.

II. Prong One: “Antitrust Injury” Should Include the Threat of Loss of Profits due to Possible Price Competition

The negative effects of agriculture consolidation have transpired largely due to the lack of antitrust enforcement from the Courts and the DOJ and FTC. The Supreme Court’s ruling on Cargill v. Monfort, which allowed two meatpacking corporations to merge even though the plaintiff, a competing firm, claimed the merge would cause a “threat of loss of profits.” This showcases how this perspective on antitrust laws has failed to err on the side of precaution and subsequently allows mergers that decrease competition in the marketplace to arise. This section outlines the intended purpose of antitrust laws, provides an overview of the case, then argues why showing the threat of loss of profits due to possible price competition following a merger does constitute antitrust injury. Further, this ruling has created an unreasonable threshold for private entities to bring potential mergers to court and has created precedent for later filings to be dismissed on the basis that they did not prove sufficient “antitrust injury.”

A. Origins of Antitrust Law

The term “antitrust” came about in the late 1800s because many companies were transferring their stock to a board of “trustees” who controlled the output and prices for entire industries.47 With this in mind, antitrust laws were designed to ensure that a few corporations do not hold substantial economic power that could “be exerted to oppress individuals and injure the public generally.”48 Not only do they intend to prevent monopolization of markets, but they aim to maintain competitive markets, increase consumer surplus, increase the quantity and quality of the product consumed, reduce deadweight loss, and improve efficiency in resource allocation as well.49

Congress created three major Federal antitrust laws to maintain competition in the marketplace: The Sherman Antitrust Act, the Clayton Antitrust Act and the Federal Trade Commission Act.50 The first of the antitrust laws, The Sherman Antitrust Act was enacted in 1890 with the purpose of protecting interstate and foreign trade by outlawing contracts, combinations, conspiracies, and anticompetitive conduct that unreasonably restrained trade.51 The Act is not violated when one firm’s vigorous competition and lower prices take sales from its less efficient competitors; in this case, the Courts state that competition is working properly.52 While the Sherman Act imposes a more onerous burden of proving actual unreasonable restraints, Congress created the Clayton Act to require proof only of potential anticompetitive effect.53 The Act intends to prevent practices that suppress competition and give large businesses undue advantages over small businesses, as well as to prohibit mergers and acquisitions that are likely to lessen competition.54

There are three key elements that help uphold United States antitrust laws and affect the level of enforcement. The first is jurisprudential doctrines that the courts develop.55 Judicial decisions may limit or expand the reach of antitrust laws by setting precedents that alter the government’s ability to challenge certain types of cases. The second is the prosecutorial discretion that enforcers, the DOJ, the FTC, and the state attorneys general, employ.56 Because these agencies determine what does and does not violate antitrust laws, a change in the enforcement discretion or philosophy of enforcers may affect the intensity of regulation. The third is the fiscal resources provided to the enforcers.57 Judicial rules that increase or decrease the cost and barrier to entry to pursue cases can affect the number of antitrust cases brought to trial.

B. Jurisprudential Doctrines are Largely Influenced by Lenient Interpretations by the Courts

Until the late 1970s, the courts strictly ruled against many mergers and in favor of protecting competition. However, this changed when Robert Bork published a book in the 1980s arguing that the government must only focus on changes in consumer prices when assessing anticompetitive harm, a perspective known as the “consumer welfare standard.”58 His framework prioritized economic efficiency over small businesses, arguing that big business should be allowed to consolidate because its efficiency benefited the economy.59 Concurring with Bork, the Chicago School principles claim that underenforcement of antitrust laws was better than overenforcement because market self-correction will provide sufficient safeguards to competition.60

Because of these new priorities, the Supreme Court, FTC, and DOJ adopted this philosophy in 1979 ushering in what is known as the Chicago Era.61 They prioritized the efficiencies and lower prices that larger firms created, thus rolling back their antitrust enforcement on larger firms to create more consolidated industries.62 Although consolidated industries may positively affect consumers by decreasing prices, the Court neglected to take into account the negative effect that consolidation in agricultural purchasing and distribution had on suppliers such as farmers. When there are less buyers, distributors, or packers who compete for the supplier’s good, the buyers are able to control and drive down the price they pay to the suppliers; they create what is known as monopsony power.

C. Cargill v. Monfort

Cargill v. Montfort exemplifies a decision invoking a diluted enforcement of the Clayton Act that leads to the creation of monopsony power. In this case, the Supreme Court overruled the Circuit and District Court rulings and decided that the plaintiff, Monfort, did not establish sufficient antitrust injury under Section 16 of the Clayton Act by claiming a threat of loss of profits to sue Excel. Monfort, the fifth largest beef packing corporation in the United States, was contesting the merging of Excel and Spencer, the second and third largest beef packing corporations in the United States. Excel is a wholly owned subsidiary of Cargill, Inc., which owns more than 150 subsidiaries in over 35 countries.63 The merger would still leave Excel as the second largest packer, but its market share would almost equal the largest packer, IBP, Inc.64

The case was first brought to the Tenth Circuit Court, where they agreed that the plaintiff proved antitrust standing and was able to seek injunction under Section 16 of the Clayton Act, which allows for a party to sue for injunctive relief due to “threatened loss or damage by a violation of the antitrust laws.”65 This conclusion was reached because Montfort’s viability in the market would be injured by (1) a threat of loss of profits from the possibility that Excel would lower its prices to a level at or only slightly above its costs, and (2) a threat of being driven out of business by the possibility that Excel would lower its prices to a level below its costs, which would violate Section 7 of the Clayton Act.66 Section 7 intends to prohibit actions that substantially lessen competition or tend to create monopolies.67 These injuries would be met on the premise that Excel would injure Monfort by enacting a “price-cost squeeze.” A price-cost squeeze would involve Excel increasing the bidding price it would pay for cattle while lowering the price it sells the end product, boxed beef, to a level at or only slightly above its production costs.68 In effect, this would require Monfort to also lower its prices in order to remain competitive, causing them to suffer profit losses.69 Excel’s large financial resources endowed by its owner, Cargill, would allow it to accept far lower profit margins than firms like Monfort, which would eliminate competitors in the short run and reduce competition in the long run.7071 This inevitability violates the Clayton Act by creating a “threatened loss or damage”72 by a pricecost squeeze, which would “substantially… lessen competition”73 and create a dynamic in which Excel can control the market to maximize their own benefit.74

The District Court agreed that Monfort’s allegations and proof of anticompetitive effect were sufficient given that Excel, being the second largest producer, could create an acquisition that realistically threatens Monfort’s position as a strong competitor in the marketplace.75 The Court of Appeals also affirmed this ruling and held that the respondent’s allegation of a “pricecost squeeze” was not just harm from competition, but constituted a claim of injury as a form of predatory pricing because Excel would drive other companies out of the market.76

D. The Supreme Court’s Ruling on Cargill v. Monfort Undermines the Clayton Act

In response to the District and Circuit Court rulings, the Supreme Court’s first argument was that the showing of loss or damage merely due to increased competition does not constitute antitrust injury to seek relief under Section 16.77 The Supreme Court looked back to its rulings on Brunswick orp. V. Pueblo Bowl-O-Mat, Inc., where they held that “antitrust laws do not require the courts to protect small businesses from the loss of profits due to continued competition, but only against the loss of profits from practices forbidden by the antitrust laws.”78 Here, the Court found that the competition that Monfort alleged, competition for increased market share, was simply vigorous competition, and not actively forbidden by antitrust laws.79 The Court suggests that if antitrust laws protected competitors from the loss of profits due to this price competition, any decision by a firm to cut prices in order to increase market share would be rendered illegal.80

However, showing loss or damage due to increased competition does constitute antitrust injury. Antitrust injury results from predatory pricing, an anticompetitive practice forbidden by antitrust laws where a corporation intentionally lowers prices below normal competitive prices in order to monopolize part of the market.81 Monfort demonstrated that this injury is at play because they proved high likelihood that Excel would engage in a price-cost squeeze. A price cost squeeze may be viewed as “simply vigorous competition” in the short run. However, if the practice continues, it will greatly reduce competition in the long run. Furthermore, antitrust laws focus on protecting competition in the long run rather than treating these matters as mere short term price wars. In this case, the Court focused on the post-merger conduct and opted to deny relief unless the plaintiff could prove a violation of the Sherman Act. Instead, the Court should focus its attention on the merger itself and grant relief if there is a significant probability that the merger will adversely affect competition in the market, focusing on the probable threat of harm rather than actual harm.82 This aligns with the purpose of Section 7 in the Clayton Act to prevent mergers that “may substantially lessen competition, or tend to create a monopoly” without requiring initial proof of ongoing, established harm to the plaintiff.83 Section 16 of the Clayton Act is not being properly enforced to protect competition if it does not grant plaintiffs antitrust injury on the basis that there is a threat of loss of profits due to possible price competition following a merger.

The Supreme Court’s second argument is that the respondent neither raised nor proved any claim of predatory pricing before the District Court. This is because Monfort did not allege that Excel’s engaging in a price-cost squeeze was included in predatory activities.84 Although Monfort may only have four passing references that claim that Excel would be able to and would probably engage in predatory pricing, it should not need to claim this, rather, the evidence of a price-cost squeeze likely occurring is enough to satisfy antitrust injury.

The Court's ruling on Cargill v. Monfort did not, however, set a per se rule, which would have unequivocally “denied competitors standing to challenge acquisitions on the basis of predatory pricing theories.”85 Therefore, competitors can still challenge acquisitions on the basis of predatory pricing. However, because the Court ruled that showing loss of damage merely due to increased competition, or the threat of loss of profits due to possible price competition following a merger does not constitute antitrust injury to give injunctive relief under Section 16,86 if following competitors try to bring up this reason for antitrust injury, they will most likely be denied standing as the Court will refer back to this case. This language has been inscribed into this section’s jurisprudence doctrines and has not been overturned or amended since, as more recently cited in the definition of antitrust standing in Glen Holly Entm’t, Inc. v. Tektronix Inc case in 2003.87 The subsequent adverse impacts of consolidation on the market demonstrate that showing loss of damage due merely to increased competition, or the threat of loss of profits due to possible price competition following a merger does constitute antitrust injury and should be struck down.

III. Prong Two: The DOJ and FTC have significantly decreased the number of agriculture and meatpacking merger acquisitions that they block

A. Power in the Hands of the Antitrust Division and Federal Trade Commission to determine Harmful Merges

The second institutional aspect affecting antitrust enforcement is observed in federal agencies. The DOJ and FTC are the federal agencies that evaluate if corporate merges valued at more than $94 million can occur.8889 Since the 1980s, regulation by the FTC and DOJ has significantly decreased. Every year the FTC and DOJ review over a thousand merger filings, and it was found that between 2000 and 2005, 95 percent of merger filings presented no competitive issues.90 For mergers that “may… substantially… lessen competition, or tend to create a monopoly,”91 the FTC conducts more in-depth investigations using their Merger Best Practices guidelines.92 Oftentimes, competitive issues with these mergers are solved by consent agreement with the parties. In the few cases where the agency and parties cannot agree on a way to fix the competitive problems, the agency may bring the merger on administrative trial to federal court.93

These agencies base their determination on if a merge is likely to create or increase market power.94 Market power is the ability of a seller or a group of sellers to profitably maintain prices above competitive levels for a significant period of time or the ability of a buyer or coordinating group of buyers to depress prices below competitive levels.95 When a merger is brought before them, such as the acquisition of Cargill by Continental, the Division conducts extensive research. In this case, they worked with over 20 attorneys, economists and paralegals who reviewed over 400 documents and consulted with officials from the USDA, FTC and state attorneys general offices. They interviewed over 100 farmers, farm organization officials, agricultural economists, grain company executives, and other individuals. In conducting their analysis, the Division determines the size and shape of the product and geographic markets, how recent buying and selling patterns would be affected by the merge, analyzes the size of the firms’ market shares, and looks at the pre- and post-merger levels of concentration in the market.9697 From this, the Division decides if the effect of the merger may substantially lessen competition in the relevant market, which determines whether or not to allow the merger to exist.98 In Philadelphia National Bank, the Supreme Court set forth an additional test that said if mergers control an undue percentage share of the relevant market and which results in a significant increase in the concentration of firms in the market inherently likely to lessen competition, then they violate Section 7 of the Clayton Act.99

After the Division follows these steps, they can prevent the merger from existing or allow the merger to proceed if they follow restructuring recommendations. For Cargill, they concluded that the merger would prevent competition and options for farmers to sell their products to. Thus, the Division suggested multiple divestitures in Cargill and Continental facilities throughout the Midwest, West and Texas Gulf. The Division did this because they wanted to ensure that farmers in the affected markets would have alternative buyers to sell their grain and soybeans to.100 This case exemplifies that the DOJ and FTC have the capacity to determine how much evidence is needed to prove injury, what constitutes control of an “undue percentage share of the relevant market,” and what “a significant increase in the concentration of firms in the market” is.101 Although the investigation in Cargill and Continental resulted in an adequate enforcement of antitrust guidelines, the majority of cases do not face comparable evaluation.

B. Regulation by the DOJ has Significantly Decreased

Decreased regulation by the DOJ and FTC is not adequately protecting competition. From 2010 to 2019, despite a 79.16 percent increase in the number of pre-merger submissions to the DOJ and FTC, from 1,166 to 2,089, the percentage of mergers that these agencies conducted a second request for decreased by 0.5 percent and 0.3 percent respectively for the DOJ and FTC.102 Despite a clear increase in the number of merger requests, the DOJ and FTC have not proportionally increased the usage of their enforcement mechanisms.

Examining enforcement in 2013, there were 1,326 merger transactions reported, 217 of which raised questions for further inquiry based solely on information reported. From this, 47 second requests were issued from the FTC and DOJ to collect data from the businesses. After receiving this information, the DOJ and FTC brought 38 merger enforcement actions which in the majority included settlement agreements with the parties involving asset divestiture to prevent post merger harm. This resulted in only 6 merger cases filed in court seeking injunction rather than settlement.103 Seeing as enforcement trends have shifted to such a great extent to allow over 95 percent of merger transactions form every year, the DOJ and FTC have clearly demonstrated a propensity to decrease regulation of mergers, which generally favors furthering the dominance of large corporations.

The Cargill case epitomizes the Court’s lenient attitude specifically against enforcement of Section 7 of the Clayton Act where the federal agencies also need to increase enforcement to uphold the goals of the statute. Under Section 7 in the Clayton Act, the number of merger cases investigated by the DOJ have decreased in each decade following the Bork era: 125.3 merger cases per year in the pre-Bork era from 1970 to 1979,104 95.1 cases per year in the post-Bork era from 1980 to 1989,105 and most recently, only 69.8 cases per year from 2010 to 2019.106 Merger cases have experienced drastic decreases in the number of cases for which the DOJ conducts a second request, finds violation of antitrust laws, and bars a merger from proceeding from the 1970s to our current age. For agriculture enforcement specifically, since 1969 the DOJ has only filed 10 cases against company mergers for fluid milk manufacturing and dairy products, while meat packing firms have only faced 7 cases cumulatively.107 The DOJ’s decreasing regulation of mergers that substantially harms competition has caused the agriculture market to become more consolidated; therefore, it must reinvigorate its deference to its statutory duties to uphold the Clayton Act and strike down on mergers that it foresees will and currently are, threatening competition on the marketplace.

From 2008 to 2011, the FTC challenged nearly all mergers that would result in three or fewer significant competitors, most that would result in four or fewer significant competitors, and none that would leave five or more competitors.108 This practice closely resembles Robert Bork’s philosophy arguing that mergers resulting in four or more competitors should be presumptively lawful.109 Although the FTC was diligent in challenging mergers that would result in three or fewer significant competitors, having five large competitors on the market still constitutes a substantially consolidated market, further decreasing competition and preventing smaller businesses from surviving and profiting.

IV. Recommendations

In order to uphold competition in the marketplace, the Courts and federal regulation agencies must take deliberate action against mergers that will inevitably have profound effects on long-term competition. In order to address prong one, where the Courts have not erred on the side of precaution and have not granted antitrust injury to parties that claim “the threat of loss of profits due to possible price competition,” the Courts should interpret American antitrust laws with Congress’s intent to protect competition, rather than through the lens of consumer welfare, a strategy that has failed to uphold empirical integrity, seeing as consumer prices have risen.110 Specifically, they should interpret Section 16 of the Clayton Act to allow for antitrust injury to include the threat of loss of profits due to possible price competition following a merger. Not only will this rightfully decrease the barrier to bringing forth an antitrust injury, but it will bring precedent back into alignment with the purpose and intention of the Clayton Act and prevent further consolidation in the agriculture marketplace.

In order to address prong two, where the DOJ and FTC have largely allowed consolidation in the marketplace to transpire with limited regulation, the DOJ and FTC must increase the number of agriculture and meatpacking merger acquisitions that they block by holistically analyzing the scope of the merger’s market power. Additionally, they must reinvestigate current corporations in the market that have unruly market power, such as Tyson, and require divestiture. Tyson is sued on average 2.7 times every month, however, it still holds a substantially large percentage of the meat processing and packing industry.111 By implementing both of these recommendations, the federal government can truly fulfill their regulatory responsibilities by laying the groundwork for increasing competition by maintaining or increasing the number of farms, distributors and meatpacking businesses.

CONCLUSION

The growing consolidation of America’s agriculture industry is alarming and poses a continuous threat to the expansion and transition to regenerative farming practices. The DOJ, FTC and the Courts have embraced Robert Bork’s “consumer welfare standard” philosophy and employ stricter standards to prove antitrust injury, allowing more consolidation to occur in the agriculture industry. These conglomerates have increased market prices,112 and in the long run, are implementing farming practices that are destroying the soil and security of America to produce its own food. There are more small and medium sized farms that implement regenerative practices such as applying manure and organic fertilizers. In order to expand the implementation of regenerative practices, large operations need to be broken down and further prevented from forming. Ultimately, allowing merges to occur and limiting regulation on the current marketplace by the Courts and federal agencies is harming consumers, farmers, and the government.

#### Our method is valuable:

#### 1. LEGALESE.

#### An open query into antitrust law is pivotal to sustain AND generate movement potential.

Amna A. Akbar et al. 21, Associate Professor, Law, The Ohio State University, Moritz College of Law; Sameer M. Ashar, Clinical Professor, Law, University of California, Irvine School of Law; Jocelyn Simonson, Professor, Law, Brooklyn Law School, "Movement Law," Stanford Law Review, Vol. 73, Issue 4, April 2021, Lexis.

It has never been clearer how ideas birthed in and by social movements are fundamental forces in law and politics in the United States. 1On the left 2in the last decade, Occupy Wall Street coined "the 99%," mobilized people against growing economic inequality and corporate power, and laid a foundation for the deepening of anticapitalist critique and socialist politics. 3The Ferguson and Baltimore rebellions, combined with organizing by the Movement for Black Lives (M4BL) and a growing constellation of abolitionist organizations, have made anti-Blackness, white supremacy, and police violence core issues on the liberal-to-left spectrum and redefined the terms of policy debate. 4Young people are organizing for a Green New Deal, a response to the environmental crisis that is remaking climate-change politics. 5Indigenous resistance from Hawaii to the Dakotas is connecting environmental justice to the revival of anticolonial land politics. 6Through strikes and organizing, nurses, teachers, and "rideshare" [\*825] drivers are reasserting the centrality of worker power to social movements and economic, racial, and gender justice. 7This scale and volume of left social movement activity--our focus--marks a resurgence of contestation after decades of relative quiet. 8Today's social movements are meeting the existential crises of our time with vision, scale, and infrastructure. They reflect the growing sense that neoliberal law and politics has failed the majority of people in the United States. And they point the way toward transformation.

This particular moment of political, economic, and social crisis demands that more of us consider how to work alongside such efforts. In this Article, we identity a methodology for working alongside social movements within scholarly work. We argue that legal scholars should take seriously the epistemological universe of today's left social movements, their imaginations, experiments, tactics, and strategies for legal and social change. We call this methodology movement law.

Movement law is not the study of social movements; rather, it is investigation and analysis with social movements. Social movements are the partners of movement law scholars rather than their subject. For at least three decades, legal scholars have studied social movements, creating a "law and social movements" subdiscipline. 9We are inspired by this work, and we believe it is [\*826] essential for scholars to write about movements to understand the theories of social change that they embody. We aim to articulate something distinct: a methodology for legal scholars across areas of law.

Movement law is also distinct from movement lawyering, an approach to lawyering in solidarity with social movements. 10Movement lawyering aims to create space within public-interest practice to work with movements to build grassroots power. 11In contrast, our focus is on creating space within legal scholarship to think alongside social movements. To be sure, these are related endeavors, and many movement law scholars engage in movement lawyering. But in this Article we give sustained attention to scholarly method.

Movement law approaches scholarly thinking and writing about law, justice, and social change as work done in solidarity with social movements, local organizing, and other forms of collective struggle. As it begins in solidarity and with commitments to justice and freedom, it often begins outside of the law as traditionally conceived. In this way, movement law builds on the work of jurisprudential schools of thought such as critical legal studies (CLS), critical race theory (CRT), Latina/o critical theory (LatCrit), feminist legal theory, critical lawyering, and democratic constitutionalism. By looking to lived experience and [\*827] structures of inequality, scholars in these critical traditions have long complicated conventional accounts of law--what it does and for whom and how it can and should change--with an eye toward collective struggle and ideation. 12As Chuck Lawrence has recently underscored, CRT teaches us that "[a]ll race reform, all racial justice, is achieved through the work of people who join together in justice movements to disrupt systems and institutions of plunder and to contest the racialized narratives that justify that plunder." 13Movement law centers itself within this history of critical thought.

We are interested in social movements for their potential to democratize our politics and embolden our visions for change. Social movements exist on all sides of the political spectrum. Indeed, scholars across the ideological spectrum might claim movement law. But for us, because our own solidarity is born out of commitments to a certain understanding of social, political, and economic justice, our focus is on left movements today: those that aim to redistribute life chances and resources; those that aim to end our reliance on prisons and police to solve political, economic, and social problems; those that confront systems of white supremacy, anti-Blackness, capitalism, ableism, cisnormativity, and heteropatriarchy; and those that struggle to fundamentally transform state and society. In this Article we focus on movements that posit wholesale transformation rather than reform as their end goal; that challenge elite rule and aim to build democracy from the ground up; and that focus on collective rather than individual well-being. 14Collectivity--across race, class, gender, sexuality, disability, and social location--leads to solidarity with the potential to profoundly shift our modes of living into ones that are more sustainable and more equitable.

Social movements have marshaled some of the most profound changes in how we relate to one another and what we can expect of the state. 15Social movements break the molds of political discourse, project new possible futures, and create terrains of engagement for more people. They galvanize hope and collective action rather than cynicism and alienation in a way that can guide [\*828] people to face the historically rooted material crises of our time. 16Radical visions--where the scale of the vision matches the scale of the problems we face--can change what we think is possible both within and outside of the law. The visions of movement actors and organizations point us toward forms of reconstruction that call us to participate in remaking the world in more just ways.

Social movements are central to left intellectual traditions. 17Scholars across disciplines are studying with renewed curiosity the histories of movements and enslavement and colonialism; capitalism and white supremacy; and race, class, and political economy. 18More than ever, this is a time for legal scholars to focus on social movements.

[\*829] When we produce legal scholarship, we propagate ideas. Typically, we tell stories about what is wrong with our systems and institutions of law, and we advocate for solutions. Legal scholarship--adjacent to the coercive power of the state--is inherently normative then. 19Movements, like scholars, are fundamentally invested in the realm of ideas. But unlike most legal scholarship, left movements are invested in disrupting the status quo and transforming political, economic, and social relations. Movements often start with disrupting ideas and telling new stories about what is possible. Movement law attempts to engage, celebrate, and participate in disruption from the grassroots. When this effort arises from within the university, it is necessarily contradictory given the university's central role in reproducing elite rule and the myth of meritocracy. Nonetheless, we believe it is important and possible for legal scholars to support efforts at radical and popular ideation toward transformation. Otherwise, we acquiesce to a much narrower and more elite discourse.

When we speak of producing scholarship in conversation with movements, we do not mean to limit our solidarity to currently existing social movements. Instead, we focus more broadly on collectives of people struggling together to generate new ideas and ways of living together, whether they are current or historical, and whether they are full-fledged social organizations, fledgling formations of community members in struggle, local organizing groups, unions, or worker centers. 20We use the term "movement" because of the collective strength and potential for transformative change that it implies.

#### Particularly, investigating legal discourse in the agriculture sector opens the toolbox for reconfiguring the broader economic system.

Renee Hatcher 19, Assistant Professor of Law at John Marshall Law School-Chicago, where she serves as the Director of the Community Enterprise and Solidarity Economy Clinic, "Solidarity Economy Lawyering," Tennessee Journal of Race, Gender, & Social Justice, Vol. 8, Issue 23, 2019, Lexis.

"To most public interest-minded law students and lawyers, practicing transactional law isn't an obvious path to saving the world . . . [But] now transactional lawyers are needed, en masse, to aid in an epic reinvention of our economic system." -- Janelle Orsi 1

An emerging cohort of lawyers are working to transform the dominant economy from one that centers on self-interest, greed, and profit maximization to an economy that centers the needs of people and the planet. These lawyers work in private practice, at legal service organizations, as in-house counsels, clinical professors, and pro-bono volunteers. Their work includes corporate structuring, contract drafting, real estate deals, regulatory advising, and law reform projects, among other things. Their clients are individuals, organizations, small businesses, social enterprises, cooperatives, worker self-directed nonprofits, community land trusts, time banks, and other collective experiments that seek to build alternative mechanisms for both economic justice and social liberation. 2 This is the "solidarity economy" movement, a growing movement building a new economic system rooted in economic democracy, social solidarity, and environmental sustainability. 3

At the heart of this new economic system are five unifying principles: (1) solidarity, (2) equity in all dimensions (race, gender, ability, etc.), (3) pluralism, (4) participatory democracy, and (5) sustainability. 4 The movement's ultimate vision is twofold, first to grow these values and practices through grassroots initiatives, and second to link these solidarity economy activities in a network of mutual support, transforming the current dominant global economy into a just, democratic, and sustainable economic system. 5 To that end, the core principles are embedded in the organizational and business structures, governance, financing, and the ways in which solidarity economy enterprises and organizations build their supply chains and partnerships. As a result, solidarity economy lawyers, lawyers that work with solidarity economy clients, often work at the cutting edge of corporate law, securities regulations, employment law, licensing, and intellectual property. However, in some cases the current legal regime is ill suited for these new types of enterprise. So, while solidarity economy practitioners are reimagining the economy and means of economic exchange, solidarity economy lawyers are attempting to reimagine the law to reflect the needs of their clients.

This essay explores solidarity economy lawyering as an emergent field of practice in the United States. After a short explanation of solidarity economy theory and practice, the essay explores the way in which transactional representation of solidarity economy enterprise clients is different from traditional business and nonprofit representation. The essay goes on to argue that transactional lawyers have a particular role to play in 1) advocating for corporate, regulatory, and contract law reform to better suit the needs of grassroots solidarity economy enterprises, 2) creatively redeploying legal techniques and practices relating to risk management, organizational form, and the allocation of property rights to further the purpose of internalizing social and ecological values into the heart of [\*26] economic exchange, otherwise known as 'radical transactionalism', and 3) "scaling up" the solidarity economy through the linkage of solidarity economy organizations and enterprises. These contributions are instrumental to the long and short-term success of the solidarity economy movement. The essay concludes with some thoughts on how solidarity economy lawyers can be most effective.

I. What is Solidarity Economy?

The solidarity economy (SE) 6 is a set of theories and practices that promote equitable, solidaristic, democratic, ecological, and sustainable development with an ultimate vision of 1) growing these values and practices through grassroots initiatives, and 2) linking these solidarity economy activities in a network of mutual support, such that they transform the current dominant global economy into a just, democratic, and sustainable economic system. 7 Many communities, across the United States and across the globe, are engaging in SE activities through grassroots economic initiatives such as: alternative currencies; community-run resource libraries; participatory budgeting; worker, consumer, and producer cooperatives; community land trusts; intentional communities; community development credit unions; community supported agriculture programs; open source free software initiatives and others. 8 Not only do SE initiatives and enterprises currently exist in every sector of the dominant economy, but they also are prevalent in informal diverse economies.9 \*\*\*FOOTNOTE BEGINS\*\*\* See, e.g., J.K. GIBSON-GRAHAM, A POSTCAPITALIST POLITICS 69 (2006) ("[W]hat is usually regarded as the "economy" -- wage labor, market exchange of commodities, and capitalist enterprise -- comprises but a small subset of the activities by which we produce, exchange, and distribute value." Diverse economies refers to a theoretical framework that accounts for all of the alternative means of economic activity.); J.K. GIBSON-GRAHAM, THE END OF CAPITALISM (AS WE KNEW IT): A FEMINIST CRITIQUE OF POLITICAL ECONOMY 4 (1996); Brian Burke & Boone Shear, Introduction: Engaged Scholarship for Non-capitalist Political Ecologies, 21 J. POL. ECON. 127 (2014); Janelle Cornwell, Worker Co-operatives and Spaces of Possibility: An Investigation of Subject Space at Collective Copies, 44 ANTIPODE 725, 739 (2012); J.K. Gibson-Graham, Diverse Economies: Performative Practices for 'Other Worlds', 32 PROGRESS HUM. GEOGRAPHY 613, 623-24 (2008). \*\*\*FOOTNOTE ENDS\*\*\* As a political project, solidarity economy proposes a transformational shift of [\*27] the relationships between the market, the state, and people, centering the needs of people and the environment over the needs of private interests and capital. 10 In doing so, SE seeks to be the "next system," replacing neoliberal capitalism by building and connecting networks of grassroots economic initiatives and practices that embody the five core principles of SE: solidarity, sustainability, equity in all dimensions (race, gender, ability, etc.), participatory democracy, and pluralism. 11

Solidarity economy is not a static concept or blueprint for a new economy. It is an ever-evolving movement that grows from existing and emergent practices, guided by the theoretical principles. 12 In other words, the theory and the practice of SE are circular through an ongoing praxis of "debate, experience research, organizing and reflection." 13 This continuous iterative evolution of SE allows for new forms of organization and experiments of exchange that best serve the material needs of its practitioners. 14 Solidarity economy broadly defines the economy as all of the ways in which people, communities, and organizations meet their material needs. 15 Therefore, solidarity economy can be thought of as "a dynamic process of economic organizing in which organizations, communities, and social movements work to identify, strengthen, and create democratic and liberatory means of meeting their needs." 16 Figure 1 illustrates some of the current kinds of initiatives that make up the solidarity economy. 17

[\*28] Figure 1. Ethan Miller, Defining Solidarity Economy: Key Concepts and Issues.

While many communities and cultures have longed practiced solidarity and cooperation to provide for the material needs of its members, 18 solidarity economy theory in the United States is relatively new. The U.S. solidarity economy movement emerged in 2007, although solidarity economy practices have existed since early in the twentieth century. 19 As in other parts of the world, the solidarity economy movement in the United States directly grew out of failures of the dominant economy, neoliberal and austerity policies, and the impending economic downturn of 2008. In many ways, the economic downtown, spurred by the collapse of the mortgage securities market and subprime loans catastrophe, shook not only the U.S. economy but also main-street's general trust in the invisible hand of the market and integrity of the financial industry. It was in the early days of the economic downtown, that communities and organizations took the first steps to nationally coordinate the U.S. solidarity economy movement. In 2007, at the U.S. Social Forum, a number of SE practitioners and organizations convened, discussed emerging practices, and strategized the future of the SE movement in the U.S. 20 Subsequently, there [\*29] have been numerous meetings to discuss the theory and future of the movement. 21 Over the last decade, the solidarity economy in the United States has grown significantly. 22 By one conservative estimate, there were more than 700 solidarity-economy businesses in 2016. 23

Moreover, the solidarity economy movement is in many ways a movement of movements, as many current movements are incorporating solidarity economy strategies into their organizing work. For example, the Movement for Black Lives Policy Platform advocates for the support of cooperative development and social economy networks as a tenet of economic justice. 24 Furthermore, a number of solidarity-economy initiatives have sprung out of local organizing efforts affiliated with the Black Lives Matter movement. 25 The indigenous rights and environmental justice movements are pushing for the creation of public banks in the wake of the Standing Rock protests. 26 Immigrant-rights advocates are incubating worker cooperatives to ensure immigrant workers can take ownership of their labor and have a say in their working conditions. 27 These efforts and other SE initiatives need legal support to thrive and flourish.

II. Transactional Lawyering in the Solidarity Economy Movement

At its core, transactional lawyering is about the structuring of organizational and individual relationships within the parameters of the law. Transactional lawyers structure businesses, negotiate and draft contracts, and advise clients on relevant laws and [\*30] regulations. 28 These skills are imperative to the long-term success of the solidarity economy movement. SE enterprises, like traditional enterprises, retain lawyers to advise on entity formation and governance, draft relevant agreements and contracts, and counsel on applicable regulations. However, SE initiatives are markedly different from traditional enterprises in three major ways: 1) the motivations of the enterprise are guided by the five SE principles and not the maximization of profit, 2) the relationships within the enterprise are often blurred and overlapping, and 3) the means of exchange are varied and diverse. 29 It's important that lawyers understand and explore these differences as there are implications on the law and legal practice.

For example, imagine a group of seven women seek out a lawyer to start a catering and prepared-food business. The women decided that they want to be equal partners, share in profits and put up the same value of start-up capital. Easy enough. This is a scenario that most experienced transactional lawyers would be able to address. However, imagine for a second that the women go on to say 1) all of the women will work and contribute to the day-to-day decisions based on democratic consensus, 2) two of the women are applying for asylum and do not have work authorization, 3) the business will provide free meals to those that are food insecure in their community, 4) a number of the capital contributions will be in the form of sweat equity, and 5) the business intends to compensate the lawyer not in dollars, but in future meals prepared by the business. '

Each additional piece of information would have an impact not only on the laws implicated but also how the lawyer might approach the case. To begin, in the spirit of consensus building, the lawyer might ensure that all seven women could attend and participate in any future client meetings. This particular business, a worker cooperative, would require a deeper analysis of entity formation and applicable regulations to help meet the client's goals. 30 Cooperative law varies greatly from state to state and the lawyer would need to think through the relevant state and federal regulations that might classify the worker-owners as either an employee or an owner of the business. 31 The lawyer would carefully have to research and analyze the relevant immigration and employment regulations to ensure that all members can participate and will be classified as owners for the purpose of federal work authorization laws. 32 The implications of such classifications can mean the difference between success and failure of the business, as well as the protection of its members. 33 Given that the business' purpose is in-part charitable, and inpart wealth building (for-profit), the lawyer would want to identify the best combination of benefits and structures, as well as carefully draft governance agreements. 34 As such, the lawyer would need to do additional fact investigation and have a better understanding of [\*31] the client's goals and priorities to provide effective counseling on entity formation. 35 In addition to considering the various entity options, the lawyer would need to explore the issue of sweat equity contributions by the worker-owners. The Fair Labor Standards Act (FLSA), 36 or other relevant state laws, might potentially prevent the worker-owners from investing sweat equity without receiving immediate compensation. The lawyer's compensation is also an issue, as the lawyer would need to research relevant regulations for the proposed barter arrangement. 37 What language would go into an engagement letter if the attorney agreed to represent the business in exchange for a future promise of food? Would the prepared meals be taxable income for the lawyer? Would the lawyer get to try the food first? All important questions that would need to be addressed before moving forward with representation of the client.

This is just one cursory example of how a solidarity economy business client might be different from a traditional business. Yet, it demonstrates the new type of legal practice that is emerging to adequately serve solidarity economy clients. SE lawyers must have a broad understanding of the full range of legal structures. Otherwise the tendency may be to propose those structures with which they are most familiar, leaving other potential options unexplored. Other substantive areas of law include securities law, employment law, tax law, intellectual property, contact law, and commercial law. Still, SE practice can implicate a wide range of legal issues far beyond these traditional bodies of business law. In the example above, the lawyer would need to research immigration law, Good Samaritan food statutes, and barter exchange taxation regulations to adequately serve the client. This is not uncommon. SE clients are rethinking and remaking the means of economic exchange. 38 This will continue to require transactional SE lawyers to expand their substantive areas of practice. Further, many solidarity economy initiatives are connected to or a part of social movements. 39 Such connections are likely to have an impact on the legal support required. In the long term, SE lawyers may need to regularly consult and collaborate with attorneys in a range of practice areas and be nimble in responding to the needs of their clients.

Beyond the technical skills and expertise of transactional practice, SE lawyering also requires what has been referred to as the right "culture fit" or the "touch." 40 This can best be explained as the willingness of a lawyer to embrace the imaginations and experimentations of clients, and subsequently put the law in service to those ends. 41 Both in legal education and mainstream practice, the minimization of risks is emphasized as the lawyer's primary concern. 42 While important, a fixation on risks in SE practice often will not best serve the goals of the clients.

[\*32] There are many gray areas of law related to SE practice. 43 It's the lawyer's job to assess, analyze, and provide the most viable options for achieving the client's goals, recognizing that the law is not always clear. 44 Specifically, in a SE lawyering practice, it's necessary for the lawyer to demonstrate creative capacity, a deep understanding of the client's perspective and goals, and a commitment to the shared values of the solidarity economy movement. 45 Recognizing that the attorney-client relationship is more than just a mere transaction, effective solidarity-economy lawyers build authentic and solidaristic relationships with their clients. 46 Relationship building is a primary way in which SE lawyers can demonstrate a shared commitment to SE values and principles. As SE lawyers grow in their experience and practice, they come to rely on their acquired knowledge, while continuing to embrace the innovative goals of SE initiatives. 47 Furthermore, as is the case with all effective lawyering, SE lawyers will need to commit themselves to understanding the context in which their clients are operating, including the movements that clients may ground themselves in. Currently, lawyers across the country are engaged in SE lawyering. 48

A growing cadre of lawyers are representing SE organizations at legal service organizations, community economic development law clinics, law firms, and in solo practice. 49 For example, the Sustainable Economies Law Center (SELC), a 501(c)3 organization, is an institutional pioneer in solidarity economy lawyering. 50 SELC has provided legal services to hundreds of solidarity economy enterprises through their Resilient Communities Legal Cafes, 51 direct representation, and legal resources on their website, including materials on cooperative law, grassroots financing, community renewable energy law, food enterprises, and alternative forms of exchange or money. 52 Beyond providing legal support to SE enterprises, SELC is an example of a solidarity economy legal service organization. 53 The organization functions as a worker self-directed nonprofit, a hybrid governance model in which a nonprofit organization adopts governance characteristics of a worker cooperative. 54 Worker self-directed nonprofits empower their workers to collectively make decisions on behalf of the organization. 55 While these nonprofits still have a governing board of directors, the board concedes significant decision-making authority to the employees or members. 56 This particular model of nonprofit governance embodies the SE principle of participatory democracy. 57 Moreover, [\*33] in furtherance of solidarity and equity principles, all SELC employees, legal and non-legal, receive the same salary, 58 and the organization provides services on a sliding scale. 59

While SELC is often cited as "the" solidarity economy legal service organization," 60 a number of legal service organizations specialize in SE lawyering. A few are worth mentioning in an attempt to build awareness for law students and interested lawyers. Baltimore Activating Solidarity Economies, for example, has provided support to a number of SE initiatives in Baltimore, Maryland, including a mapping project of the local solidarity economy. 61 Likewise, the Urban Cooperative Legal Center based in Newark, New Jersey, provides legal support to start-up coops and organizes community events to discuss cooperative development. 62 Additionally, the Urban Justice Center's Community Development Project works with a number of New York City cooperatives and SE initiatives. 63 In the same vein, the Center for Community Based 2 Enterprise (C2BE) in Detroit, Michigan, not only provides cooperative legal support but also integrates cultural organizing to scale the local Detroit solidarity economy. 64 Law for Black Lives has also provided and facilitated legal support to a number of SE campaigns. 65 Finally, organizations like the Working World and the ICA Group have lawyers on staff that regularly engage SE legal practice. 66

Similarly, a number of transactional and community economic development (CED) law school clinics around the country provide legal support to SE enterprises. For the past two years, the clinic that I direct at John Marshall Law School-Chicago has used solidarity economy theory as a framework for case selection, prioritizing those clients that exemplify the five principles of SE (equity, sustainability, participatory democracy, solidarity, and pluralism). Currently, most of our clients are worker cooperatives and cooperative incubators. Recognizing the local emerging solidarity economy and gap in legal services [\*34] in Chicago, the clinic at John Marshall Law School is currently being rebranded from the Business Enterprise Law Clinic to the Community Enterprise and Solidarity Economy Clinic. Other clinics to highlight with a SE practice are Vermont Law School's New Economy Law Center, 67 Harvard Law School's Community Enterprise Project, 68 Hofstra Law's Community and Economic Development Clinic, 69 New York Law School's Nonprofit and Small Business Clinic, 70 University of Baltimore School of Law's Community Development Clinic, 71 University of Michigan Community and Economic Development Clinic, 72 American University Washington College of Law's Community and Economic Development Law Clinic, 73 and CUNY Law School's Community and Economic Development Clinic. 74 There are also a number of law firms engaged in SE practice including the Tuttle Law Group, 75 Dorsey & Whitney LLP, 76 Gilmore Khandhar LLC, 77 the Law Office of Elizabeth Carter, 78 and Sarah Kaplan Law Office 79 to name a few. Lawyers at these institutions and others are exploring new organizational forms and governance structures, engaging in law reform projects, and structuring relationships between SE enterprises. 80

III. SE Lawyers are Reimagining the Law

Law reform is a particular point of intervention in which lawyers can add value to the SE movement. In examining the fullness of the solidarity economy movement, there are complex and innovative initiatives that require the exploration of "gray areas" of the law, law reform projects, and the creative redeployment of transactional practice, referred [\*35] to as 'radical transactionalism.' 81 Unlike traditional businesses, SE enterprises do not fit neatly within established laws. The current statutory framework is largely designed to regulate adverse self-interests of economic actors in the mainstream economy, like the employer/employee, landlord/tenant, and producer/consumer relationship. 82 As such, our laws often fail to account for the diverse economic arrangements and overlapping, solidaristic nature of relationships within the solidarity economy. Continuing with the example of a worker cooperative, there are numerous state and federal laws that regulate the employer-employee relationship. 83 Most of these statutes assume that there are two separate and distinct parties, the employer and the employee, that have separate and adverse interests. However, in worker cooperative enterprises, worker-owners are effectively both employees and employers. This leaves significant ambiguity as to whether worker-owners will be classified as an employee under any given regulation or if an employee relationship exists within a worker cooperative business.

In the course of their work, lawyers are well positioned to identify the insufficiencies of the law to address the needs of SE clients. In understanding the confines of the legal framework, lawyers can propose and participate in law reform campaigns that better accommodate the innovation of the SE movement. For example, SELC has been instrumental in a number of policy reform campaigns in California, 84 most recently helping to secure the California Worker Cooperative Act. 85 The statute provides important visibility to California worker cooperatives, and also provides some clarification on the employee classification of worker-owners. 86 The law also confers additional benefits on worker cooperative businesses, including important securities exemptions and limiting the power of "community investors". 87

Often law reform efforts are guided by SE organizational coalitions. Lawyers can play an important role within these coalitions. Specifically:

[\*36] 1. SE lawyers can serve as legal translators of the status quo and produce popular education resources on the current state of the law. 88

2. SE lawyers can identify which aspects of the law are barriers for the long-term success of the SE movement.

3. SE lawyers can draw upon their experiences in practice to craft legislation that's responsive to the wider SE movement.

4. SE lawyers can work with government staffers to draft legislation.

5. SE lawyers can provide legal alerts and continuing legal education programs to educate lawyers on updates to the law.

In each of these roles, lawyers can add value and support to the larger SE movement. While SE lawyers are currently doing this work, many more are needed to support local and state law reform efforts.

Beyond law reform, lawyers are also, more daringly, radically reimagining the laws of economic activity. "Radical transactionalism" is the creative redeployment of transactional legal techniques and practices to reimagine and reconfigure the legal building blocks of the economy based upon social and ecological values. 89 One such example is the reimagining of intellectual property law and copyright licensing that gave way to the creation of the Creative Commons license. 90 The Creative Commons license, established in 2001, "provides free, easy-to-use copyright licenses to make a simple and standardized way to give the public permission to share and use creative works." 91 Created by law professor Lawrence Lessig, Creative Commons is a relatively new innovation that legally allows individuals to share "knowledge and creativity to build a more equitable, accessible, and innovative world." 92 In the larger scheme of our hegemonic legal underpinnings, this example only begins to scratch the surface of what is possible. Imagine if a group of 1000 SE lawyers, based in communities, actively and collectively began to reimagine the "rules of our economic road." What would it look like to infuse the principles of equity, sustainability, solidarity, and participatory democracy into contract law, employment law, property law, and the laws of business organizations? The result would be nothing less than a transformation of the current social economic system. Developing and popularizing alternative rules based upon transformative principles can be the beginning of a more just future. 93

[\*37] The difference between law reform and radical transactionalism is akin to the difference between reformist reforms and transformational re-imaginings. 94 In the case of law reform, the given policy proposal starts from the status quo and often deals in rigid legal frameworks, as well as the assumptions and ideological underpinnings of the current system. Radical transactionalism as applied to SE lawyering, begins with the principles and values of solidarity economy theory. From there the lawyer deconstructs and re-envisions the legal building blocks of economic activity. This kind of political project and radical reimagining, again, speaks to the creative capacity necessary for effective solidarity economy lawyering.

IV. SE Lawyers are Positioned to Scale the Solidarity Economy

SE lawyers can also add value to the solidarity economy movement by linking and structuring relationships between solidarity economy enterprises. As local communities continue to innovate diverse SE initiatives, the larger part of SE theory and practice is linking these various grass-root organizations in international networks of exchange to build out a just global economy. In other words, the full ambition of the solidarity economy movement is a "pluralistic conglomeration of worldwide economic activities that share a set of core values." 95 To achieve this goal, the solidarity economy rejects the traditional concept of "scale" and focuses on the meaningful linkage and integration of SE initiatives into larger solidaristic networks. 96 "Scaling-up" the solidarity economy includes the structuring of supply chains and the provision of services between SE enterprises, but also extends to activities of mutual aid and support like collective skill-sharing and workshops, policy advocacy, financing, joint ventures, and the development of solidarity markets. 97 All of these activities serve to move an even-larger share economic activity out of the dominant capitalist sector and strengthen the growing global solidarity economy.

SE lawyers are poised to aid in this important work of scaling-up the solidarity economy. Lawyers are well situated to identify potential scaling opportunities and structure relationships between solidarity economy initiatives. Being few and far between, SE lawyers tend to work with a number of SE enterprises in their specific locales. As a result, SE lawyers can be instrumental in mapping the local solidarity economy, identifying the needs and offerings of existing SE enterprises, and structuring business relationships between SE initiatives by drafting agreements. For example, in 2018, the Business Enterprise Law Clinic at John Marshall Law School- Chicago was commissioned by the Illinois Worker Cooperative Alliance to complete a policy report that included mapping the local worker cooperative ecosystem. 98 Law students in the clinic researched, identified, and interviewed existing worker cooperative businesses, some of which were current or previous clients. 99 The clinic is also participating in a local coalition building effort, Chicagoland Cooperative Ecosystem Coalition (CCEC), that aims to facilitate opportunities for cooperation among cooperatives and supporting technical assistance [\*38] providers. 100 Another example is the work of SE lawyers with the Baltimore Roundtable for Economic Democracy (BRED). BRED is a network table of Maryland-based worker cooperatives established in 2016. 101 BRED provides non-exploited financing and technical assistance support to further the local Baltimore solidarity economy. 102 The organization also provides popular education and workshops on cooperative development to the larger Baltimore community. 103 Solidarity economy lawyers in Baltimore have been an integral part of the BRED initiative, 104 and contributed to mapping project of the Baltimore solidarity economy. 105 These examples highlight some of the ways in which lawyers are currently scaling the SE movement.

CONCLUSION

In conclusion, solidarity-economy lawyering is an emerging practice for transactional lawyers. Skilled transactional lawyers are needed to provide direct representation to the increasing number of SE enterprises. If attorneys are to be effective in the endeavor of SE lawyering, they will need to use new creative approaches and utilize every tool in the transactional lawyering toolbox. Specifically, SE lawyers need to have a broad knowledge business law concepts, including the full range of legal entities, commercial law, tax, employment law, intellectual property law, and securities. Beyond a working knowledge of the substantive areas of law, effective SE lawyers will need to embrace the imaginations and experimentations of SE clients, and put the law in service of their clients' visions. This requires creative capacity and the willingness to explore and advise SE clients on "gray areas" of the law. Navigating this kind of practice also necessitates a meaningful understanding of the client's context and goals.

#### 2. PLANNING.

#### Analyzing existing errors in this sector provides both a material AND discursive praxis for dismantling commodification of agriculture.

Patricia Allen & Alice B. Wilson 08, Director, Center for Agroecology & Sustainable Food Systems, University of California, Santa Cruz; PhD, Cultural Anthropology, UNC-Chapel Hill, "Agrifood Inequalities: Globalization and Localization," Development, Vol. 51, Issue 4, 2008, pg. 538-539.

The tendencies to elitist and paradoxical orientations and outcomes in the US alternative agrifood movement are not intentional. In fact, many of the participants explicitly support social justice, even though it goes against the grain of American individualism (Allen and Hinrichs, 2007). And, nearly every sustainable agriculture organization now lists social justice as one of its goals, a significant change over the years. The local food movement can become a liberatory movement in two key ways.

First, the local food movement, by de-industrializing the table through self-transformation and ethical food practices, has the potential to be an immediate ‘here and now’ way to build a different world and resist neo-liberalization. Gibson-Graham (2006) and Gibson-Graham and Cameron (2007) point to the development of community projects that eschew private ownership relations and the appropriation of surplus value by non-producers. For example, one of the newest food trends are ‘pay what you can’ restaurants based on the idea that everyone deserves good food, but not everyone can afford to pay the same price (Farnsworth, 2008). The USA Domestic Fair Trade Working Group has launched an effort, now piloted in several states, to bring fair trade practices to the US by working to create a third party-certified standard that would represent social justice criteria, including a living wage. The ethics of consumption and the connection between food and embodiment makes food a pivotal point for challenging and charting pathways to alternative critical engagement.

Second, beyond the value of actual practices, there is the value of discursive and cognitive change and engagement. Because our relationship with food is one of the ‘closest-in’, consumption provides a place, a site of unmapped possibilities present within every situation, with immanent transformative potential to cultivate new subjectivities and the cultural alternatives to neo-liberal hegemony. The local food movement can build strong communities that join with other communities to challenge Polanyi’s (1944) ‘fictitious’ commodification of humans and nature. In the organic market, for example, the importance of its growth lies primarily in the opening it provides for the conscious ‘defetishization’ of food, and for enjoining people to think critically about the food system (Allen and Kovach, 2000). If neo-liberal capitalism rests firmly on the industrialization of agriculture and the commodification of food, then the project of highlighting the transformative political potential in the daily decisions people make about food ^ that is, denaturalizing industrial food ^ becomes central to opening up alternatives to neo-liberalism.

While food-system localization advocates must be challenged to analyze the implications of the widespread, uncritical embrace of the idea of place in a landscape of massive historical inequality, place also has liberatory sensibilities. A sense of place can develop a consciousness of linkages and a positive integration of the global and local, building a ‘global sense of the local, a global sense of place’ (Massey, 1994: 156). Applying this understanding of place as a process and locality as a set of relations has the potential to expand the local food movement’s attention to inequality. Rather than a localism based on romantic essentialism or one that reads local as good and global as bad, local food movements can partner with other regions to address inequality and the policies that create and foster it.

The United Nation’s Human Development Report cites unfair policies as the cause of the increases in global inequality. Even the World Bank is advocating changes in unfair international trade policies. Koc (1994) suggests that ‘globalization’ become a term for the knowledge that we share the same world, which requires responsible and caring relationships among members of the world community. If we take this approach, we can join together to end inequality and environmental destruction both through community-scale entrepreneurial efforts and through changing public policy. If we do not, we end up where we are today, with Wal-Mart as the world’s largest purveyor of ‘local’ food. Changes in American agrifood policies and citizen engagement with everyday food choices are key to reversing the trend of increasing inequalities both between and within nations.

#### 3. PLURALISM.

#### Competition is a complex web of systems that requires a pluralist lens for an accurate assessment.

Clive L. Spash & Adrien O.T. Guisan 21, Chair, Public Policy and Governance, Vienna University of Economics and Business; PhD, Vienna University of Economics and Business, "A Future Social-Ecological Economics," Real World Economics Review, No. 6, 09/07/2021, pg. 203-214.

Economies are the socially structured institutional process involving the interaction of humans with the natural world. Social reproduction is achieved only within the bounds of the given structure and mechanisms of biophysical reality. The form and scale of economic processes depends upon a set of spatially and temporally contextual social institutions. That is economics concerns the form and function of social provisioning process which can take various forms and are far from limited to price-making market or capitalist institutions. Starting from processes of social provisioning, economics becomes the study of plural historical, actual and potential economies with their underlying institutional arrangements and biophysical basis rather than a singular abstract idealised “economy”. This broadens analysis not only to what institutions, norms and values shape the economic process and agents’ behaviours, but also to what are socially desirable and ecologically sustainable systems of social provisioning. Economics is neither value free nor ethically neutral but its stance on both should be made explicit. It must also be realist about how economies are reproduced via social and ecological mechanisms. That means linking to both power relations and ethical and just means of provisioning, but also material and energy throughput that respects others (human and non-human). The aspirations of economists to provide for the well-being of humanity, if taken seriously, mean a revolutionary change in economics is long overdue.

The philosophical basis of the approach is argued to be closest to critical realism. Core aspects of correspondence here are depth ontology raising the profile of both structure and mechanisms as opposed to a sole focus on empirical facts. Structure as a metaphysical reality with multiple causal mechanisms operating in open systems then poses challenges for how economics conducts itself as a science. While following critical realism in its epistemic pluralism there is also a recognised need for structuring interdisciplinary research and uniting diverse fields via common ontological understanding leading to a structured methodological pluralism (not the eclecticism of constructionism and conventionalism). Potential methods for research are selected on the basis of the qualities of an object of study and research question and as such remain open and diverse (quantitative/qualitative, intensive/extensive, see Sayer, 2010). Economic science is then neither deductivist, empiricist nor reducible to a set of idealised methods.

We start this explanation of SEE by taking issue with the hegemonic definition of economics based on choice and offer an alternative based on social provisioning. This clarifies the failure of economics to address different forms of economies both in theory and as actualised and operational both historically and at present. The relationship of economies to needs and their satisfaction with an associated material and energy throughput then becomes part of economic analysis. As noted, a clarified relationship between the ecological economic and the social is required and we explain some basic aspects of the relationship to social reality. This coverage is an outline of the ontological commitments of SEE, that is how reality is understood, its key constituents as far as an social-ecological economic system is concerned and some of their relationships. Next we outline the way in which economics can be conducted from the perspective of two other aspects of philosophy of science, namely epistemology and methodology.

II. Economics as the study of social provisioning

A rather obvious approach to defining what constitutes economics as a subject is to determine its primary object of study. Economics as an orthodoxy has for some time been dominated by a neo-Austrian dogma that was introduced significantly via Lionel Robbins (1932) and adopted into the mainstream, not least in microeconomic theory. This placed the concepts of resource scarcity and individual choice at the centre of a liberal political economy that was supposedly value free. The economic problem became meeting unlimited and competing wants and the supposed solution was meant to be resource allocation via “the market”, soon supplemented by (macro-)economic growth. In fact a single institutional process associated with capitalism was being advocated, namely, what Karl Polanyi (1957) termed, the price-making market. Robbins neo-Austrian definition then merged into Chicago school neoliberalism, where choice in a market setting, subject to price incentives, became the essence of economics and this has since permeated its meaning. This approach permitted an imperialistic expansion of economics into all sorts of subject areas, simply based on the idea that humans must make decisions as individuals so that any decision became an economic topic, e.g. equating everything from buying a cup of coffee to suicide (as infamously proposed by Becker, 1976).

In stark contrast, an older tradition regards the core of economics as determining the social and institutional arrangements for providing the needs of a community (or nation). Here the aim is to achieve a common good or well-being of all. What constitutes the good/well-being for a group then requires explicit ethical judgment. Modern times reduced the goal of seeking the “common weal” (i.e., the ability to fare well, prosper and have good fortune) into accumulating wealth and making money. Economics then simply became the study of capital accumulation using money and market prices and ultimately leading to economists’ claims of being able to determine optimally efficient public policy.

SEE immediately takes issue with reducing the subject down to studying something as singular as the economy, as if there were only one such entity or form. The term “the economy” is merely unthinking code for market capitalism, while denying actualised varieties of capitalism and that this is only one form of economic system (Hodgson, 2016). So rather than reduce economics to the study of one generic form meant to approximate the currently dominant system, a far broader approach is required, and not least so because this system is failing and creating catastrophic social and ecological crises.

A more comprehensive approach is to define economics as the study of social provisioning to meet human needs within an ethical framework of care and justice for others, both human and non-human. Social provisioning is a necessary activity for any social group whether a household, village, town, city, region, nation state or global collective. It concerns the ways in which people organise as social groupings to satisfy their needs. Markets as mechanisms for allocation are merely one form of arrangement and themselves diverse in structure.

Economics can then be seen as concerned with the variety of institutions for ensuring the satisfaction of needs and the reproduction of a society. Institutions here are to be understood as inclusive of conventions, norms, rules and regulations (Vatn, 2005). This immediately opens up economics for the consideration of alternatives and potentialities rather than the nihilistic claim that there are no alternatives.

A common objection to a focus on needs is that this is deterministic and fails to allow for the variety that appears evident in human society. Such a claim can be seen as confusing objective requirements with subjective means of their fulfilment. Thus Max-Neef (2009 [1992]) makes the distinction between needs and the satisfiers that enable their actualisation. He identifies nine fundamental needs – subsistence, affection, understanding, participation, leisure, creation, identity, freedom – that are regarded as universal and only changeable over extremely long time periods of species evolution (Max-Neef, 2009[1992]: 138). Meeting needs is regarded as a necessary prerequisite for human flourishing, while their means of fulfilment is socially contextual and varies across space and time (Rauschmayer and Omann, 2017). Satisfiers relate to the institutions, norms and practices that structure the satisfaction of needs, and will influence how economic goods and services contribute to their fulfilment or inhibition (Max-Neef, 1992). As such, while needs remain objective, how they are expressed, perceived, and fulfilled will always be subjective, conditioned by institutional arrangements and wider social and cultural contexts. This embeddedness and emergence of an economy from and with social structure forms one of the foundational ontological commitments of SEE.

In turn, social and economic systems are understood as being embedded in, and fundamentally constrained by, biophysical structures (Spash, 2017; Spash and Smith, 2019). All economic processes interact with their environment. There is a straight forward and basic dependency of economic systems upon flows of materials and energy as well as sinks for the necessary removal of waste material and energy. Economies are open social-ecological systems. Their processes operate within a set of limits prescribed by ecosystems structure and functioning, and social structure represented by actors and their institutional context.

III. The biophysical in economics

A basic fact, although absent from most economic thinking, is that natural resources and waste sinks are required to ensure social provisioning. The reproduction of societies must address the maintenance of ecosystems structure and their functioning or fail. Production fundamentally requires energy, or, more precisely, available energy termed “exergy”. That is, humans require energy capable of performing useful “work”, which is defined, as in physics, to mean the exertion of a force against some form of resistance (Ayres and Warr, 2009). Such work can be performed by humans, animals or machines, but will always require some input of exergy, whether it is the solar radiation embodied in food that fuels human and animal labour, or fossil fuels to power a heat engine. This dependency of societies on flows of energy and materials is captured in the concept of “social metabolism” (Krausmann, 2017). There is no single social metabolism because it will vary depending upon the structure of an economy and its social provisioning mechanisms, and there-in lies the potential of alternative socialecological economies.

The metabolic nature of human societies emphasises the role of materials and energy in their reproduction. This make the laws of thermodynamics central to any economic process as explored by Georgescu-Roegen (1971). The first law of thermodynamics stipulates that The metabolic nature of human societies emphasises the role of materials and energy in their reproduction. This make the laws of thermodynamics central to any economic process as explored by Georgescu-Roegen (1971). The first law of thermodynamics stipulates that

Human, and non-human, survival depends upon material and energy exchange which means on being open systems. Giampietro (2019) notes how Schrödinger described living organisms and ecosystems as having the capacity to seemingly avoid, or even reverse, entropic decay through interaction with their surroundings but this requires gathering available energy and concentrated materials from, and disposing of waste into, other systems. Entropy is not actually reversed because it continues in the larger system with which living organisms interact and are dependent. As biophysical entities living organisms are open systems. In general, open systems can maintain organisation, a given size and level of activity, but this has consequences for the systems with which they must interact. The growth of any organism, ecosystem or population is therefore fundamentally limited by the biophysical structure of its environment. These are termed horizontal limits by Devictor (2017: 120-121), because they relate to the spatial-temporal boundary for a given population, assemblage or ecosystem. The same principle applies to human societies and their economies, which depend upon ecosystems for flows of materials and energy as well as sinks for the waste they generate. Giampietro (2019) remarks that this implies that the processes ensuring the reproduction of elements of a “technosphere” (i.e. a social economy) must not interfere with the reproduction of elements in its associated “biosphere” (i.e. ecosystems structure and function) upon which they depend for maintaining a given scale of activity and organisation. Different societies have attempted to address this requirement in different ways with varying degrees of success in sustaining themselves.

Human history consists of a long period in which social provisioning was organised by free roaming, migratory, hunter gatherers prior to the rise of sedentary agricultural settlements. The former appear highly sustainable, long lived and relatively low impact, although some extinction of species is implicated. The latter consisted of small bioregional economies, with regional material flows and solar radiation as the main source of exergy, reliant on agriculture and forestry for various reproductive processes. The industrial revolution marked the start of a major transformation of social metabolism in human social and economic systems. The use of fossil fuels – coal then gas then oil – became the main source of exergy driving production processes, while increasing use of concentrated minerals replaced solar dependent plant and animal materials. This expansion of production, along with the development of artificial fertilizers, facilitated the growth of economic activities and populations beyond their previous limits (Spash, 2017).

This social metabolism appears highly unsustainable. After a few hundred years operating in just parts of the global provisioning system the results appear headed towards catastrophic collapse. The move away from exergy derived from solar radiation to finite stocks of concentrated minerals, combined with economic growth, has meant the social metabolism of industrialised human societies rapidly depleted the “entropic dowry” upon which it depends (Georgescu-Roegen, 1971). As a physically closed system, the Earth exchanges flows of energy but not of materials with its surrounding (at least not in any significant sense), while the reproduction of biospheric entities is made possible by the existence of various climatic systems that dispose of thermal energy into outer space, maintaining favourable conditions for life (Mayumi, 2017). Once used the stocks of low entropy are in effect irreversibly lost. In theory, the flows of exergy from solar radiation could be harnessed to reverse the dispersal of available energy on Earth, but to date this remains science fiction, while the ability to reconcentrate all dissipated materials to original quality on a substantive scale appears equally implausible (Spash and Smith, 2019). Recognising the biophysical reality of the economic process then leads to the inevitable conclusion that industrial economies are dependent on finite stocks exergy and their continued operation, let alone continual growth, is impossible over any extended period of time.

While the exhaustion of finite resources remains an ultimate limit on human activity, an arguably more pressing limit is the accumulation of waste. Industrial social metabolism “merely transforms low entropy into waste” (Georgescu-Roegen, 1971). As such, pollution should not be treated as a problem outside the system (i.e. an externality), or an anomaly, that could somehow be solved through increased efficiency, or correcting prices, but as an integral part of the economic process (Spash, 2021b). The Laws of Conservation indicate the inevitability of pollution because mass remains the same, but the quality of materials, like energy, declines. Ecological economists such as Daly (1992) have emphasised the scale of impacts from human activity (e.g. waste accumulation). What has been given less attention is the qualitative aspect arising due to the creation of artificial substances and interventions that would not have otherwise occurred and to which natural systems and entities are unable to adjust. Such unnatural impacts on the biosphere and ecosystems lie at the heart of the ecological crisis, such as the on-going mass extinction of species. Thus, not just the scale of human activity (e.g. quantity of waste, population size) but also its qualities determine the consequences for the environment and functioning of ecosystems. The importance of the form of intervention is why technology is never neutral, and also what determines the extent to which something is unnatural (Deckers, 2021). Humans are then engaged in processes of change not equilibrium and stability.

The development of ecology in the 1970s brought new insights into the structure of complex systems and their interconnections. This was mainly driven by the realisation of the disruptive impact of human activities on ecosystems’ structure and function, which in turn affected human systems (Spash and Smith, 2019). Contrary to previous views of ecosystems as isolated, self-regulating and stable systems, they became recognised as complex and dynamic open systems. The potentiality to change ecosystem structure dramatically following systems collapse was highlighted by Holling (2009[1986]), who described this organisation and reorganisation process as part of a cyclical pattern. The evolution of an ecosystem or population can be chaotic with abrupt changes in trajectory. Besides the “horizontal limits”, mentioned earlier, “vertical limits” are emergent and arise due to interactions between ecological levels and dependencies between different components of the system (Devictor 2017). Human activities interacting with ecosystems have uncertain and indeterminate consequences for their structure and function. In the face of such partial ignorance and indeterminacy over human intervention, public policy would better be precautionary than risk taking (Stirling, 2017), and society prepared to adapt rather than lock itself in to a specific “optimal” pathway (e.g. infrastructure, technologies, energy and materials).

IV. The social dimension of economics

Social reality is the dynamic outcome of human practices from which it emerges and by which it is reproduced (Lawson, 2006). However, emergence means that social structure while dependent upon is not reducible to human practices (e.g. individual behaviour). Social structure enables coordinated interactions through collective practices. Collective practices refer to accepted ways of doing things in a community, and can emerge in various ways, notably because of their functionality, but also simply by chance or repeated occurrences (Lawson 2012). They form a basis for individuals to form expectations as to the appropriate course of actions to follow in order to coordinate with others. Interconnected obligations and rights may evolve that are relationally constituted and constitutive of social positions (Lawson 2006). For example, the positions of employer and employee exist in relation to each other and entail associated rights and obligations for both parties.

How, and to what degree the actions of agents are pre-determined by social structure, as opposed to being autonomous, is a fundamental point of debate. Mainstream economics reduces “society” to being an aggregation of individuals who act purely out of individual selfinterest (i.e. maximising their own personal utility) and are basically identical (both ethically and psychologically). As such it cannot explain the historical variety in social provisioning systems – production and consumption patterns – throughout history and across contemporary cultures. This requires understanding human variety and social relations as emergent and mediated through institutions and values that interact with, shape and form economic structures. Human action is always relative to a particular context in space and time and set within social structure. While agency is restricted it is neither denied nor entirely pre-determined.

Following Jessop’s (2001, 2005, 2007) “strategic-relational” approach, structure and agency can be viewed as dialectical concepts beyond an artificial dualism. He considers structures as strategically selective, but not absolutely constraining, leaving some room for agency. His main argument is that structures generally tend to favour some actions over others. In this sense, he emphasize the importance of a strategic context for action: agents will strategically reflect on their (usually incomplete) understanding of structural constraints and opportunities and act accordingly. Action is therefore both structured, and “structuring” as it tends to reproduce structures and their patterns of strategic selectivity. These recursive interactions between agency and structure create tendencies because structures are not absolutely constraining. There is then only relative and temporary stability to patterns of strategic selectivity, with the possibility for actions to circumvent structural constraints or change them.

As structures are the product of human agency, they are dynamic and are open to change (Lawson, 2012). Through their practices and interactions, humans continuously (and often unintentionally) reproduce and transform the social structures that influence these practices. The employer-employee relation for example has evolved, with a changing set of rights and obligations as unions have negotiated better working conditions. Likewise, the social positioning of women has changed as emancipatory movements have fought for equal rights as citizens.

That major social structures can change (if generally only slowly) is evident from the contrast between modern society and archaic societies. For example, Sahlins (1972) described how hunter-gatherer economies were characterised by a high degree of underproduction and disdain towards accumulating material possessions. Modern industrialised societies promote over production and waste in a throwaway, fashion conscious mode of conspicuous consumption. Thus, modern consumer behaviour is not an ahistorical trait of human nature, but a specific form of social structure which helps reproduce the capitalist mode of production. The change in economic and social structure during the rise of capitalism and associated market economies has sometimes been described as a change in terms of the extent to which “the economy” is embedded in society. A prime example is the work of Karl Polanyi (1957) which argues that such modern market economies should be understood using a “formal” economic approach (i.e. individual choice in price-making markets). He regards most of human history as having been spent in “primitive” economies, where market exchange was largely or totally absent, and distribution occurred via reciprocity and kinship groups (Polanyi, 1957). Economic (provisioning) activities were described as being embedded in social relations and institutions. Understanding such economies required a “substantive” approach to economics in contrast to the formal approach, which he accepted as valid only for modern economies. The latter are governed by rational logic, efficiency, self-interest and prices which he believes means they can be regarded as disembedded from social relations (Gemici 2008; Polanyi, 1957).

While Polanyi highlights aspects of institutional differences between capitalist market economies and past economies, the division he draws between socially embedded primitive economies and socially disembedded modern economies is erroneous and only serves to reify the utopia of the “self-regulating market” that he painfully attempted to deconstruct (Spash, 2019; Gemici, 2015). The notion of (dis-)embeddedness fails to capture the changing qualities of social provisioning, and ultimately denies their social aspects. This encourages the separation of the social and economic, rather than their conceptual distinction and actual connection. Modern market economies are instituted differently than their historical counterparts, but market relations remain embedded-in, and built upon networks of social relations (Granovetter, 1985).

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Price-making markets have little, or in fact nothing, in common with perfectly competitive markets, where each firm has no power to set prices or control other factors of production. Actual market economies evidence oligopoly and monopoly power institutionalised in the corporation. Prices are the result of power relations and that includes the power to structure markets and regulations in ones own favour. Multi-national corporations and the Davos elite do not wait to be regulated; they lobby and influence government action in their favour opting for self-regulation when other choices are unavailable.

Power in the market place also means creating demand for products. Large firms have means to manipulate social attitudes, and therefore to manage what consumers buy and at what price (Galbraith, 1979; Kapp, 1978 [1963]; Spash and Dobernig, 2017). Promotion of dissatisfaction is the essence of modern marketing via normalising comparison with others, status-seeking (i.e. keeping up with the Jones’s), fashions, in-group/out-group identity, shopping as therapeutic and possessing the latest technology. Rather than industrial production leading to material satiation, and the need for less work, the consumer society has evolved with more work and more disposable products. This process has long been recognised as involving conspicuous consumption (Veblen 1991 [1899]) and manipulation by corporate and business enterprises (Galbraith 1969 [1958], 2007 [1967]; Kapp 1963).

V. Philosophy of economic science

Mainstream economics has attempted to employ and maintain discredited philosophical approaches to conducting itself as a science. On the one hand it aspires to finding objective truths through empiricism as if theory was unnecessary and data could speak for themselves. On the other it promotes a form of deductivism that places abstract mathematical models at its core with unquestionable foundational axioms divorced from any reality. Sometimes the two are combined in a pseudo logical empiricist approach,1 or claims to some vague form of positivism with epistemological positions such as a fact-value dichotomy, a naïve objectivism and the search for universal laws (Spash, 2012). None of this has been neutral, but has rather hidden an implicit conceptualisation of reality. Thus, the particular worldview of mainstream economics has tended to favour regarding economies as physically isolated, mechanical, self-regulating, equilibrating and predictable systems. Leaving an ontology to be defined by a methodology (whether deductivist or empiricist) means falling foul of the epistemic fallacy. That is, objects and their relationships only become accepted as valid, or even recognisable as relevant, if they conform to the methodology, e.g. if something cannot be measured it is ignored, effectively not existing in the analytical approach. Thus mainstream economics is blinkered by its methodological choices and methods (e.g. cost-benefit analysis) come to dictate understanding of reality (e.g. Nature must have a monetary price to be of value). In addition, contrary to the approaches of mainstream economists, the second half of the 20th Century saw a general recognition that science operates in a social context, and that our knowledge is fallible. However, the failings of mainstream philosophy of science are not the primary concern here (see Tacconi, 1998; Lawson, 2006; Spash, 2012, 2020), but rather we aim to suggest what would be a way forward in relation to SEE.

The search for philosophical foundations led Tacconi (1998) to propose a combination of post-normal science and constructionism. However, in its strong form constructionism denies realism and is incompatible with the ontological commitments of ecological economists to a biophysical reality independent of the human mind. Post-normal science is also not a philosophy of science, but an epistemological critique of traditional naïve objectivism in the natural sciences and its transference into the social sciences. As Tacconi (1998) seems to recognise his mixture of inconsistent approaches results in contradictions. Puller and Smith (2017: 19) summarise the problem as follows:

“Ecological economists seem to be searching for a way to combine a perception of the world as independent of our knowledge, while at the same time admitting the social construction of knowledge and the role of meaning-making in the social realm”

They then detail how a philosophical well-grounded approach can be found in critical realism, which combines ontological realism with epistemic relativism.

The form of critical realism of relevance here is associated with the early works of Roy Bhaskar (1975 [2008], 1979). As explored by Lawson (1997) in relation to economics, a strong emphasis is placed on the importance of addressing ontological issues. More specifically critical realism propose a depth ontology that goes beyond empiricist and actualist philosophies to give place to structure and the causal powers of their mechanisms. Structures and mechanisms make events happen. What is actualised is merely part of the potential and the result of which mechanisms and counter mechanisms are operative and which ones dominate. The empirically observable is then merely a subset of what is actualised based on human ability to take events into account.

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While social structures are human constructs they are no less real for that. Capitalism is, for example, a recognisable system with real mechanisms and effects (as described earlier). Reality is further conceived as stratified, with hierarchically ordered strata, starting from a physical dimension, followed by chemical, biological, social and economic dimensions (Collier 1994b). All biological entities are physical, but physical structure is independent of biological structure. Similarly, the co-dependent social and economic strata are dependent upon the biological, the chemical and physical, but not vice versa. However, as consistent with the earlier discussion, higher strata are irreducible to lower from which they are emergent. Similarly, Georgescu-Roegen (2009[1979]) exemplifies such properties by considering how an elephant is composed of physical and biological structure but its behaviour (an emergent property) cannot be explained purely form physics or chemistry. As we have noted society is not simply the aggregation of the individuals of which it is composed.

This stratified and layered understanding of reality also results in a concept of causality that differs from traditional realist approaches. Instead of being explicable as event regularity, critical realism explains actualised events using the concept of causal powers of mechanisms based on structures and mechanisms (Collier 1994a). In open systems, there are multiple mechanisms at play that can either enable or prevent the actualisation of potentialities. Rather than seeking universal and timeless “laws” of Nature there are law like conditions where certain tendencies of mechanisms become actualized (Puller and Smith, 2017).

Bhaskar describes the scientific process as “the social production of knowledge by means of knowledge” (Collier, 1994a: 54). In this view, “transitive” knowledge or thought objects, provide the concepts, models and theories that are simultaneously the raw material and the product of science, and which seek to explain “intransitive” reality or real objects (Sayer, 2010). Science seeks descriptive and explanatory knowledge if natural and social entities, phenomena, events and their relationships. While social structure is subject to change it is not so easily or quickly, it has durability (Lawson, 2006), and that means the same transitive / intransitive approach to understanding knowledge can be applied. Those who emphasise change as undermining all knowledge (e.g. Goddard, Kallis and Norgaard, 2019) fail to allow for durable structure and mechanisms which are the essence of the ability to know anything. There is also a tendency to over play the role of social scientists in affecting their objects of study.

As Sayer (2010: 33) states “social scientists and historians produce interpretations of objects, but do not generally produce the objects themselves”. He argues that a clear distinction is required between an object of inquiry and our knowledge of it, which consists in the language, concepts or images that we use to describe reality. Thought objects are therefore referents to their “real” counterparts, but he regards knowledge of true correspondence as impossible, i.e. all knowledge is fallible.

Experience of the external world consists of ideas (percepts, sense data, qualia) involving socially contextual conceptualisation (e.g. language, culture, prior knowledge). The extension of knowledge involves reconceptualization and involves the role of metaphors and analogies which relate to existing ways of thinking e.g. the current prevalence of computing metaphors and analogies. The transitive or thought object in critical realism involves weak constructionism and is termed epistemic relativity or (sometimes) epistemological relativism. This weak constructionism contrast with the radical relativism of strong constructionism where knowledge is simply a matter of shared conventions among researchers. In such accounts the relation to real structures, mechanisms and objects is regarded as irrelevant or even the existence of a reality beyond the human mind is denied.

Although knowledge is fallible, it is not equally so. Choices can be and are made between difference explanations and descriptions. Representations of the world are of practical use and their employment in our actions and practices has consequences which can be evaluated, help us navigate it and enable us to have an impact on it. We judge what works well and what does not. In Sayer’s (2010: 48) terms intersubjectively shared conventions must prove themselves to be practically adequate, so that our expectations about the world and results of our actions are actually realised. This is more than just the usefulness of a theory, because the adequacy of knowledge is also judge in terms of descriptive realism relative to the structure of reality. Thus critical realism is distinct from instrumentalism (such as found in American Pragmatism) because the aim is not simply prediction but causal explanation. Prediction can be equated with explanation only if one assumes event regularity, which fails to hold in open systems like economies. Indeed, prediction is unnecessary for the explanation of a phenomenon (Collier, 1994a).

Investigation of open systems requires a distinct approach from the idealised laboratory experiment which tries to create a partially isolated system through controlling mechanisms. The limited applicability of such methods for social phenomenon means alternative methods are typically required, such as the use of counterfactuals. However, as Danemark et al. (2002b) point out, there is no specific “method of critical realism”. Indeed the method for investigation is relative to the object of study and research question. Critical realism also recognises a wider range of modes of inference than the traditional induction and deduction. It includes the roles of retroduction and abduction (see Danermark et al., 2002a), as forming part of the process of providing causal explanation, which opens up the methodological toolbox of social sciences and changes understanding of methodology as supposedly (but not actually) conducted in traditional sciences. An inference always implies a form of generalisation and can either refer to extrapolation in an empiricist sense or to conceptualisation of the “hidden essence of things” in a realist sense. Danemark et al. (2002a: 100) suggest five strategies that can help us discern the hidden underlying structures and mechanisms: (1) counterfactual thinking; (2) social experiments; (3) studies of pathological cases; (4) studies of extreme cases and (5) comparative studies.

There are also grounds for judging which methods are appropriate. Methods and related theories must be adequate to their objects of study (Puller and Smith, 2017; Spash, 2012). For example, evolutionary theory, and its associated tools for analysis, is inadequate for understanding the operation of a mechanical clock. Thus, Hodgson’s (2008) argument that evolutionary theory should replace mechanistic theory in economics is flawed because it simply repeats the same mistaken belief that all objects of relevance to economic must be of one form (i.e. evolutionary rather than mechanical). Similarly the imposition of mathematical formalism as defining economics fails not because the methods is inherently wrong but because it cannot address the object of study, i.e. the characteristics of economic systems. More specifically quantifying everything with arithmomorphic concepts excludes all qualitative aspects (Georgescu-Roegen, 2009[1979]). This indicates the need for a structured methodological pluralism, where theories and methods are informed by the qualities of the object under study and cooperation occurs between those with common understanding (Spash, 2012).

A final aspect of note is the emancipatory role of social science research. Investigating the real (structural) cause(s) of a social phenomenon means the explanation of the social scientist will inevitably clash with the existing ideas of some people, that is new evidence may appear, theories brought into question, previously confirmed positions be undermined. Such is the nature of scientific research. Social scientists criticise those holding fallacious ideas. If there are institutions holding those false ideas then the research is also a criticism of them and the social scientists has a role in removing wrong beliefs. Collier (1994a) argues the role of the social scientist is not just to criticize but should be to undermine institutions promoting false ideas. Emancipation is then seen as transforming structure. When considering environmental research the case being made here is clear because research showing beliefs about the benefits of economic growth, fossil fuels, chemicals, plastic, asbestos, genetic modification and so on, to be false then criticise the institutions promoting such things. Research is neither neutral nor value free and facts have ethical implications for both the researcher and society.

VI. Conclusion

The multiple social, ecological and economic crises of our age, and the failings of mainstream economics to explain or address the structural causes of these crises, means new approaches to economics are essential. SEE has been outlined here as a necessary and emerging paradigm. Economics has become increasingly detached from its object of study and the orthodoxy is fundamentally flawed as a social science because it advocates a prescriptive methodology while lacking any serious engagement with epistemology and ontology. The resulting epistemic fallacy means it promotes a narrow implicit world view as if a factual truth. Failures here include imposition of limited quantitative methods and mathematically formalist methodology that exclude qualitative aspects of reality and the use of isolated/closed systems thinking for an open system reality.

Economies are the socially structured institutional process involving the interaction of humans with the natural world. Social reproduction is achieved only within the bounds of the given structure and mechanisms of biophysical reality. The form and scale of economic processes depends upon a set of spatially and temporally contextual social institutions. That is economics concerns the form and function of social provisioning process which can take various forms and are far from limited to price-making market or capitalist institutions. Starting from processes of social provisioning, economics becomes the study of plural historical, actual and potential economies with their underlying institutional arrangements and biophysical basis rather than a singular abstract idealised “economy”. This broadens analysis not only to what institutions, norms and values shape the economic process and agents’ behaviours, but also to what are socially desirable and ecologically sustainable systems of social provisioning. Economics is neither value free nor ethically neutral but its stance on both should be made explicit. It must also be realist about how economies are reproduced via social and ecological mechanisms. That means linking to both power relations and ethical and just means of provisioning, but also material and energy throughput that respects others (human and non-human). The aspirations of economists to provide for the well-being of humanity, if taken seriously, mean a revolutionary change in economics is long overdue.

#### Only through a pluralistic analysis at the intersection of planning AND legalese enables critical rethinking of present-day economics past theory and towards practice.

Dr. Bronwen Morgan & Dr. Declan Kuch 20, Professor, Law, University of Sydney Law School; Vice Chancellor’s Research Fellow, School of Law, University of South Wales, "Diverse Legalities: Pluralism and Instrumentalism," in The Handbook of Diverse Economies, Chapter 36, ed. J. K. Gibson-Graham & Kelly Dombroski, February 2020, pg. 323-329.

Law is important to economic thinking and practice. Why? Because practices of legality, both formal and informal, help to define understandings of property and ownership, to enforce transactions between parties, to reallocate economic resources from one group to another and to compensate for harms suffered in economic interactions. Law, to some extent, allocates the rights, duties and resources that constitute the range of diverse economic practices explored in this field of scholarship, and tends to both legitimate and facilitate these practices. Law is important proactively and not simply as a reaction to ‘trouble cases’ (Sarat et al. 1998): it can constitute economic activity as much as proscribe or regulate it. As this chapter will show, across all five domains of diverse economies, law arranges or rearranges obligations into new patterns that can be repeated or modified until they crystallize into new social relations. As such, law has a cross-cutting salience for the analytical structure of diverse economies. And particularly once encoded by the state, law tends towards ‘frozen politics’ (Morgan 1999), accruing a stickiness to the social relations it governs that is relatively hard to roll back.

To what extent then does law play a role in ‘producing a discourse of economic difference as a contribution to a politics of economic innovation’ (Gibson-Graham 2008)? This question as such has not been articulated to date in diverse economies scholarship. There is thus fertile potential for productive dialogue. We start with the observation that diverse economies scholarship and socio-legal scholarship share a common commitment to two key assumptions about the role of law in the economy. The first is that legalities are not separate from social practices but are rather embedded in them, whether in state-centred form or beyond the state. The second is that legality can be equally constitutive of non-capitalist and alternative capitalist economic practices, even though many formal practices of state-centred legality may tend to consolidate capital’s hold on the economy. Just as diverse economies scholarship unsettles ‘familiar representations of capitalism as an obdurate structure or system, co-extensive with the social space’ (Gibson-Graham 2008, p. 615), so too legality is by no means obdurate or necessarily implicated in blocking and prohibiting, but instead can reveal malleable openings for economic difference, and perform alternatives to the familiar nexus between capital, private property and waged labour.

This chapter explores two pathways opened up by the question of law’s role in producing a discourse of economic difference: legal pluralism and legal instrumentalism. Legal pluralism, most simply, refers to the recognition of the coexistence of multiple authoritative legal processes that operate within a specific jurisdictional or territorial area. Legal instrumentalism refers to a mode of legality which has roots in late nineteenth-century philosophical pragmatism where legal institutions are seen as a means to an end. While legal pluralism diversifies understandings of sources of law, legal instrumentalism is more outcome-focused: legality is viewed as providing resources for retooling the economy, using legal instruments to help bring community economies, for example, into being. This retooling can create openings in the status quo that we have described elsewhere as ‘radical transactionalism’, where legal building blocks of property and capital can be creatively deployed to provide a foundation for new social and democratic possibilities (Morgan and Kuch 2015, p. 559; see also Morgan and Thorpe 2018). However, alliances between legal forms and centralized state political power often significantly constrain the possibilities and openings available in legal settings and institutions, including in courts, in the writing of legislation and the operation of regulatory bodies. Appreciating these limits can strengthen diverse economies scholarship. This chapter emphasizes that legal instrumentalism should not assume the central or monopolistic salience of legality, but is rather one part of a complex assemblage of social and political relations that create, perform and constitute diverse economies.

LEGAL PLURALISM AND ECONOMIC DIFFERENCE

Legal pluralism is open-minded as to the source of binding norms, viewing them as embedded in customs or social practices as much as official state-sanctioned institutions. Contemporary understandings of legal pluralism tend to assume pluralization against a benchmark of modern, secular legal norms generated by state institutions, but of course a longer history and broader geographical view on legal systems reveals a rich mixture of relationships between state, civil society, religious and citizen institutions. Modern secular formal legalities were closely linked by Weber and others (Rheinstein 1967) to practices that support capitalist activity. This has led to the perceived interdependence between formal-legal rationality and capitalistic practices around profit, accounting and commercial dispute resolution. Certainly, along with the rise of Westphalian conceptions of national sovereignty understood hierarchically, there has been a tendency for formal-rational legalities in the modern era to compress the breathing space for diverse and plural understandings of legality. Hence a common thread through legal pluralism is the recognition that a multiplicity of institutional and cultural sites for the generation of legal norms can coexist without the necessity for a hierarchical relationship of ‘higher’ and ‘lower’ authority (see Chapter 33 by Marx and Chapter 40 by Bargh in this volume).

Assuming some degree of legal pluralism is thus naturally congruent with a stance on diverse economies that positions legality not as an external skeleton for a constrained subset of economic activity, but rather as always performing shifting boundaries between capitalist, alternative and non-capitalist practices. This is illustrated particularly well by reference to the range of exchange and labour practices foregrounded by diverse economies scholarship. Along these two dimensions, many practices flourish that illustrate legalities strongly decentred from state law. The labour practices discussed in chapters on unpaid labour (Williams and White, Chapter 14; Dombroski, Chapter 16), informal labour (Placino, Chapter 19) and non-human labour (Barron and Hess, Chapter 17) all tend to take place without reference to the purview of waged market labour as defined by formal employment law. Chapters on precarious labour (Pavlovskaya, Chapter 13), reciprocal labour exchange (Gibson, Chapter 18) and affective labour (Dombroski, Chapter 16) explore forms of labour which might well be part of formal labour practices defined and shaped by state law, but whose ethos or contours are distorted by the operations of such state law. In these instances, legal pluralism in many instances will capture a much more nuanced understanding of the relationship between binding norms and non-legal dimensions of reciprocity or care.

These relationships may be mutually productive, or they may be sites of tension and friction. For example, Lahiri-Dutt (2016) explores mining on the fringes of the Indian nation-state as a site where informal economic activity and cultural practice intersects with formal law in ways that produce friction across a variety of judicial and executive sites, such as tax collection. Existing labour practices embedded in the informal economy conflict with state regulations about mining in ways that are indeterminate. Implicit in Lahiri-Dutt’s discussion is that the existing practices of the community tend to be defined as illegal by their relationship to competing sources of state rules. But the norm-generating nature of informal activities and cultural practices is entirely visible to both legal pluralism and diverse economies scholarship. Despite the hospitability of legal pluralism and diverse economies, the tendency towards formalization over time noted above is endemic to labour practices, whose status as a contractual relation under capital has always been especially vexed in the context of law. A century of labour law in most Western jurisdictions has been built upon policing the boundary between legitimate and illegitimate labour contracts. To give a recent example, the sharing economy has blurred the employment status of those who work through digital platforms.

A similar perspective can be applied to the range of exchange activities explored in diverse economies literature. Direct provisioning (see Chapter 24 by Grasseni) and share systems are relatively clearly non-market transactions. Although law may still monitor fraud or abuse of power, it does not clearly frame or constitute the actual exchange. However, if we explore alternative currencies (see Chapter 25 by North), fair trade goods (see Chapter 27 by Naylor), direct producer–consumer supply chains (see Chapter 23 by White), gleaning (see Chapter 22 by Morrow), or especially social procurement (see Chapter 28 by McNeill), the constitutive and possibly constraining presence of legality is much more apparent. These modes of exchange are partially constituted by modes of legality which impose their own conceptions of legitimacy (legal vs. illegal) onto them. Legalities matter, but in much the same way as economies matter in diverse economies: that is, in terms of framing a wide range of disparate possibilities that shift continuously. Take for example the long history of shared hospitality provided as a gift. Since the development of the ‘sharing economy’ (see Chapter 29 by Sharp), Couchsurfing is one example of modern technology (digital platforms) facilitating and expanding this gift-based form of sharing. The mutuality of such gifts can be extended through non-monetary exchange practices such as time banking (see Chapter 26 by Diprose), or entirely commodified through commercial digital platforms such as Airbnb. The shadow of formal-rational law shapes not only the market transactions but also those practices involving offering space as a gift, or in exchange for other time-based services. Formal state law in the areas of tax, liability and contract might potentially apply to these activities, often in a bid to make them ‘visible’ such that income flows can be taxed, damages may be sought, and commercial agreements may be enforced (Morgan and Kuch 2015). The trajectory of formalization over time is a legacy of legality.

However, it is just as possible to focus on the social norms that animate the non-market dimensions of these transactions and explore how macro-legal frameworks can support these. This is no easy task. As Davina Cooper (2013) has explored in researching time banking, for instance, wider capitalist framings often pressure transactions performed in the time bank to mirror capitalist valuations. And over time, this constrains those patterns of exchange and labour that we identify here as beyond the purview of formal state law. In short, the iceberg familiar to diverse economies scholars becomes increasingly top-heavy.

Law can be a site of remedying this imbalance in two ways: firstly, by critically addressing the increasingly instrumental approach to considering the role of law in producing economies of difference; and, secondly, through greater focus on systemic change and organizational frameworks for practices of work and exchange, particularly enterprise and finance. To extend the Couchsurfing example: in instrumental terms, there is a reasonable likelihood that diverse legalities may induce pressure on entities like Couchsurfing to adopt more capitalistic practices, including the evolution of Couchsurfing from non-profit to a ‘for-benefit’ legal form of enterprise. A diverse economies reading can help draw attention to what is lost and gained in such a move.

LEGAL INSTRUMENTALISM AND BUILDING OTHER ECONOMIES

Legality manifests as malleable, performed and situated. This resonates with the way that diverse economies scholarship implies an anthropological sensibility about how order is made. Such a sensibility means, in part, shifting away from thinking of law as necessarily defined as a set of particular rules that generate specific outcomes. To some extent this puts legal instrumentalism in tension with diverse economies – but sometimes there are instrumental possibilities present in existing formal state law that embody transformative possibilities. At other times, those possibilities are currently inchoate, embedded in social practices, customs or patterned behaviour that could be characterized as legal pluralism. It might be possible to say that in general ‘non-capitalist’ practices are less likely to be captured by the dynamics of legal instrumentalism – but the general picture of how and when law matters is often much more fluid and nuanced.

Law relates to the five dimensions of diverse economies (see Tables 1.1–1.5 in Chapter 1) indirectly, rather than creating an additional dimension. This is the case for both legal pluralist and legal instrumentalist perspectives. From the perspective of legal pluralism, the pluralism relates to sources of authority (state or non-state) rather than to economic practices. Modern economies are in many ways defined by the institutions that enforce the boundary between legitimate and illegitimate actions in all domains of economic practice. Enforcement involves a spectrum of activities from criminal sanctions to the ‘softer’ cultivation of appropriate conduct of citizens, consumers and workers by means of the incentive frameworks laid down by legal rules. The boundary between formal and informal emanations of law is a variation of the point made above that legal pluralism is an important dimension of diverse economies. As noted earlier, transactional practices such as gifts or financial practices such as household income flows are typically invisible to formal law. Yet formal law can also shift this situation by defining precisely when these practices become visible to the state, as for example when governments redefine the sharing of private housing through digital platforms as a taxable transaction.

This outcome-focused perspective on law is much more instrumental. From the perspective of legal instrumentalism, though – and similarly to legal pluralist approaches – legality is not an additional distinctive dimension of economic practices. Rather, legality constitutes (on occasion) those practices: law allocates the rights, duties and resources that constitute prac-tices of labour, finance, enterprise etc., legitimating them (from the perspective of the state) to varying degrees. The instrumental salience of law for diverse economies of difference is its capacity to arrange or rearrange obligations into new patterns that can be repeated or modified until they crystallize into new social relations.

The joint stock corporation is perhaps the purest creature of law in a typical economic landscape, possessing as it does the quality of legal ‘personhood’ and the admitted fiction of the ‘corporate veil’ that limits shareholder liability without capping profits (see Chapter 11 by Walenta in this volume). But legal engineering can fashion distinct kinds of organizational economic actors, making the legal form of an enterprise a crucial site of political potential. Legal form dictates the flow of money, including profit; responsibilities when things go right or wrong; equity, voting rights, debtor relations, and shares. The centrality of law in the creation of these various incidents of organizational personhood means that legal instrumentalism can be constitutive of quite different entities, rearranging equity, debt, audit and shares in novel company law formats.

As William Davies argues, doing this helps ‘start to imagine a wholly different economy, simply through considering how freedoms, powers and responsibilities might be combined differently, via subtly redesigned legal instruments’ (Davies 2013). In the sharing economy context, the emerging ‘platform cooperative’ movement (Schneider 2018) and peer-to-peer commons-based organizations (Bauwens and Pantazis 2018) are powerful examples, with diverse forms of company and intellectual property law at their heart, some of which are finding their way into propositions for concrete organizational alternatives to Airbnb such as FairBnB (https://fairbnb.coop/ [accessed 08 May 2019]). This is not inconsistent with legal pluralism: for example, a legal pluralist understanding of ownership shows the ways companies can be rethought as commons (Healy 2018), in dialogue with formalist-focused instrumentalist approaches that are sympathetic to this vision (Deakin 2012). Also illustrative of the co-presence of legal pluralism and legal instrumentalism, jurisdictions like the UK and USA have legislated distinctive company forms for social enterprise, whilst in Australia, certification schemes and a creative approach to the customization of ordinary company law (Morgan 2018) have arguably filled the role of formalizing social missions into diverse economic organizations.

While the legalities of diverse enterprise illustrate how formal law can be constructively instrumental, the legalities of finance might be seen as constraining the breathing space for community economies to flourish (but see chapters in Part V of this volume). The finance sector is often viewed instrumentally through the lens of capitalocentric political economy, highlighting the dubious ways the sector has grown parasitically upon useful economic output without contributing to it (Jessop 2012; Quiggin 2009). Large multinational financial corporations dominate infrastructure capacity, leading to situations where finance entangled with state law tends to steam-roll community interest concerns. For example, Airbnb’s venture capital funding took it from major US cities to a global presence with little regard for local regulation or its impact on rents. Between 2008 and 2018, Airbnb reportedly took on more than US$3 billion of venture capital funding (Benner 2017). Following highly public backlashes from neighbourhoods being hollowed out by property investors through the platform in cities such as Paris, Barcelona, Berlin and New York, local taxes and ordinances are now often collected alongside Airbnb’s site fees as an instrumental mechanism to resolve its intrusion into neighbourhoods across Europe and the United States.

The financial disentanglement of Airbnb’s responsibilities to city residents can be contrasted with FairBnB, the cooperatively owned enterprise structure mentioned above that provides an alternative to Airbnb. Enterprise diversity brings in its train diversity in financing and the use of surplus: rather than profits to offshore shareholders and taxation directed to municipal coffers, FairBnB provides ‘a platform to be owned and managed by a cooperative of users and neighbours who will collectively decide how to reinvest part of the profits in local projects that would help to ease the impact of tourism, protect residency and fight gentrification’.

PROPERTY AS A SUBSTRATUM: LAW AS A COMMONS

If labour and transactions give breathing space for non-capitalist activities while enterprise and money struggle more but constitute foundational shifts when successful, property law is the most entrenched of all (Capra and Mattei 2015). Airbnb’s operations obviously depend crucially on individual property rights over individual dwellings, but could law create a different kind of substratum for a different kind of sharing economy? In many ways, the cumulative effect of using law to retool enterprise, labour and finance in the ways described above is to construct a kind of commons despite the individualized property rights of its substratum. This is consistent with the point often made by diverse economies scholars that neither property ownership nor the type of legal rights that pertain in relation to property are determinative of a commons (Davies 2017; Gibson-Graham et al. 2013).

This point is echoed within legal doctrine, in relation to both private property and the commons. In relation to the first, the ‘social function of property’, an established doctrine in certain jurisdictions, in Latin America and France especially, embraces:

the idea that an owner cannot always do what she wants with her property; rather she is obligated to make it productive, which may include putting it at the service of the community. In other words, sometimes the state is obligated to require individuals to sacrifice some property rights in order to put property to its productive and socially functional use, or to do so itself. (Foster and Iaione 2015, p. 308)

In relation to the commons, this concept is often interpreted in two divergent ways by courts: one ‘based on the inevitable rivalry or subtractability of an open access resource, and the other based on the inherent public value of an open access resource (even if privately held)’ (Foster and Iaione 2015, p. 294).

The substantive ambiguity, then, of legal resources, is a common thread here. And indeed, some socio-legal scholars use this to argue that law is itself a kind of commons. Roger Cotterrell elaborates on law’s capacity to function as a communal resource by ‘approving and protecting the empirical conditions that facilitate mutual interpersonal trust’ (Cotterrell 2002, p. 643), and Amanda Perry-Kessaris (2009, p. 21) identifies three pathways for doing this: ‘expressing the values and interests that hold people together, coordinating the values and interests that hold people apart, and provoking and facilitating participation in social life’. If legal rules express consensus where possible and coordinate dissent in a socially responsive and participatory fashion, they become themselves a communal resource. And the intellectual resources of diverse economies scholarship add a rich substantive dimension to the idea of law itself as a commons. In illuminating the diverse ways that existing social practices embed property, markets, transactions, money and exchange, it becomes more imaginable that legal rules and legal institutions can and should reflect, express and facilitate that diversity; diversity that is in fact long-embedded in the tradition of law (Capra and Mattei 2015). The tradition of legal pluralism already embodies such commitments, and if legal instrumentalism can work with the grain of legal pluralism, then legality itself will become more open-textured. Diverse legalities will increase capacity to temper law’s tendency to consolidate capitalist practices, instead opening up economic difference and helping to institutionalize its diverse possibilities.

CONCLUSION

We would like to close by stressing that we are by no means claiming that law is all that matters. It may be a highly salient aspect of ‘producing a discourse of economic difference’ but it is also deeply insufficient. Formal state laws are just words on pages: irrelevant until embedded in social practices and power dynamics. Informally, and beyond even legal pluralism, social norms often do similar work; even formally, financial architectures and their conditional force frequently do similar work, securing the force of law without taking the form of general rules. This injunction to attend to both legal form and infrastructure should not be mistaken for a methodological prescription for diverse economies research. Formal law is often not the obligatory point of passage for resolving disputes in community enterprises, nor does it necessarily dictate monetary flows through an enterprise, for example. The operations and forms of legality are radically insufficient for the creation of enduring institutions and practices.

Nonetheless we close by urging explicit engagement with the dynamics of legality, in particular via more extended conversations between diverse economies and socio-legal scholars. Whether law is viewed in instrumental terms as a resource for retooling economies or in legal pluralist terms as a fresh language for enacting discourses of economic difference, it is far more than a rigid external framework. Rather, legality is a rich interpretive site, with more plasticity and open texture than many might assume; perhaps even the capacity to act as a commons itself.

#### That practice of political change is the sole vector to overcome hegemonic constraints on a plurality of alternative food systems.

Philip A. Loring 11-9, Arrell Chair, Food, Policy, & Society, University of Guelph. Associate Professor, Geography, Environment, & Geomatics, University of Guelph, "Regenerative Food Systems and The Conservation of Change," Agriculture & Human Values, 11/09/2021, Springer.

There is a pressing need to rapidly redesign global food systems around practices that can meet ambitious goals for ecological sustainability and social justice (Rockström et al. 2020). Global food systems have succeeded in consistently increasing food production, both in sum and per capita, since the 1960s, while also keeping food prices relatively stable (Loring and Sanyal 2021). However, despite producing ample quantities of food, these food systems fail to ensure food security for a billion or more people worldwide (Holt-Giménez et al. 2012). Too, the continued growth of these systems has only been possible because of myriad unsustainable and unjust practices that degrade ecosystems (Campbell et al. 2017), destabilize global climate (Vermeulen et al. 2012), and impoverish rural communities (Sen 1983; Hornborg 2009). Indeed, numerous segments of the global food system are arguably only economically feasible so long as they can be subsidized by cheap chemical inputs and labor (Rist et al. 2014). Some scholars have gone so far as to describe today’s industrially oriented systems as “coerced”, or “zombie regimes”, because they lack internal resilience and are only sustainable as long as their hunger for these subsidies can be fed (Rist et al. 2014; Angeler et al. 2020).

Attempts to build alternative food systems that address environmental issues like climate change while also doing a better job of providing people with sufficient, safe, and culturally appropriate food are well underway in a variety of locales (Trivette 2012; Witter and Stoll 2017; IPES-Food 2020). Local and Indigenous food movements, regenerative grazing, cellular agriculture, and digital agriculture are some of the noteworthy ways that people are pursuing innovation and reform, though the specific aims, scope, and merits of these strategies are heavily contested (Fraser et al. 2016; Rotz et al. 2019). At a minimum, the prevalence of diverse discourses and technological imaginaries regarding the future of food indicates a widespread societal engagement with, if not consensus regarding, the basic premise that our food systems urgently need to be transformed.

One critique that is raised repeatedly in debates and discussions about food system reform relates to the matters of definitions and standardization. The introduction of each new concept to the food systems discourse—sustainable, local, resilient, and now, regenerative—has come with a concomitant flurry of debate and discussion about how to best define, categorize, certify, or regulate these concepts. Some argue that these concepts are too vague or impossible to define (Born and Purcell 2006), while others encourage rigorous definition and the creation of standards to make these concepts meaningful and marketable (Sutton 1996; Newton et al. 2020). Others still argue that these concepts are necessarily emergent in nature, and only take shape as people take them up and put them into practice in ways that work for their local social and ecological contexts (Eriksen 2013; Witter and Stoll 2017; Penca 2019).

From the perspective of paradigm change, part of what makes concepts like sustainable, local, and regenerative potentially revolutionary is their plurality, because food systems issues and solutions are inherently place-based (Katz-Rosene 2020; Loring 2020a). Nevertheless, these concepts must convey meaningful information if they are to inspire much needed changes in food production and confidence in consumers. Likewise, a focus on the first principles that drive various food systems configurations can help us to identify the root causes of problems with the current paradigm, so we can develop the strategies that might collectively come to constitute the new paradigm (or paradigms) that replace it.

In this paper I present a framework rooted in human ecology for making sense of the various possible configurations of food production systems, one that maintains space for pluralism while still highlighting meaningful differences in how those configurations relate to social and ecological outcomes. Rather than focusing on specific food production practices or technologies, the framework focuses on how food systems are organized: specifically, on patterns of livelihood strategies and resource diversity. First, I provide some background on debates over sustainable food systems and the emergence of regenerative agriculture. I follow this with a discussion of the framework, its theoretical underpinnings in ecology and thermodynamics, and the four archetypical regimes for food systems that the framework establishes: regenerative, degenerative, coerced, and impoverished. I then conclude with a discussion of pathways for transforming food systems and opportunities for additional research.

Background

Much discussion has been had in the last few decades over the appropriate scales, systems, and technologies for redesigning global food systems and attending to food security challenges (Kloppenburg et al. 1996; Born and Purcell 2006; Eriksen 2013; Fraser et al. 2016). Numerous strategies and solutions are being explored and promoted, including food systems localization (Kloppenburg et al. 1996; Trivette 2012), organic production (Reganold and Wachter 2016), sustainable intensification (Garnett et al. 2013), agroecology (Pereira et al. 2018), digital agriculture (Fraser and Campbell 2019), and regenerative agriculture (Newton et al. 2020; Schreefel et al. 2020). These various positionalities have spawned persistent and often heated debates that, while important, are arguably hindering progress on achieving the rapid transformations we need to avoid further climate and food systems breakdown (Fraser et al. 2016; Rockström et al. 2020).

One challenge in these debates is that the arguments are not necessarily being made on the same terms: some emphasize matters of technology or scale, such as inputs, outputs, and food miles, while others focus on social and organizational matters such as equity, sovereignty, and social-ecological linkages and feedbacks. While the former are no doubt critical considerations when thinking about how to improve food production, the social and ecological outcomes of the various technologies we have at our disposal are necessarily mediated by the cultural and ecological characteristics of where and how these technologies are implemented (Kottak 1990; Vandermeer et al. 2018). Sustainable livestock management, for example, will take dramatically different forms depending on the details of the landscape, systems of land tenure, and the cultures practicing it (Savory 1988; Dunford 2002; Saunders and Barber 2008). It is thus inadvisable to hastily proclaim that any specific set of foods, food production technologies, or scales of operation are universally sustainable or not (Born and Purcell 2006; Katz-Rosene 2020).

Consider regenerative agriculture—a collection of integrated practices for food production that emphasize soil health, carbon sequestration, ecosystem resilience, and nutrient-dense foods (Ikerd 2021). At the heart of regenerative agriculture is a commitment to improving the ecological (and sometimes social) outcomes of agricultural practices, usually starting with soil health as a foundation for addressing issues related to climate change, water quality, land productivity, and biodiversity conservation (Francis et al. 1986; Toensmeier 2016; Rhodes 2017; Schreefel et al. 2020). Research suggests that regenerative practices can achieve win–win scenarios: increasing on-farm profits while also improving other ecosystem services as well (LaCanne and Lundgren 2018). While not a new concept, regenerative agriculture has seen a major uptake in recent years by practitioners and corporate strategists in response to increased public awareness of the environmental impacts of agriculture. Definitions of regenerative agriculture vary widely (Newton et al. 2020; Schreefel et al. 2020), with some attending primarily to matters of process (e.g., reliance on organic methods or reduced tillage), while others emphasize critical outcomes (e.g., biodiversity, carbon sequestration) (Newton et al. 2020). Carbon in particular is often emphasized; carbon farming and carbon ranching have both become popular monikers for regenerative practices (White 2014; Toensmeier 2016). However, the scramble by agribusiness to adopt a regenerative identity has been plagued by inconsistencies, a lack of attention to context, and a less than critical approach to what various purportedly regenerative technologies can achieve (Giller et al. 2021).

Ikerd (2021) argues that the regenerative paradigm is not necessarily about soil, carbon, or specific technologies, but about energy and whether our cultural systems for food production work with, rather than against, the capacity of living systems to return energy from less useful to more useful forms. His argument rests on the principles of thermodynamics, specifically the second law, which establishes the tendency of energy to move from more useful to less useful forms. When we use energy entropy increases, which in practical terms means that the energy becomes less useful. But, living systems are adapted to work against the general trend of increasing entropy (England 2013), and are capable of reconfiguring used energy back into more usable forms. They do this through an intersecting, co-evolved tapestry of cycles of release and renewal that occur at multiple spatial and temporal scales (Gunderson and Holling 2002; Loring 2020b). From the fast cycles of soil microbes to decadal oscillations of predators and prey and the centennial cycles of forest succession, energy in living systems is repeatedly used and recovered, moving up, down, and across food webs, from low entropy to high entropy and back again, in an ongoing process of adaptive change.

What the second law of thermodynamics means for food systems is that this tapestry of change must always be conserved, lest their regenerative capacity be progressively eroded (Loring 2020b). To put it another way, wherever human activities actively resist natural variability and change to achieve highly structured and uniform outcomes, environmental degradation will result. Industrial monocultures, for example, simplify soils and agroecosystems with pesticides, herbicides, predator control, and the use of fertilizers. These technologies come with a high entropic cost because they disrupt the fast and slow cycles of change—such as decomposition and nutrient cycling, plant and animal population dynamics, and landscape-level disturbance and succession—that would normally return used energy back to usable forms. By comparison, human activities that are organized to work with variability and change, via strategies that emphasize flexibility, steward cycles at multiple scales, and are responsive to environmental feedbacks, have high negentropic potential, meaning that they can contribute to or even enhance the regenerative capacity of natural systems (Travis et al. 2013; Ikerd 2021).

Collectively, I refer to this thermodynamic understanding of living systems as the ‘conservation of change’: a double entedre that refers both to the principle itself and to the practice of adhering to it, i.e., ‘conserving change’. In a practical sense, wherever we manage our food systems for stability and uniformity, the more we risk diminishing the capacity of these systems to return energy from less useful to more useful forms. The principle tells us that change must happen somewhere; conserving that change means ensuring that our interactions with living systems work with rather than against the system of intersecting cycles that make regeneration possible. This can be as straightforward as adapting our diets to the seasonal availability of cultivated and wild foods or as extensive as adapting our food systems to complement multidecadal cycles of ecosystem disturbance and succession. As I discuss below, shifting cultivation, holistic ranching, Indigenous fire management, and to a lesser extent crop rotation and preserving food for out-of-season consumption are all examples of cultural practices that seek to embody the conservation of change principle.

The framework

Here, I present a framework for applying the conservation of change principle to food systems. My goal is not to impose prescriptive definitions for which practices or technologies count as regenerative or sustainable. Neither is it to establish a false binary that casts food systems as either regenerative or not. Rather, the goal of this framework is to make sense of the range of possible food system configurations and how these configurations relate to social and environmental outcomes. As noted, whether food systems achieve regenerative outcomes in the thermodynamic sense relates not merely to the technologies at play but also to the organization of the cultural systems implementing them.

The framework is based on the two key organizational properties introduced above: diversity and flexibility. Diversity is a central feature of ecosystem organization, one that is essential to both ecosystem health and productivity (Pimm 1984; Rapport et al. 1998; Hooper et al. 2005). While caveats exist (Chase and Leibold 2002; Hooper et al. 2005), there is generally a positive relationship between an ecosystem’s diversity and its productivity, resilience, and stability (Pimm 1984; Fjeldsaå and Lovett 1997; Tilman et al. 2001). As such, food systems based on uniform ecologies tend to be less productive and prone to boom-and-bust dynamics (Clough et al. 2009; Barbier 2020). They can be successful for a time, but they leave people vulnerable to shocks or incentivized to act unsustainably (Fraser et al. 2005; R. S Steneck et al. 2011; Nayak et al. 2014; Henry and Johnson 2015). Food systems based on diverse ecologies, by comparison, provide people with multiple options for maintaining resilient livelihoods and nutrient-rich diets (Mulumba et al. 2012; Bogaard et al. 2017; Renard and Tilman 2019; Bernhardt and O’Connor 2021).

The second concept in the framework is flexibility, which refers to the extent to which our cultural systems can anticipate and respond to change. Flexibility is an adaptive strategy that is ubiquitous across the history of human societies (Thornton and Manasfi 2010). Whereas rigid food systems are tightly oriented to one or a few key livelihood strategies, flexible food systems exist when people have both the freedom and willingness to adapt their subsistence strategies when necessary (Loring and Gerlach 2010; Carlisle 2014). Flexibility confers resilience (Fraser et al. 2005; Carpenter and Brock 2008) but is only possible if people have sufficient opportunity to develop the ecological knowledge and social institutions they need to recognize and respond to environmental feedbacks that signal when change is necessary (Cinner et al. 2018).

Some have used the concept of portfolios to theorize the beneficial intersection of food system diversity and flexibility in practice (Fraser et al. 2005). Drawing on economic theory, Fraser and colleagues show that when people have access to multiple viable resources (diversity) and are willing and able to switch among them as necessary (flexibility), the resulting portfolio reduces vulnerability to future shocks. This portfolio effect has been observed in a variety of food-related settings, from subsistence food systems to global fisheries (Loring and Gerlach 2010; Beaudreau et al. 2019).

Here, I theorize diversity and flexibility as independent but intersecting dimensions that are central to food systems’ regenerative potential (Fig. 1). Considered together, these two dimensions create four archetypical regimes—degenerative, regenerative, impoverished, and coerced—that we can use to characterize food systems and their likely entropic or negentropic outcomes at a variety of scales. Below, I discuss each of the four regimes, drawing on real world examples as possible. I present these in no particular order, starting with the upper left quadrant and proceeding clockwise, which I clarify here to avoid any implication that there is some natural progression or order to these regimes. Likewise, I do not present these as hard-fast categories, meaning that food systems in practice may well entail an assemblage of activities that exemplify different regimes to varying degrees.

[Chart omitted]

Regime 1: degenerative

This regime involves food systems with access to high resource diversity, but rigid livelihood strategies that focus only on one or a few of the options that are available (Fig. 2a). The singular focus in degenerative regimes can be driven by strong economic incentives or subsidies, policies, or cultural norms. High value and demand for the resource incentivizes aggressive harvest, and there may be an assumption that the resources in question cannot be overharvested, or that they are so easily substituted that overharvest is irrelevant. Either way, even as evidence of environmental degradation emerges, people in these systems are unwilling or unable to switch to alternatives. Only when the targeted resources are extremely imperilled or collapsed do people finally move to other locales or more abundant resources.

[Chart omitted]

“Fishing down the food web” is a well-described example of a degenerative regime (Pauly et al. 1998). In brief, this is a pattern of serial fisheries depletion, where fishers focus only on a few commercially valuable species, often starting with the largest and longest-lived predators, and then move on to progressively smaller and shorter-lived species as the larger ones become overfished. A similar pattern, fishing through the food web, happens when concurrent demand for smaller species increases, not because the larger ones are extirpated but because overall demand has grown beyond what the larger species can accommodate (Essington et al. 2006). Cultural preference remains for the largest species, with lower trophic level species generally going to those with lower incomes or for use as bait or feed in large species aquaculture (Stergiou et al. 2009).

Intensive livestock grazing and shifting cultivation are both examples of practices that have been implicated in degenerative regimes. Persistent overgrazing, for example, drives desertification, which forces ranchers to abandon existing lands and move their animals to new lands, which are often acquired via new deforestation (Weber and Horst 2011). Likewise, intensive shifting cultivation, a practice where forests are cut and burned to create highly productive agricultural lands, can lead to a similar pattern of land abandonment and deforestation if farmers focus only on single crops after they burn or if they do not allow sufficient time between burns for fallow and regrowth (Brady 1996). As noted below, however, both of these technologies can also figure into regenerative systems when managed in a way that conserves change.

The degraded ecosystems that result from degenerative regimes can be highly resilient and unlikely to recover without direct intervention. Where these degenerative systems are perpetuated by outside actors, local people are then left coping with impoverished regimes, because they have no choice but to continue subsisting with what little is possible in this degraded environment (see Regime 3, below).

Regime 2: regenerative

Regenerative systems are high in both flexibility and diversity and entail cultural systems that conserve change by emphasizing responsiveness to environmental cycles and feedbacks while also valuing ecosystem and food system diversity as outcomes (Fig. 2b). As noted, regenerative systems are high in negentropy because livelihood strategies work actively to complement or enhance natural cycles of release and renewal. As such, regenerative systems involve high levels of ecological expertise and strong norms and institutions that emphasize close relationships, active observation, and resource conservation (Berkes 2008).

There are numerous historical and contemporary examples of regenerative food systems, from ancient agriculture and mariculture to contemporary grazing (Dunford 2002; Bogaard et al. 2017; Loring 2020b). There is likewise extensive evidence that most pre-colonial Indigenous environmental practices were, and continue to be, regenerative in nature (Fisher et al. 2019; Ellis et al. 2021). Among these systems is shifting cultivation, including the ancient forest gardens of the Maya (Kleinman et al. 1995; Padoch and Pinedo-Vasquez 2010; Ford and Nigh 2015). As noted, shifting cultivation involves strategic, rotational burning and a mix of crop and orchard-like cultivation strategies that are adapted to work with the forests’ multiple post-fire successional stages. While some modern examples of shifting cultivation cause degradation and have become vilified in modern environmental discourse (Brady 1996), there is extensive evidence that the numerous variations of the system practiced around the world were highly sustainable until disrupted by colonial invasion (Kleinman et al. 1995; Padoch and Pinedo-Vasquez 2010). To this day, the generative benefits of shifting cultivation are evident in the Amazon, in such forms as Amazonian dark earths (terra preta) and the widespread patterns of high biological and biocultural diversity that still characterize the region (Oliveira et al. 2020).

Cattle winterage, a recently revitalized practice in the Burren region of Ireland, is another example of a regenerative system (Dunford 2002; O’Rourke 2005). This is a unique and traditional form of transhumance where cattle are moved up to higher grazing areas in the winter, a time when the disturbances they cause by grazing and trampling, and the nutrient inputs they provide via their manure and urine, are all beneficial to the soil and plant community. The recovery of this system has driven major improvements in local biodiversity and water quality in the Burren and has also fueled a revitalization of traditional heritage in the region.

Regime 3: impoverished

Impoverished systems have limited diversity, but livelihoods remain flexible, in part because people must rely on whatever options are available for meeting their needs (Fig. 2c). As noted above, degenerative systems often leave impoverished systems in their wake, because local people are left with little choice but to cope with the social and ecological legacies of resource extraction after those doing the extraction have moved on (Hornborg 2009).

Impoverished systems tend to be highly resilient (Carpenter and Brock 2008), both because degraded ecosystems are resilient and because people have become so dependent on the few resources that are available, that they must harvest those resources even when doing so maintains their degraded state (Brashares et al. 2004; Nayak et al. 2014; Loring 2016). This pattern has been described in the resilience literature as a poverty trap and in political ecology as the marginalization-degradation feedback loop (Carpenter and Brock 2008; Robbins 2012). Impoverished systems also exhibit tight couplings between livelihoods and the few resources available. For example, Brashares and colleagues (2004) show that bushmeat hunting patterns in West Africa were tightly coupled to the availability of fish—people increased hunting when fish supplies were sparse and vice versa.

Impoverished food systems are a ubiquitous legacy of the extractive practices of colonialism and industrial capitalism around the world (Hornborg 2009). For example, Nayak and colleagues (2014) show how resource extraction by elites and for industrial fisheries in India and Brazil has instigated this mutually reinforcing trap through a combination of disempowerment, marginalization, class exploitation, and economic exclusion. Because impoverished systems create perverse economic incentives for people to further degrade those systems, restoring regenerative capacity of impoverished systems must start first with improving local livelihoods, for example through immediate subsidies, reparations, and local development based on ecological restoration (Cao et al. 2009).

Regime 4: coerced

Coerced regimes entail a combination of rigid livelihood strategies and ecological uniformity (Fig. 2d). Unlike impoverished systems, however, in a coerced system the lack of diversity is not the result of degradation but of active cultivation, in that strategic actions are taken to favor and maintain the abundance of only one or a few highly valued key resources (Cassano et al. 2009; R. S Steneck et al. 2011; Borkhataria et al. 2012; Angeler et al. 2020). Because people are actively promoting the success of these resources over others, systems that were previously diverse and regenerative become progressively simple, i.e., monocultures, and the social institutions that develop around the success of these monocultures become extremely robust (Henry and Johnson 2015; Angeler et al. 2020). While coerced systems can gain a reputation for their sustainability (Acheson 1975; Henry and Johnson 2015), all of their regenerative potential is tied up in maintaining the prized resources. As such, while these systems can be lucrative, they are vulnerable to disruption, prone to boom-and-bust dynamics, and difficult to change (Clough et al. 2009; Barbier 2020). Coerced systems can also be prone to path dependence, where past decisions significantly constrain future adaptability (Cox et al. 2019).

Some coerced systems have been described as a “gilded trap” (R. S Steneck et al. 2011). Examples include rice, cacao, and coffee production in Latin America and lobster fisheries in Maine (Cassano et al. 2009; R. S Steneck et al. 2011; Borkhataria et al. 2012; Cox et al. 2019). Maine lobster fisheries, for example, have long been hailed as sustainability success stories and are well known for the many customary practices and informal institutions that have enabled fishers to effectively convert the Gulf of Maine ecosystem into a lobster monoculture (Acheson 1990). Top predators are all but absent from the marine foodweb (Robert S. Steneck and Wahle 2013), and a significant proportion of lobsters’ diet now comes from baitfish rather than wild, predated fish (Grabowski et al. 2010). Economic diversity among Maine fishers is also at a historic low (Steneck et al 2011). Thus, the fishery and fishing communities alike face unprecedented vulnerability to ecological challenges like climate warming and disease, as well as to economic stressors like recession and market disruptions like COVID-19 (R. S Steneck et al. 2011; Henry and Johnson 2015).

Cox and colleagues (2019) found a very similar set of circumstances in the coerced rice farming regime in the Dominican Republic: a highly productive system that is cultivated for its uniformity and that, as such, requires extensive capitalization and external inputs. What this case adds to the present discussion is the role of path dependence in the emergence of coerced regimes, in that local people become progressively locked into specific actions that reinforce the regime. In the case of the Dominican Republic, this has included a pipeline of farmer debt, negative impacts of rice farming practices on the surrounding ecosystems, and the build-up of finance, subsidies, and technical governmental assistance around rice production to the exclusion of other agricultural possibilities.

Discussion

While relatively straightforward in its construction, this framework can be applied to explore food systems at any number of organizational levels, from the resource strategies and portfolios of individual households, farmers, or fishers, to community- and regional-level patterns of resource use and coordination. At question in any such exploration is the disposition of the system towards change: whether people seek to conserve change, by working with natural cycles of variability and by adopting strategies that are flexible, responsive, and that promote diversity, or if they seek to fight change in favor of the stability of one or a few valued resources at the expense of other aspects of the living system.

Critical here is the recognition that it is not the specific technologies or practices, per se, that make a food system regenerative. While some technologies, like herbicides and pesticides are arguably predisposed towards achieving stability and uniformity, many food production practices could theoretically be encountered in any of the four regimes. Grazing and shifting cultivation, for example, have been a part of both degenerative and regenerative regimes, and the contrasts between these are instructive for understanding the conservation of change principle. In both cases, their outcomes depend on people’s flexibility and responsiveness to environmental change, and whether people are taking steps to isolate or integrate their food production practices with the surrounding landscape and cycles of change therein (Savory 1988; Padoch and Pinedo-Vasquez 2010). Shifting cultivation was not only regenerative but enriching to the Amazon biome when people practiced it in a way that was fully integrated into all stages of the forest’s successional system. The same is true for the Burren winterage, in which grazing is enhancing a long-degraded landscape because the system is organized to attend not only to the needs of people and the cattle, but the seasonal needs of the landscape.

Differentiating among regenerative and coerced systems can be particularly challenging because the latter generally emerges from the former, and can be maintained as sustainable, at least for a time. To identify whether a system is moving from regenerative to coerced regimes requires attention to historical trajectories of development as well as to some of the hallmarks of coerced systems explored above, including declines in ecological health and biodiversity, and evidence of emerging path dependence, such as debt pipelines, industry consolidation, and build-up of subsidies around individual, high-value resources. The similarities among regenerative and early-stage coerced regimes is particularly noteworthy because it could be exploited by firms seeking to capitalize on consumer interest in regenerative practices despite perpetuating a system that is, in fact, extractive and harmful.

The disposition of feedbacks and power are two additional ways that the four regimes can be differentiated. Feedbacks describe the quality of information moving to and from social and ecological components of the system (Sundkvist et al. 2005). Examples of feedbacks include a hunter or fisher seeing direct evidence of population decline, or a consumer’s use of labeling and traceability to ensure coffee farmers receive a fair wage and conduct responsible farming practices. Power, likewise, refers to whether people are free to respond and adapt to environmental feedbacks as they see fit. People may not have the ability to choose alternatives in response to feedbacks, for example because of rigid markets, overly complex supply chains, oppressive political regimes, exclusionary pricing, or systems of command-and-control governance that are less sensitive to local environmental and social circumstances (Lang 2003; Clapp and Fuchs 2009).

In regenerative systems people rely on tight feedbacks, and they need the power to observe, experiment, and adjust their actions in response to indicators of environmental change. Indigenous food systems, for example, which often involve complex seasonal calendars of practices and a large portfolio of alternatives, rely heavily on ecological knowledge and sustained environmental observation (Berkes 2008). In impoverished regimes, feedbacks may exist, but people may not have access or the power to choose alternatives, whether because environmental degradation has eliminated alternatives or because the alternatives that do exist are economically or politically reserved for elites. In degenerative systems, feedbacks are either hidden, ignored, or misunderstood; historical examples of overfishing, for example, was in part a result of a cultural assumption that fish stocks would be infinitely replenished. In coerced systems, cultural values and availability of cheap subsidies can lead harvesters to ignore feedbacks that signal increased vulnerability of the system at large, while the progressive consolidation of control and wealth also restricts producers from exploring alternatives and limits consumers’ ability to influence decisions regarding how their food is produced.

A final way that the four regimes differ is the role of resilience. In regenerative systems, there is an ongoing give and take of resilience, in that at times, people draw resilience from ecosystems, while at others they impart resilience to ecosystems through their willingness to be flexible and promote diversity (Fig. 3). In degenerative systems, by comparison, wealth is extracted until ecosystems can give no more and people move on to whatever will provide a viable substitute. Ecosystems in degenerative regimes continue to provide resilience for social systems, but as entropy increases, the resilience and regenerative potential of the system is eroded and diversity declines. Coerced systems have a similar pattern, except that human actions are designed to impose structure by way of ecosystem simplification and the introduction of subsidies to enhance production of the desired resource. Finally, impoverished systems are highly resilient for their lack of natural and social capital, which creates a reinforcing pattern that keeps entropy high, and hence, regenerative potential low.

[Chart omitted]

Pathways to regenerative systems

Understanding how degenerative, coerced, and impoverished regimes come to be, and what keeps them stable despite their diminished entropic capacity, is key to identifying pathways to achieving regenerative food futures (Table 1). There is likely no uniform progression of food systems through the four regimes, though transitions away from regenerative systems is arguably the most common trajectory seen in the last century, driven by a mix of colonialism, modernist ideology, and the rapid deployment of technologies in service of neoliberal capitalism and the Global North (Hickel et al. 2021; Loring and Sanyal 2021). Exploring such a transition in the Netherlands, Geels (2009) shows how a dramatic transition from diverse, mixed farming systems to industrial hog farming resulted not simply as a result of technological innovation or farmers making rational decisions, but from a complicated interplay of social narratives of progress, government policies and land rationalization, technological developments, and the rise and influence of supermarkets, to name some of the major factors. Similarly, Clapp (2021) shows that a mix of technology, market, corporate, and state regulatory forces, together with coordinated exclusion of alternative pathways, were responsible for the widespread global transition to chemical herbicide-centric cropping practices. Examples are also numerous where degenerative colonial regimes of resource extraction have collapsed, leaving behind impoverished systems in which local people are locked into precarious dependence on sparse local resources and external aid (Sen 1983; Nayak et al. 2014).

[Table omitted]

There are also some examples where improvements in science and technology, coupled with sufficient social and economic incentives, have enable transitions away from degenerative regimes. Fisheries are a ready example; improvements in fisheries science and monitoring, together with privatization in the forms of quotas, growing demand for sustainable practices, and proliferation of certification schemes, have been extremely effective at slowing the “fishing down the foodweb” pattern and enhancing and stabilizing individual, high-value fish stocks (Hilborn et al. 2020). However, continued oceanwide declines in marine biodiversity and biomass suggest that, while sustainable, at least some of these fisheries may be more accurately described as coerced rather than regenerative (Palomares et al. 2020; Pimiento et al. 2020). The widespread societal pattern of disenfranchisement and injustice that has accompanied these socio-technical transitions in sustainable fisheries further substantiates this assessment (Pinkerton and Davis 2015; Bennett et al. 2021).

Moving into a regenerative regime represents likely the most difficult pathway for transformation. Sociotechnical regimes like food systems are generally conservative in nature (Lawhon and Murphy 2012), which means that there are internal stabilizing processes and features that keep these regimes functioning despite their numerous problems: subsidies, the ability to export and mask environmental damage, and the power to coerce and constrain people from seeking alternatives are three examples. Initiatives for systemic change need to confront these stabilizing system dynamics at least as much as they address practices that work directly against the conservation of change principle. This means attending to the history of how these systems have developed and the imbalances and injustices that have emerged as a result. Likewise, this means that technological innovations, on their own, are unlikely to be sufficient to spur regime change unless they disrupt existing distributions of power.

Because strong institutions and path dependence often feature into existing food production regimes, new forms of collective action and disruptive innovation are necessary to move global food systems towards regenerative alternatives. Alternative food movements exist in the shadow of the dominant regime, which means they are necessarily at a structural disadvantage (Lawhon and Murphy 2012; Hoey and Sponseller 2018). As such, emerging food systems innovations can benefit from systemic disruptions to the status quo before they find the necessary niche space to thrive. For example, alternative food movements such as community supported agriculture and fisheries thrived during the first 18 months of the COVID-19 pandemic, while global food supply chains faltered (Stoll et al. 2021; Thilmany et al. 2021). Extra support for these innovations, by way of social finance, exemptions from restrictive policies and regulations, and access to platforms and opportunities for collaboration, can also be critical to increasing niche space and facilitating planned transitions to regenerative food systems (Salatin 2007; Stephens and Clapp 2020).

Strategies to achieving regenerative food systems must also be restorative and retributive in nature—not merely a swapping out of new practices for old—but designed to address and compensate for past social and ecological harms while also devoting sufficient resources to restore local biodiversity and social capital (Lam and Pitcher 2012; Ikerd 2021). If people are locked into impoverished systems, for example, immediate aid and relief is necessary to enable people to take pressure off depleted resources. But, this aid must be coupled with active ecological restoration and sufficient social and political reform to ensure that people are empowered to rebuild and develop adaptive strategies based on local ecological knowledge and tight social-ecological feedbacks (Sundkvist et al. 2005; Cao et al. 2009).

Conclusion

We face critical environmental, climatic, and societal challenges related to our food systems. Debates over how best to define, implement, and scale out solutions are important, but rigid policing of concepts like regenerative agriculture can be counter to the pluralism that is truly necessary for developing food systems that work for local people, places, and cultures. Here, I offer a framework that establishes clear and meaningful patterns in how food systems are organized and how these patterns relate to ecological, and to a lesser extent societal, outcomes. This framework, and the conservation of change principle upon which it rests, are a novel application of principles drawn from thermodynamics and grounded in numerous real-world examples that can be used to understand existing food systems challenges and plan for future food systems transitions. The framework is generally agnostic regarding the specifics of the practices and technologies being implemented, which leaves space for pluralism in how people relate to the land, sea, and their neighbours through food.

Conserving change, as a principle for achieving food systems that are sustainable, equitable, and just, is thus not just a technological challenge but a cultural reorientation in which we adapt our livelihoods and reorient our perception of value to fully acknowledge the generative contributions of the natural world to our lives. Many Indigenous and peasant communities already understand, embody, and practice this perspective, and I believe that the widespread and growing interest in radically changed food systems indicates that this reorientation is underway in the grassroots of food systems around the world.

Next steps in research on regenerative food systems could further test the conservation of change framework through empirical studies and meta-analysis or systematic reviews. There may well be important caveats or counterfactuals to be discovered that can help to further develop guidance for organizing food systems to achieve regenerative outcomes. This is certainly true for issues of power and equity; it may not be the case that all regenerative systems will necessarily support outcomes such as social and environmental justice, though my working hypothesis is that they will. Still, the framework offered here is clearly situated in the human ecology of food systems, so while it does begin to capture issues such as power, marginalization, and capacity, more research and theorization are called for to explore the political ecology of these regimes and the possible pathways and necessary conditions for achieving systems that are not only regenerative but equitable and just as well.

## 2AC

### Case---2AC

#### Future-making and legal strategies for incremental reform grounded in the right to exist do NOT reinvest in settlerism---rather, it’s an act of imagining plural futures for the making against settler threats to the present

Joseph Weiss 18, Assistant Professor of Anthropology, has been conducting fieldwork with the Haida community of Old Massett since 2010, explores the intersections between time, ecology, and Indigenous sovereignty and self-determination, “Conclusion: Unsettling Futures,” Shaping the Future on Haida Gwaii: Life beyond Settler Colonialism, UBC Press, 2018, pp. 246–258

For its opponents on Haida Gwaii, Enbridge presages a rather different future, one in which the unpredictable waters of the Hecate Strait all but guarantee a tanker spill. Such a spill would devastate the waters and lands of the islands and the neighbouring coastline of British Columbia, destroying the fish and poisoning the plants that currently draw on ocean waters and the animals that feed thereon. Neither eagles nor ravens could survive, living as they do on a diet that consists primarily of marine life. All this would all but guarantee the disappearance of Eagles and Ravens, the Haida people whose lifeways are so fundamentally tied to the islands of Haida Gwaii. Haida Gwaii could no longer be home. A song recorded in protest again Enbridge by Aboriginal artist Kinnie Starr and animated as a music video by Haidawood,3 a team of Haida and non-Haida stopmotion artists and animators, makes this threat explicit, asking in its opening lines: “Who will save our waters, save them for our great granddaughters, save them for our great grand-daughter’s sons, ... save them before all is dead and done?”4

This nightmare future, this future that is no future, is one that looms large over the whole of this book. It is familiar because it is a reiteration of the horror of ecological cataclysm that the CHN formed itself in opposition to, that the hippies risk metonymically bringing about by taking from the lands and waters without respect. But it is also familiar because, in a broader sense, it is the future that settler colonialism attempted to give to Native peoples – indeed, rendered as their already given destiny. This is the future of Indigenous erasure, of ultimate disappearance, of a closed temporality that can only end in “all dead and done.” However, Haida people take the future of “no future” neither as inevitable nor as already determined; rather, the work of future-making acts to ward off the nightmare future of Haida erasure, putting in its place multiple possible futures in which Haida people continue. Take the blue signs on the lawns of the Masset(t)s, Old and New, implicitly answering Kinnie Starr’s question with the bold declaration that the islands (will) stand “UNITED” against Enbridge. But the social significance of these futures is never encompassed solely by the ways in which they respond to the threat of nightmare futures. As we have seen, the production of a future of Haida and non-Haida unity is considerably more complicated than a declaration of shared solidarity, speaking, as it does, to a particular history of Haida and settler relations and fantasy schemas, and productive ways in which non-Haida can be integrated into Haida systems of sociality and responsibility. To speak of a future united against Enbridge is thus necessarily to speak of many other things, just as is the case when speaking of a future of Haida return, a future of care-full leadership, or a future of traditional authority. Larger social worlds unfold out of the constitution of particular futures.

This is why, more than anything, I want to make clear that the significance of Haida future-making does not lie simply in the specific ways in which individual futures respond to the particular dilemmas of the settler colonial present; rather, what is most crucial about future-making as a way of thinking out from within the temporal brackets of settler colonialism’s deferred erasure is the fact of futuremaking itself. What matters most is the capacity to say, as Haida rapper Ja$e ElNino does in a guest appearance in Starr’s song, “Now expect the best from the northwest / What’s next? Just guess.” ElNino asserts the openness of the future, challenging his listeners to attempt to predict the field of possibilities still to come. At the same time, ElNino clearly locates the space out of which this field of possibilities emerges – “expect the best from the northwest,” he raps, specifying the capacity to produce “what’s next” as belonging to the “northwest,” to the coast’s First Nations and perhaps also to their non-Indigenous allies, united against Enbridge. In so doing, ElNino rejects the overdetermination of his lands and his people, suggesting that they themselves have the capacity to build their own futures that, by virtue of their very existence, challenge settler projects of destruction, environmental and otherwise.

This is the space of possibility that I sketch out in Shaping the Future on Haida Gwaii. Now I want to highlight its significance for our understandings of Indigenous political life under settler colonialism and within the field of political anthropology more generally. Thinking and working with the future in the ways that Haida people do can be understood as its own potent assertion of sovereign self-determination, even though it is not restricted to any one particular legal or political claim. Rather, Haida forms of future-making track between the formal realms of law and politics and a host of other concerns, constraints, aspirations, and projects in everyday Haida life. The constitution of an autonomous Haida government that promises to protect the islands from settler incursion for the sake of future generations co-exists with the hope that those future generations will also find success in the settler world. Love for Haida Gwaii and the desire for it to endure ecologically can be understood equally as the ground for proper Haida care-full politics, the opportunity for non-Haida to learn to engage respectfully with Haida on significant environmental issues, and the object of problematic hippie fantasies. The fact that such moments can be encompassed within a relatively coherent Haida lived world and can be imagined as part of Haida futures suggests that Haida are actively retaking – and to an extent have already retaken – control of their continuing existence outside the temporal foreclosures of the project of settler colonialism.

We might ask, however, to what extent this reassertion of the rights to continuing existence is of largely symbolic significance in the context of the seeming fixity of colonial nation-states and the domination of Native (and non-Native) lives by the demands of settler capitalism. To what extent can Haida people determine their futures if those futures are always calibrated according to the demands and expectations of settler society, economically and otherwise? What does future-making truly accomplish, especially when it is as much aspirational as it is something that has the capacity to be actualized? I argue that Haida future-making unsettles. It does not overthrow colonial domination, nor does it carve out an autonomous Indigenous space within Canada; rather, it proceeds through interdependencies and adoptions, ambivalences and anxieties, situating Haida people as necessarily in relation to and in relations with non-Haida. But this is also its potential power. Just as the forms of Haida time work to gradually realign temporal sensibilities on Haida Gwaii even as they appear to be bounded within the constraints of settler time-discipline, Haida future-making carries the potential for the strategic reiteration of the settler colonial present, shifting its realities even as it reinscribes them.

Sovereignty

Haida future-making takes place in the midst of a struggle over sovereignty. And this not just in the sense of the Council of the Haida Nation’s ongoing assertion of its sovereign right to govern the lands and waters of Haida Gwaii on behalf of all Haida people. Rather, as Joanne Barker argues, over the course of the latter half of the twentieth century sovereignty has emerged as a “particularly valued term within Indigenous scholarship and social movements and through the media of cultural production. It [is] a term around which analyses of Indigenous histories and cultures were organized and whereby Indigenous activists articulate their agendas for social change” (Barker 2005b, 18). Through the assertion of sovereignty, Indigenous political leaders, activists, and scholars refute “the dominant notion that Indigenous people [are] merely one among many ‘minority groups’ under the administration of state social service and welfare programs”; instead, “sovereignty defines Indigenous people with concrete rights to self-government, territorial integrity, and cultural autonomy under international law” (Barker 2005b, 18). The trouble is, of course, that Indigenous claims to sovereignty are always made within the context of colonial nationstates, whose own legitimacy is put at risk both by the prospect of self-determining Indigenous Nations (re-)emerging within their boundaries and by the troubling of their own historical narratives of sovereign rights (Comaroff and Comaroff 2003). One of these narratives reinterprets Indigenous lands as terra nullius and thus open to occupation. Thus, while sovereignty might indeed “define” Indigenous peoples with concrete rights to territorial title and selfdetermination, in theory equal under international law to the states who also lay claim to their territories, that definition does not in and of itself make possible the practice of this sovereignty. In this regard, settler states such as Canada have shifted in their response to First Peoples’ sovereignty claims from outright rejection to selective recognition, but even the latter still positions Native nations as being subject to the authority and oversight (if not the structural forms) of the state.

This means that Indigenous governments such as the CHN are in a precarious position, attempting to constitute their own sovereign authority without access to many of the conventional means of sovereignty in Western political thought – for example, the monopoly on legitimate violence (Weber 1946), decisive authority to make and enact law (Schmitt 2005), and/or exclusive territorial control (Brown 2010; Hobbes 1994). Alongside this precarity is the equally anxious question of whether or not sovereignty is even an appropriate analytic around which to centre Indigenous rights precisely because it is historically a Western concept, one that has been drawn on to dispossess Indigenous peoples over the course of settler colonial history (Barker 2005b, 18–19). Indeed, the very next essay in Barker’s edited volume, by Taiaiake Alfred, categorically rejects sovereignty, calling it an inappropriate tool for Indigenous political assertions not only for these reasons but also because it draws attention away from developing and furthering “genuinely” Aboriginal political modes of thought (Alfred 2005; see also Alfred 2009).

The fact that sovereignty remains such a preeminent concept in the struggle for Indigenous rights even though it is both epistemologically problematic and politically constrained has meant that there has been a recent push in both anthropology and Indigenous studies to “widen” the definition of sovereignty so that it might encompass multiple forms of Indigenous social, political, and legal practice outside of the conventional purview of “sovereign power” (e.g., Cattelino 2008; Richland 2011; Simpson 2000, 2014). Or, as Joanne Barker puts it:

There is no fixed meaning for what sovereignty is – what it means by definition, what it implies in public debate, or how it has been conceptualized in international, national, or Indigenous law. Sovereignty – and its related histories, perspectives, and identities – is embedded within the specific social relations in which it is invoked and given meaning. How and when it emerges and functions are determined by the “located” political agendas and cultural perspectives of those who rearticulate it into public debate or political document to do a specific work of opposition, invitation, or accommodation. It is no more possible to stabilize what sovereignty means and how it matters to those who invoke it than it is to forget the historical and cultural embeddedness of Indigenous peoples’ multiple and contradictory political perspectives and agendas for empowerment, decolonization, and social justice. (Barker 2005b, 21, emphasis in original)

The opening up of sovereignty as flexible, multiple, and subject to all manner of diverse rearticulations carries particular weight since, as a historical concept in Western political theory, sovereignty is overwhelmingly concerned with closure. As Wendy Brown argues in her Walled States, Waning Sovereignty, the classic vision of sovereign power rests in the capacity to divide the inside from the outside, to make borders around a people – a “nation” – and separate that people from those outside it. Thus Schmitt’s “friendenemy” distinction, for instance, or even John Locke’s consistent preoccupation with fences as a way of marking the existence of territory (Brown 2010; Schmitt 1996; Locke 1988). The historical conditions of Indigenous sovereignty claims in the context of settler colonialism make such absolute closures impossible for Indigenous peoples.

We might add, though, that the persistent presence of these claims also challenges the closure of the settler nation-state. Indeed, this is part of Brown’s point. The fact that we see ever more spectacular performances of sovereign power on the part of contemporary nation-states – for example, the titular “walls” that are being constructed along the borders of an increasing number of states – is a sign of the insecurity of their political authority (Brown 2010).5 The conditions of settler colonial sovereignty, in other words, may be rather more “open,” and thus closer to those of Indigenous “nation-within-nations,” than they may at first appear. If this means, in turn, that the future for settler political life is becoming as uncertain as the future for Indigenous life has been since the advent of settlement, then this means what we have already begun to see: the dilemmas facing the Haida people in their future-making practices are also the dilemmas facing settler society. Take, for example, how the absence of any “one” definitive governing entity compels the constitution of an aspirational framework of accountability that could, were it realized, render Haida relations navigable to the many governments that claim Haida loyalty. Such dilemmas are not restricted to the Haida sociopolitical world; rather, they may be endemic to contemporary democratic societies and the multiple forms of governance (licit and otherwise) that emerge therein.

In suggesting that there are Haida ways of refiguring a shared Haida-settler set of contemporary problematics, we might think of Haida future-making both as an instantiation of the multiple, flexible, and always contingently located practices of sovereignty to which Barker points and as a different way of thinking about Indigenous political potentiality. In the former sense, Haida future-making is without doubt concerned with carving out spaces in which Haida existence can continue, expand, and change without losing the capacity to reproduce itself as Haida existence – thus the processes of homecoming or the explicitly political attempts to establish control over the islands for future generations. If the absence of Indigenous sovereignty is the absence of the capacity of an Indigenous people to (self)-determine their own futures, then the constitution of Haida futures can be seen as sovereign work, whether in the overt sense of the CHN’s assertions or in the somewhat more implicit mode of Alice Stevens’s proposed mass adoptions. Significant here, though, is the fact that these acts of future-making carry meanings beyond their status as responses to the social and political dilemmas of contemporary Haida life. Thus Alice Stevens’s adoption project seeks to bring hippie children into the framework of Haida kinship relations, not only neutralizing their potential threat but also constituting a complex new network of social relations between Haida and non-Haida whose potential significance goes well beyond the protection of Haida territory and resources. Thus the CHN emerges as a state-like governing entity through its authorizing promise to take care of the islands, but in so doing it takes on a series of new roles in Haida political life whose full consequences remain to be seen. If it is a sovereign action to envision an opening of possible futures for Haida people, then this very openness might also exceed the boundaries of sovereignty as a problematic for Indigenous people even as it responds to them.

Which is also, perhaps, why Haida futures seem so consistently to sketch out social, ecological, and political fields that encompass non-Haida – more, that are futures for Canada as well as for the Haida people living within the nation-state’s borders. What would it mean to figure an Indigenous sovereignty that speaks beyond itself, one that promises to invert the order of settler domination through reconfiguring the shared futures of Indigenous and settler peoples? This would not be a sovereignty premised on territorial closure or even absolute political autonomy. It would, however, decisively overturn any settler colonial anticipations of the inevitable erasure of Native peoples. Quite the opposite, it would position Indigenous practices of anticipation, aspiration, certainty, and anxiety at the forefront of contemporary modes of political imagination. Rather than perceiving Indigenous peoples to be running out of time, we might all be understood – or at least imagined – to be running on Haida time.

Whether or not we accept the possibility that Haida future-making opens up the boundaries of sovereign possibility for Indigenous people, what is not contestable is that Haida people continue. They continue traditional practices and lifeways in sometimes transformed, sometimes continuous ways. They continue asserting their capacity to engage with settler Canadian society. And, more than anything, they continue to assert their right to envision, imagine, expect, contest, and constitute their futures. This is not always as explicit as the CHN’s authoritative attempts to safeguard the islands or even as Alice Stevens’s adoptions. More often than not, Haida people produce their futures simply by not even considering the possibility that this is not something they can, should, and have a right to do. They treat their right to continue temporally, socially, and otherwise as if it were already given and so work to reconfigure the present to make it so.

Beyond the Settler Colonial Moment

That the Haida people believe in their right to determine their futures does not mean that they believe that they have any exclusive power to do so in precisely their own terms. To paraphrase Marx, Haida people make their own futures, but they do not make them as they please.6 As has been noted, the flow of Haida departures and returns unfolds within the broader context of the settler, capitalist state; indeed, these departures and returns are made necessary by the current absence of economic opportunity on island, just as the arrival of potentially threatening strangers is a result of their privileged position in the very capitalist economy they seek to escape. Constituting futures in which Haida people have the freedom to engage with that economy (and settler society more generally) as they see fit while retaining the capacity to come home reiterates the inescapability of some form of engagement with the mainstream settler economy. Likewise, the notion of Haida Gwaii as Haida homeland cannot be separated from current Haida struggles to assert their rights to the lands and waters of Haida Gwaii, the resources found therein, and the sovereign capacity of Haida people to govern themselves and the islands in the ways they find appropriate. This is, recall, the very crux of the CHN’s commitment to the assurance of futurity, as it is only by positioning itself as the rightful, sovereign government of the Haida Nation and its homeland of Haida Gwaii that it can adequately care for the islands and protect them from external threat. And the continued advance of the Enbridge project, despite fierce opposition from the CHN, the Old Massett Village Council, their Haida constituents, and the non-Haida actors with whom they are “united against Enbridge” gave the nightmare futures of environmental collapse a frightening immanence. The assertion of the openness of the future is made, in short, in and against a context in which closures remain endemic.

But note what has changed in the nature of these closures since the forecasts of Indigenous disappearance with which Shaping the Future on Haida Gwaii begins. In the narratives of colonial actors like Duncan Campbell Scott, it was absolutely clear that “Indians” were disappearing because their social worlds were being superseded by more “civilized” ways of living and being, ways that Native peoples would inevitably adopt; if they did not, they would perish outright. There was a future: it was simply a settler one. But the nightmare futures that Haida work to ward off in their own future-making reach beyond Haida life alone. Environmental collapse, most dramatically, threatens the sustainability of all life; toxins in the land and the waters put human lives at risk regardless of their Indigeneity, race, or gender (e.g., Choy 2011; Crate 2011). Put another way, the impetus for non-Haida to be “united against Enbridge” with their Indigenous neighbours is due to the fact that an oil spill would profoundly threaten the lives and livelihoods of non-Aboriginal coastal residents. Nor is the anxiety that young people might abandon their small town to pursue economic and educational advantages in an urban context limited to reserve communities: the demands of capitalist economic life compel such migrations throughout the globe. The nightmare futures against which Haida people constitute alternatives are not just futures that threaten the erasure of Indigenous peoples under settler colonialism: they are also futures that threaten the erasure of settler society itself.

The work of Haida future-making, then, is not restricted to the borders of reserves like Old Massett or Skidegate, porous as they may already be; instead, in Haida future-making we find the implicit assertion that Haida people can make futures that address the dilemmas of Haida and settler life alike – futures that can at least “navigate,” to borrow Appadurai’s phrasing, towards possible futures that do not end in absolute erasure. If Povinelli and Byrd are correct and settler liberal governance makes itself possible and legitimate through a perpetual deferral of the problems of the present, then part of the power of Haida future-making is to expose the threatening non-futures that might emerge out of this bracketed present. This work reveals as a lie the liberal promise of a good life always yet to come and attempts, instead, to constitute workable, livable alternatives. In so doing, Haida futures challenge the possibility that there could be any single, coherent settler future. The imaginary of “replacement” that grounds the settler colonial project is revealed as an aporia, an empty anticipation that at best only masks the complex and shifting landscape of Indigenous-settler relationships that characterize contemporary settler states like Canada. There is no one liberal good life waiting on the horizon, and there is no horizon in the settler state that can be imagined without the presence of Haida and other Indigenous peoples.

This, I would submit, is the unsettling dimension of Haida futuremaking, its capacity to reveal that, as Derrida might say, settler colonial time has always been “out of joint” with itself (Derrida 1994).7 And it gains this unsettling capacity precisely because Haida future-making as we have seen it does not (and perhaps cannot) escape from the larger field of settler-colonial determination. Existing as a nation within a nation, envisioning ways of being Canadian that do not conflict with the essential practices, values, and traditions of Haida history, Haida future-making is at the same time Canadian future-making. Incorporated within the Canadian settler state, Haida people now have no choice but to make futures for it, even as they do so in terms of their own particular perspectives and histories. Perhaps what remains is for the rest of Canada to catch up. After all, when Ja$e ElNino suggests that the members of his audience can only guess at what’s next, he might be implying that they lack the conceptual resources to truly make their own futures, something that is most definitely not the case for Haida people. “Expect the best from the northwest,” he sings.

Or so we hope. So much of future-making is ideational. It emerges in discourse as people talk about how things are and how they should be, as they assert what will certainly happen in defiance of other possibilities, make claims and offer criticisms, make plans and voice hopes. What will come to pass from it all is rarely terribly clear. We are not sure, for instance, whether other projects like the Enbridge Northern Gateway Project will emerge, even though that project has been rejected, at least for now, by the federal government. But this does not mean that future-making does not accomplish social work. Thinking about the future enables Haida people to address dilemmas of the present, to suggest solutions to issues that seem intractable in the moment. These are not just the problems of Indigenous people; rather, we have seen that many rural communities face challenges of mobility and migration, that questions of political accountability resonate across (neo)liberal democracies, and that environmental struggles seek to protect the planet itself. As part of Haida lived worlds, these futures ground various political and social strategies that address contemporary concerns on Haida Gwaii. So, too, they sketch out different relationships between Haida and non-Haida, sometimes totally new, more often simply shifted towards the more respectful, the more care-full, the more equitable. And regardless of what emerges from any of these particular futures, for good or for ill, they represent, in the strongest possible terms, the assertion that Haida life has not been foreclosed in contemporary Canada; rather, Haida people continue, and they continue to imagine, anticipate, predict, work towards, and aspire to their futures. Not just about to be erased, not always about to disappear. Ongoing.

#### Psychoanalysis does not justify the immutability of settler colonial ontologies.

Alex Trimble **Young &** Lorenzo **Veracini 17**. Alex Trimble Young is an honors faculty fellow in the Barrett Honors College at Arizona State University. He serves on the editorial collective of the interdisciplinary journal Settler Colonial Studies. Lorenzo Veracini is at the Swinburne University of Technology in Melbourne, Australia. His research focuses on the comparative history of colonial systems. He has authored Israel and Settler Society (2006), Settler Colonialism: A Theoretical Overview (2010), and The Settler Colonial Present (2015). Lorenzo is coeditor of The Routledge Handbook of the History of Settler Colonialism (2016) and editor in chief of Settler Colonial Studies. 2017. “‘If I Am Native to Anything’: Settler Colonial Studies and Western American Literature.” Western American Literature, vol. 52, no. 1, pp. 1–23.

Apprehending this history as what Jodi Byrd has called the “transit” over which the international “postwestern” cityscape of Las Vegas is realized leads us into a reading of a very different type of frontier than the one memorialized on Fremont Street (Transit xv). Read this way, as a site of Indigenous dispossession, the West cannot be seen as a dynamic site of pure possibility, as Gilles Deleuze and Félix Guattari have represented it, as “a rhizomatic West, with its Indians without ancestry, its ever- receding limit, its shifting and displaced frontiers” (19). The repetitive revisitation of frontier tropes recalls what critic Hamish Dalley calls “the frozen temporality of settler- colonial narrative,” which, “fixated on the moment of the frontier, recalls nothing so much as Freud’s description of the ‘repetition compulsion’ attending trauma” (Dalley). The “hyperreal West” in this context emerges as a fantasy (Lewis 194), in the sense that theorist Jacqueline Rose describes in her work on Israel/Palestine. “Never completely losing its grip, fantasy is always heading for the world it only appears to have left behind” (3).5 Of course settler colonialism is but one of the “secret histories of Las Vegas” that underwrite the postmodern wonderland visitors fi nd on Fremont Street and the strip, and but one of many structures of violence that shape life in the contemporary western United States.6 Nonetheless, it remains a structure central to the consideration of “westness.” As the postwestern critics argue, “westness” is neither contained by geography (as the popularity of the Western genre internationally attests), nor necessarily representative of cultural production being produced within the western United States (Kollin x– xi). When we speak of a cultural production as “Western,” we are speaking of a work that addresses the process and consequences of settler conquest, whether we are discussing a California memoir, an Australian novel, or an Italian fi lm.7 This is not to say that Western cultural production is always a result of settler colonial ideology, but rather that it is engaged with questions pertaining to it. Th e problem of the West is, in a crucial sense, the problem of settler colonialism. Imagining postwestern futures thus requires a critical outlook that is more than just inclusive in its politics, transnational in its scope, and poststructuralist in its methodology. Our movement toward the “post” in the conceptual space of the Western must be decolonial in its orientation. Such a critique would abandon unilateral settler attempts at postnational place-making in order to critique settler colonial structures of violence. Such a critique would not work to reify these structures as permanent or inevitable, but rather to probe their contradictions, and to promote the Indigenous intellectual traditions that have long been at work critiquing the settler colonial present in order to shape a decolonial future.8 We hope that this special issue of Western American Literature, which features critical readings of western American film and literature by three scholars from different fields and national backgrounds, can contribute toward this effort.

### Honorable Harvest K---2AC

#### 2---Environmental damage occurs due to contingent and political practices---“being” can’t explain policy choices, AND challenging modern settlerist ontologies can’t unsettle destructive practice.

--“Moderns,” “Us,” etc. is referring to the Western, masculine, heteronormative subject---not like modern vs savage

Clive **Hamilton 17**. Professor of Public Ethics at Charles Sturt University in Canberra. 06/26/2017. Defiant Earth: The Fate of Humans in the Anthropocene. 1 edition, Polity.

The ontological wrong turn For all its “materialism” post-humanism moves in a world of knowledge, or rather knowledges and perspectives. It is a reaction against modernity’s claim that the only legitimate way to understand the world is through a single universal kind of reason, one that emerged from the foundational distinction between the subject who knows and the object that is known. The “ontological turn” goes beyond post-humanism’s defense of different knowledges to defend the truth of a variety of ways of being, a plurality of ontologies. The turn has been lent empirical force from anthropology in the observation that other cultures did not separate and elevate the human in the way the Moderns did. Of course this has been known for a long time. The novel move is to understand these cultures not as alternative ways of seeing the world – perspectives interpreted as anything from primitive to respect-worthy to the only means of saving the Earth – but of different worlds, that is, different ways of being. The most systematic, powerful and scholarly statement of this position is by Philippe Descola in Beyond Nature and Culture, which systematizes ontologies with various combinations of modes of interiority and physicality. He posits four: naturalism (the modern Western way of being), animism (among Amazonian Indians, for example), totemism (Australian Aborigines), and analogism (Chinese geomancy or Europe in the Middle Ages). In this way the Western mode of being is merely one among others, and Descola is not afraid to point to its faults, while maintaining a respectful neutrality toward the other three. In considering the (Western naturalist) opposition between nature and culture, the non-human and the human, Descola asks which unique feature could separate humans from nature. He concedes that children learn early to distinguish between entities endowed with intentionality and those without it, and that intentionality is only one of a range of obvious differences between oneself and natural objects. Yet, he asks, why draw the frontier between human and object at intentionality or language or the ability to make things? Why not draw the frontier at independence of movement, or at life, or even at material solidity? We Moderns would do better to go to pre-modern ontologies to understand the world around us rather than rely on “the tiny quantum by which we distinguish ourselves” from other objects. 31 Well, that tiny quantum was enough to shift the Earth’s geological arc and to do so more or less consciously. It was the place at which Moderns stood to move the Earth, and where the lever they used to do it, modern technology wielded by the force of capital accumulation, was manufactured. And the truth is that preventing the Earth from moving a great deal further from its Holocene homeliness cannot be achieved by standing somewhere else, and certainly not in the Amazon rainforest. Or, more accurately, the place to stand must be a step forward from the modern one rather than a step backwards. Descola observes, quite rightly, that nowadays it is hard to refer to any difference between “Us and Others” without being accused of incipient racism (in the case of the bad guys) or “impenitent nostalgia for the past” (in the case of the well-meaning ones). 32 He defends himself from the latter accusation with the argument of his book – that Western cosmology is only one among several ways of being and those immersed in it cannot use it to judge the others (although he in fact does, in a positive way). How am I to defend myself against the accusation of incipient racism when I underscore the difference between modern Us and pre-modern Others? The immediate response is to remind ourselves that Others did not make the Anthropocene; that was done by Us. The implication is, as I have been arguing throughout, that the Moderns are responsible for immense accomplishments by building a system of astonishing dynamism, transforming the conditions of life in ways at once magnificent and ruinous. A second defense is that, notwithstanding all their merits, pre-modern ontologies cannot help us now. While acknowledging the unheralded sophistication of their cosmologies and deep relationships with the natural world, they could not provide the ontological grounding for the vast technological achievements of modernity nor its world-ruining effects. At the very end of his volume Descola writes that it would be mistaken to think that pre-modern cultures “can bring us a deeper wisdom for the present time than the shaky naturalism of late modernity.” 33 Elsewhere he tells us we should not “cling to” our way of seeing the world when there are better ways “still very much alive.” 34 But not even the inheritors of those other ways believe that. If we accept the validity of the division of the world into various ways of being and corresponding ontologies, it nevertheless remains true that one of those ontologies, Western naturalism, has become utterly dominant and continues to drive the others from the face of the Earth. This “ontocide” may not succeed completely because Indigenous people, while negotiating their existences in the modern world, are finding means of retaining elements of their cosmologies and ways of being, creating modern-traditional hybrids. At the risk of speaking on their behalf, most Indigenous people understand that old worlds cannot be preserved except by rearticulating them in a dialogue with the modern world. Social scientists who call for a return to non-dualistic pre-modern ways of being – Descola even suggests we might find dead ones on library shelves and make them “come to life once more’ 35 – propose a political strategy that Indigenous people themselves typically do not entertain. So ontological anthropology risks freezing Indigenous people in purified ways of being, whereas they are daily negotiating blends and compromises between modern and non-modern ontologies, not least when engaged in practices such as the production of “traditional” artworks. The new ontological divisions of the avantgarde anthropologists are not worlds that Indigenous people themselves feel obliged to occupy. There are bridges to cross from the modern to the nonmodern and back again, and many do it several times a day. It is true that the grounding of certain Indigenous ontologies holds something that ought to be recovered in a new Anthropocene way of being beyond modernity, and that is their cosmological sensibility. It is the very “primitivity” of these cosmo-ontologies that separates them from more “sophisticated” premodern traditions like Christianity, city religions that turned inwards to become preoccupied with the self and its salvation. As the Anthropocene consumes the world, it’s hard to listen to earnest words spoken in prayer halls or meditation rooms about how to know God or to achieve emptiness without being struck by the thought that the inwardness of all such journeys of the self serves as a distraction from what is happening outside the window, and that the absence of separation of the traditional Indigenous self from its natural world may hold a powerful message for how to live in the Anthropocene. Nevertheless, it is not patronizing to say that Indigenous people do not have the solutions to the Anthropocene. The Anthropocene is as much a shock to them as it is to everyone else. To turn to them for answers shoulders them with an impossible burden. We made the mess and “going native” ontologically is no answer. Looking upon Indigenous cultures with awe and regarding them as having magical potency is to fetishize them, a tendency now taken so far by some as to attribute to them the power to fix the climate and reverse the geological destabilization of the planet. There is no need to reject the historical truth of modernity and go looking among pre-modern ontologies for an alternative. The only way forward is to begin from where we are, in modernity, and from there work toward a “beyond-modernity” way of being, a fifth ontology to add to Descola’s four. Even if we set all this aside there is a much more compelling reason why it is futile to look to Indigenous ontologies for an answer to the Anthropocene. The vast majority of non-Western people live not in the Amazon rainforests, the Arctic Circle, or the central deserts of Australia; they live in the sprawling cities of China, Nigeria, Brazil, and Indonesia. For the most part, they are quite willing to leave behind the remnants of non-naturalist ontologies – which typically they see anyway as the preserve of primitive tribes within their own territories – and seek to adopt Western ways as quickly as they can. The largest populations of Asia, Latin America, and Africa are attempting, many with extraordinary success, to emulate the growth mania, technological practices, consumer lifestyles, and personal identity formation of the Euro-American way of being. Introducing Beyond Nature and Culture, Marshall Sahlins writes that Descola’s claim is that “other people’s worlds do not revolve around ours.” But the hard truth is that in practice they do and, like ours, their worlds are being sucked into the whirlwind of the Anthropocene. The new great power, China, strives to ensure its best and brightest are steeped in modernity’s subject–object ontology by sending them to be shaped by the universities of the North, the cathedral schools of naturalism. If Europe made the transition from the analogism of astrology and alchemy to the naturalism of science across the seventeenth and eighteenth centuries, China has done it in 30 years of industrial growth, albeit on cultural grounds thoroughly tilled, fertilized, and cultivated over the previous four decades by that other great agent of Western naturalism – Marxism. It’s too late to exhume the corpse of Confucius. Neither comparative ontology nor science studies provides a firm basis for social analysis. The preoccupation with objectivity and the “subject–object split” has never extended to the other domains of modernization – business, technology, the state, politics, law, and colonial conquest. Modernity, in the words of Lucas Bessire and David Bond, “has never been organized around any single binary.” 36 A mistaken understanding of nature by scientists in their labs was no guide to the messy historical world outside that gave rise to the actual practices of modernity. And against the excessive power attributed to the modern philosophy of culture versus nature, Bessire and Bond remind us that climate change is not due to modernity but to the burning of fossil fuels, and we are better off going to actual history and recent politics to find a way to counter it. One interrogates the nature–culture split in vain for an explanation of why France decided to generate its electricity from zero-emissions nuclear power while Britain took the coal option. It is a stretch of logic to go from modern science’s claim to objectivity to the chauvinism of the anthropologist studying “the savage mind” of the non-Westerner. Those immersed in Western naturalist ontology were not alone in viewing the Other through eyes of racial superiority, as every black person or Korean arriving in nineteenth-century Japan discovered. Cultural chauvinism knows no ontological boundaries. The step from the Moderns seen through science studies to the modernization worldview of the anthropologist – let alone the colonial conqueror – is in fact a large leap. “The Modern” risks becoming a portmanteau into which is stuffed every attitude, practice, and ideology that might be called “Western,” one that can be opened up for an answer to any question. Ostensibly, ontological pluralism has emerged to release us from “the crushing division between Object and Subject.” 37 Such a pluralism means we no longer judge other ways of seeing the world through Western eyes, scorning them as superstitious or backward cultures while basking in the light of modernity. But isn’t there a third option, other than dismissing pre-modern ontologies as superstition or giving them equal or higher ontological status? It is one that maintains a respectful distance, standing aside and saying “we cannot know, and will not judge,” and then acknowledges that Western naturalism emerged supreme, even if it did so merely as the philosophical enabler of European military-technological power and colonial conquest. Recovering the cosmological sense? When Indigenous people found white invaders on their shores they did not see the occasion as a meaningless accident that “just happened”; they went looking in their cosmologies for an understanding of where the episode fits in their world. Are these white visitors old spirits returning? The sense of grand events embedded in an unfolding order rather than arriving accidentally is characteristic of non-modern cosmologies, and of course to religious traditions in the West. Yet, like humanists, post-humanists understand world history as a series of accidents. A world history purged of all inner meaning is the ontological heart of modern cosmology, one captured in the shift in the meaning of the word – from a life-governing set of beliefs about the creation of the world, its meaning, and the place of the tribe within it, to that of theories of the origins and physical structure of the universe. So a view of modernity as a meaningful unfolding within a larger world or cosmic order is more deeply non-modern than the ontological pluralists’ view that it was a historical misfortune to be rectified by going to the ontologies of the non-Moderns to learn how we might merge nature and culture once again or recognize that they never really split. Yet I’m suggesting that, for those who sense some larger meaning in the Anthropocene’s arrival and what it may be telling us about the role of humans on Earth, there is no going back to pre- modern ontologies for an understanding; we must look ahead to the evolution of modernity itself, driven by its own endogenous forces and contradictions within a larger order. Recasting agency is at the center of this rethinking. For post-humanists, the human claim to exclusive agency is an illusion. If we are so deeply embedded in networks that the division between humans and non-humans is dissolved and our agency is barely distinguishable from that of an ant or a robot, then intentionality and freedom become mirages. They are suspicious of all categories of early modern philosophy used to define humans as unique creatures – freedom, consciousness, will, Reason. Yet turbo-charged agency was the essence of modernity, combining freedom from oppression with power over nature, using science and technology and the institutions that mobilized them. Yes, post-humanism has taught us to blur the hard-and-fast division between subject and object by accepting our inescapable physical entanglements. It has made us understand, thanks to ecology and Whitehead, that nothing exists outside of its relationships. And it has demolished the idea of capital-S Science rising above the actual world of scientific practice. Yet if humans can exist only within networks that does not mean we are nothing more than nodes in the tangled web of worldly processes. Modernity was not an illusion but the arrival of the time of greatest promise and greatest danger, each represented by real social forces and movements that have fought out the great political and social battles. Only when we accept the greatness of the human project and the extreme danger that goes with it can we pose the epoch-defining question: how are we to use our power to pacify and protect the Earth rather than destroy it?

#### 4---Their assertion of a monolithic form of “traditional ecological knowledge” essentializes history and places a disproportionate burden on indigenous peoples for conservationism.

Anker et al. 20 [Kirsten Anker, teaches property, legal theory and Aboriginal law/Indigenous legal traditions at McGill University, with research interests extending also to evidence, dispute resolution, resource management and legal education. Her book Declarations of Interdependence: A Legal Pluralist Approach to Indigenous Rights explores various aspects of claiming Native (Aboriginal) Title as a way to inspire a re-imagination of law, November 20 2020, "Ecological Jurisprudence and Indigenous Relational Ontologies: Beyond the ‘Ecological Indian’?,” From Environmental to Ecological Law (London: Routledge), https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3703825&download=yes, accessed 7-22-21] AB

Like the “noble savage” before it, the ecological Indian has been subjected to an extensive campaign of myth-busting, such as in Krech’s controversial monograph The Ecological Indian (1999). Although Krech asserts that first peoples are generally ecologists in the sense of understanding the connected systems of life (22), a heated academic debate has turned on the more narrow question of whether or not Indigenous peoples were actually conservationists (see Harkin and Lewis 2007), through the deliberate maintenance of ecosystem diversity (Hames 2007, 180). Krech documented cases where pre-Columbian peoples drove species to complete or local extinction through overhunting or uncontrolled use of fire or irrigation (1999, see also Diamond 2005). The role of humans in the mass extinction of megafauna in the Pleistocene is disputed (see Kelly and Prasciunas 2007), but more recent examples are less ambiguous, such as the moa and other birds in New Zealand and giant lemurs in Madagascar (Alvard 1994). The literature sometimes shows contains accounts of what appear to be wasteful practices: for example, Inuit kills of uncountable numbers of caribou in the 1910s, removing only the skin, tongue and spinal sinew (Jenness 1957, 71), or Cree and Chipewyan in the eighteenth century killing more buffalo than they could consume (Hearne cited in Brightman 1993). Other scholars contend that historic conservation is often epiphenomenal; that is, preservation of biodiversity is a function of population density, technological capacity and opportunities or desire for trade, rather than long-term planning (Alvard 1994, 133). If so, argues Raymond Hames, once firearms and increased demand from trade arrive, overharvesting could become a problem (2007, 181). Moreover, rather than see these incidents as anomalies within an Indigenous conservation ethic, some authors argue that it is the spiritual, ecosocial lifeworlds of peoples, even their deep respect for wildlife, that can produce counter-conservation outcomes, as defined by Western environmentalism. Where hunting is part of a reciprocal human-animal relationship, the success of the hunt results from the animals’ decision to gift themselves, and requires respect to be shown to the animals (or their spirit master) (Nadasdy 2007); where the proper ceremonies or practices are performed (for example, prayers, offerings, disposal of remains), the resource is infinitely renewable—for some because the animals would reincarnate (Johnson Gottesfeld 1994, 447; Krech 1999, 204). In the Yukon, a contemporary “catch and release” program where smaller fish are returned to the water was seen by elders to insult the fish because it effectively rejected their gift (Washbrook 19964, 21–22). A similar concern for offending the spirit master embroiled Innu and provincial resource managers in a recent dispute over caribou/atiku conservation: the Innu insisted that it was their abandonment of hunting, or hunting disrespectfully, that was causing the atiku to “leave”; the solution is then not to hunt less (the choice pursued through the hunting ban imposed by the government of Newfoundland and Labrador) but to renew the hunt with the proper protocol (Blaser 2016). Brightman concurs that for the Rock Cree in the 1700s, “[i]t was failure to kill all the animals offered that would jeopardize future hunting. . . . To kill all the animals possible . . . is an act of love and gratitude” (1993, 290). He argues, as does Krech, that an ethic of restraint—taking only what you need—or an understanding of finite resources, came from Cree encounters with Euro-American resource managers in the nineteenth and twentieth centuries, even if it was incorporated within the existing paradigm of respect owed to the animals (1993, 308–309; Krech 1999, 206).

#### The AFF is key to reorient relationships to Land---Kimmerer agrees that targeting industrial agribusiness is vital to both honoring Land AND solving for structural supply chain weaknesses.

NSAC 21, This is the second blog in a series exploring the impacts of consolidation and concentration in the agriculture industry on farmers and the broader food system. The series is authored by NSAC Policy Associate Billy Hackett, with meaningful contributions by farmers and experts. Read the first entry: The Time is Ripe for Competition and Antitrust Reform in Agriculture, “FARMERS TRAPPED IN UNSUSTAINABLE CYCLE BY BIOTECHNOLOGY, SEED CONSOLIDATION”, <https://sustainableagriculture.net/blog/farmers-trapped-in-unsustainable-cycle-by-biotechnology-seed-consolidation/>, July 9th, 2021

“The plants can tell us her story; we need to learn to listen.”

Robin Wall Kimmerer, Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants

Land and seed once belonged to no one and were shared by all, replicating the giving essence of the natural world. Today, these precious resources are tightly controlled and commoditized inputs. The modern U.S. food and agriculture system is designed to maximize a narrow concept of economic efficiency which fails to prioritize the well-being of small family farmers, rural communities, or the land.

This is the same system that disproportionately harms Black, Indigenous, and people of color (BIPOC) communities, one rooted in the living consequences of Indigenous genocide, Black enslavement, and Latinx displacement and which continues to depend on a foundation of exploited labor. Meanwhile, the multifaceted benefits of traditional Indigenous farming practices – which produced an abundance of nutritious food while replenishing soil nutrients, preserving the freedom of wild animals, and even controlling weeds and pests – are being appropriated and rebranded as “alternatives” to today’s conventional, industrial agriculture model without proper credit or compensation.

What role did corporate consolidation and concentration play in the commoditization and appropriation of seed and farming practices? How does this impact farmers? How might we learn from the past to move forward?

Seed and biotechnology consolidation

Believe it or not, farmers in the United States did not always need to purchase their own seed. Instead, a core function of the U.S. Department of Agriculture (USDA) when it was founded in 1862 – and the Patent Office before that – was the collection and public distribution of germplasm, or seed. The federal government mailed millions of seed packages to farmers across the country, free of charge. Farmers were encouraged to save and share seed as well as experiment with crops to breed varieties that met their specific, regional needs. These practices sustained innovation and bolstered profits for farmers at a time when agriculture was the country’s chief economic engine.

Free distribution of public domain seeds to farmers across the country is no longer the case. Today, seed is treated as a privatized agricultural input. According to a recent report by the Family Farm Action Alliance, The Food System: Concentration and Its Impacts, just four multinational biotechnology corporations are responsible for at least 50 percent of sales in the global seed market: Bayer, Corteva, Limagrain, and ChemChina. Meanwhile, Bayer, Corteva, and ChemChina as well as BASF are responsible for roughly 65 percent of market concentration in the agrochemicals industry, which includes herbicide and pesticide development.

How did we get here?

“Seed used to be managed as an open, public resource,” began Kiki Hubbard, Advocacy and Communications Director at Organic Seed Alliance, when asked to recount what led to the consolidation and concentration of the seed industry. “It has quickly become one of our most privatized resources.”

Though seed distribution programs were immensely popular among farmers in the nineteenth and early twentieth centuries, emerging private seed breeders and horticulturalists lobbied the federal government – their biggest competitor – to end the program in 1924. This early seed industry bears little resemblance to the industry today. Small and regionally-based private seed companies acted mainly as breeders of regional seed and distributors of publicly developed seed varieties. In contrast, today’s dominant players genetically engineer and mass produce seed alongside complementary inputs including fertilizers and pesticides, as we have seen with major field crop seed corporations selling corn, soybeans, cotton, canola, sugar beets, and alfalfa.

The beginning of this transition can be traced to the 1930s, when a growing number of plant breeders and horticulturalists rediscovered techniques to breed hybrid varieties with desirable traits and develop markets around their exclusive seed. The increased demand for agricultural exports generated by World War II and with continued research breakthroughs led to the mass acceptance of hybridized seed, upon which farmers gradually became reliant.

Rising mechanization and research developments in sectors across the U.S. economy, parallel to those in the agriculture industry at the turn of the century, generated pressure for lawmakers to write and strengthen existing laws to protect the intellectual property of inventors. Though plants and seed were historically interpreted to be products of nature and thus, not patentable per existing patent law, the American Association of Nurserymen estimated that a potential one billion dollar market existed for the business and successfully lobbied the federal government to pass the Plant Patent Act of 1930. This became the first statute allowing biological materials to be patented, though this applied only to unique asexually reproducing plants.

Intellectual Property: Intellectual property is a broad categorical description for the set of intangible assets owned and legally protected by a company from outside use or implementation without consent. An intangible asset is a non-physical asset that a company owns.

Utility Patent: The right to exclude others from making, using, offering for sale, selling, or importing the invention. May be granted to anyone who invents or discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof.

Plant Patent: May be granted to anyone who invents or discovers and asexually reproduces any distinct and new variety of plant.

For decades, USDA and Congress remained hesitant to extend patents to sexually reproducing plants. “In the 1930s, Congress saw the dangers and potential for patents on seed to lead to market concentration and less innovation,” Hubbard explained, and “all of those consequences have [since] played out.”

In the face of mounting pressure from burgeoning seed companies, Congress passed the Plant Variety Protection Act (PVPA) in 1970. The compromise authorized USDA to grant certificates that afforded plant breeders the exclusive rights to produce and market sexually reproducing plant varieties that were distinct, stable, and uniform, provided that other researchers could still use the protected seed to breed improved varieties and that farmers could save seed to replant. Evidence suggests that in its first decade, the PVPA actually increased the number of distinct plant varieties available to farmers, but this arrangement did not last.

“Congress intended for the PVPA to govern protections of sexually-reproducing plants,” noted Hubbard, but subsequent Supreme Court decisions reshaped the debate around patenting life. The 1980 Supreme Court decision in Diamond v. Chakrabarty allowed newly engineered oil-eating bacteria to be patented, effectively signaling that inventors of any human-made microorganism could be granted utility patents – including plants. The U.S. Patent and Trademark Office was soon approving thousands of utility patent applications for plants that reproduce sexually. Importantly, where PVPA protections were explicitly designed to reinforce the rights of researchers and farmers to save protected seed, utility patent holders may forbid this.

The expansion of intellectual property protections in the 1980s occurred in tandem with the evisceration of antitrust policies and merger guidelines under the Reagan administration. These policy shifts laid the foundations for a “merger mania” in the 1980s and late 1990s, giving agribusiness corporations the ability to buy-out potential competitors or otherwise expand their services and markets unchallenged. This corporate-friendly landscape and the emergence of new biotechnologies enabled the Monsanto Company to pave the way for the takeover of the private seed industry, foreseeing a lucrative opportunity for expansion.

Monsanto, founded as a chemical company in 1901, became a pioneer in the production of agrochemicals in the mid-twentieth century. The company manufactured the insecticide DDT, which proved as critical to combating malaria-transmitting mosquito populations as it was to inspiring Rachel Carson’s book, Silent Spring, and a renewed environmental movement. (Congress banned DDT in 1972 for its adverse impacts on human health and the environment.) Monsanto later produced and commercialized a new weed-killing herbicide, Roundup, in 1976. This success catalyzed the company’s pivot to biotechnology to genetically engineer an herbicide-resistant crop variety that would not be harmed by Roundup.

Biotechnology: Techniques to adapt plants for specific needs or opportunities using advanced biochemical, molecular, cellular, and genetic technology; inserting desirable traits into the genome of a living organism.

Genetically Engineered (GE): The artificial manipulation, modification, and recombination of DNA or other nucleic acid molecules to modify an organism using biotechnology.

To create and mass-produce a seed that would resist Roundup, Monsanto needed a captive supply of germplasm. “One of their main strategies,” noted Hubbard, “was to buy up smaller [seed] firms to access their varieties and simply insert their GE traits without needing to do any of the breeding work themselves.”

Monsanto thus began to acquire small and regionally based seed companies, exponentially multiplying their supply of germplasm and restricting the distribution of these varieties which had been carefully bred to possess ideal traits. These foundations enabled Monsanto to become the first company to genetically engineer a plant cell and eventually mass-produce a Roundup Ready line of seed. Early attempts to commercialize certain GE food products, including the infamous Flavr Savr tomato, failed in the face of consumer backlash. Yet those GE commodity crops that are mostly used in processed foods and as livestock feed quickly became integrated into the industrial food system.

Dr. Phil Howard’s visual of mergers and acquisitions in the seed industry from 1996 to 2018 reflects that the race for biotechnology corporations to possess germplasm and patents is not just still in progress, but heating up. Monsanto remained the world’s largest producer of GE seed until its $63 billion acquisition by Bayer, a German pharmaceutical and biotechnology company, in 2018. Today, Bayer alone is estimated to control the global markets for more than 35 percent of corn seed, 28 percent of soybean seed, and 70 percent of cottonseed.

What impacts does this consolidation have on farmers, ranchers, and rural communities?

Impact on farmers and communities

To many, the advent of the modern seed and biotechnology industry represents the pinnacle of benevolent ingenuity for our food system.

There are certainly conversations to have about the role genetically engineered crops play in increasing yields and boosting productivity of agricultural land per-acre through the reduction of crop loss. However, just as important but less present in mainstream conversations is a frank consideration about whether those gains can be justified given the adverse, long-term impacts that conventional farming has on people, animals, and the land.

When these conversations are better informed by the growing number of studies which point to the benefits of sustainable farming models, as well as its scaleable potential, we are compelled to ask: “Is the status quo worth defending?”

It could be, if the power imbalance between farmers, rural communities, and multinational corporations did not breed adverse consequences for the former. Recall that seed was once treated as public property and openly shared – not only in the 1800s, but for millennia on this continent by Indigenous people. In addition, integrated crop-livestock systems kept pests and weeds at bay while limiting soil disturbance to preserve the microbial community and prevent erosion, among other restorative benefits for soil health. No rising input costs or potentially dangerous chemicals were necessary, unlike today.

In 2019, U.S. farmers spent $118 billion to purchase seed and plants, fertilizers, animal feed, and agricultural chemicals. The cost of total farm input expenditures has increased almost $80 billion since 2009, a classic symptom of an industry that has become too concentrated. Bayer, Corteva, Limagrain, Chem-China, and BASF exclude competitors with control of at least 50 percent of the seed and agrochemicals markets by raising the price of inputs for farmers (including with a novel “technology fee”) without risking their own market dominance.

To strictly analyze the cost of seed, consider that corn farmers who paid $26.65 per planted acre of seed in 1990 paid $93.48 in 2019. This represents a dramatic increase of roughly 350 percent, beyond the rate of inflation, following the biotechnology merger-mania and the co-opting of the seed industry.

Health and human consequences compound this financial loss, with all such liabilities externalized by multinational corporations and placed upon farmers and consumers. In 2015, the International Agency for Research on Cancer classified the active ingredient in Bayer’s Roundup, glyphosate, as “probably carcinogenic to humans.” Farmers and farmworkers in proximity to glyphosate are potentially at-risk, as are consumers who consume GE food with glyphosate residue. Though glyphosate has since been banned or limited in dozens of countries, the Environmental Protection Agency re-approved Roundup to be used in the United States last year – even as lawsuits from 46,800 plaintiffs alleged personal injury from exposure to Bayer’s glyphosate-based products.

Bayer insisted that they would “defend the safety of glyphosate… vigorously.” Then, in February 2021 Bayer announced a $2 billion settlement to cover claims from individuals who developed cancer after being exposed to Roundup. This settlement, reached in private arbitration, is not an admission of guilt. Roundup not only remains on the market but is still the weedkiller favored by farmers. What else would conventional farmers use with their Roundup Ready seed?

Genetically engineered seed has indeed taken over. The Food and Drug Administration (FDA) reports that GE soybeans comprise a stunning 94 percent of all soybeans planted in the United States, GE cotton accounts for 94 percent of all cotton planted, and 92 percent of corn planted was GE corn. The multinational corporations that produce and market these GE seed varieties do not only place their products on the market but remove non-GE varieties of seed inherited from acquired seed companies. The result has been an alarming reduction in farmer choice – despite the illusion of many unique seed brands – as well as the decimation of crop biodiversity.

Source: Rural Advancement Foundation–International

In 1983, a report by the Rural Advancement Foundation International (RAFI-USA) revealed that the United States lost 93 percent of its agricultural genetic diversity in the twentieth century. That was before the consolidation of the seed and biotechnology industries in the mid-1990s, and nationally the trend has continued. This genetic uniformity poses a significant threat to the U.S. food supply. The more that the agriculture sector relies on a few uniform, patented seed varieties, the more susceptible these conventional farms become to epidemic pathogens or unexpected climate events. (We saw what happened during the Dust Bowl when traditional foodways were replaced with industrial, monocrop farming.)

Rather than elevating the long-term resilience and security of our food system, a 2019 AGree report notes that “the tendency for farmers to specialize production to only a few commodities presents risks in the event of any type of shock (e.g., extreme weather, disease or pest outbreaks, price cycles, market fluctuations, etc.).”

The corn problem

Let’s take a closer look at corn production to illustrate the vulnerabilities of monoculture systems and how they were shaped by corporate interests at farmers’ expense. With more than 90 million acres of land planted to corn – almost 30 percent of the country’s 320 million acres of harvested cropland – it is the United States’ leading crop commodity.

Do Americans eat that much corn on the cob? No! The demand to produce this much corn did not come from consumers, but was artificially generated by private agribusiness interests.

If you drive through the American corn belt, you will see the degree to which U.S. agriculture has become dependent on just two commodities: corn and soybeans. Defenders of the corn monoculture system point to the wide array of products which contain corn as an integral ingredient – from sweeteners and biofuels to animal feed – as proof of what must have been an inevitable climb to occupy this position of primacy. Yes, the United States meets the climate, soil, and topographic conditions necessary to mass-produce corn, but that does not mean that it always will or that we should.

Corn is a resource intensive crop to grow. It demands copious amounts of water and nitrogen, and industrial farming practices to plant and harvest corn are beginning to erode carbon-rich soil in the Corn Belt. Despite attempts to boost nitrogen levels in the soil with synthetic fertilizer (runoff from which poses an environmental concern), these products cannot completely replace natural minerals. In addition, genetic uniformity increasingly exposes farmers throughout the Heartland to elevated market and weather risks, including drought and emerging patterns of climate change. The United States cannot continue to produce and rely on corn to the extent that we do today – it is not resilient long-term.

Jonathan Foley warns in his piece, It’s Time to Rethink America’s Corn System, that “given enough time, most massive monocultures fail, often spectacularly… A single disaster, disease, pest, or economic downturn could cause a major disturbance in the corn system.”

In fact, corn farmers are already losing nearly $3 billion per year in harvest yields per acre. It is fortunate, then, that so much corn is not inherently necessary to the functioning of a society and may be replaced as an input by several alternatives. To illustrate, biofuels can be produced from less-intensive, even regenerative plants, including hemp and switchgrass. In addition, nearly 95 percent of processed animal feed is made of corn and may be replaced with broader adoption of integrated crop-livestock systems and pasture grazing.

Why, then, does the production of and dependence on corn continue to grow? Because farmers lose real income, not agribusiness, in the same way that farmers receive a decreasing share of every dollar spent on food in the United States while the share of biotechnology, equipment, and food processing corporations rises. This relationship is imbalanced at best and at worst parasitic, but always framed as symbiotic.

It’s a trap!

“Farmers lose when crop prices collapse, but buyers of those crops win.”

To remain profitable, multinational agribusiness companies must generate and maintain a constant state, or at least a general trend, of overproduction and depressed commodity prices. Input suppliers, including biotechnology and seed corporations, can sell their patented products to a client (farmers) always seeking to expand their operations. Meanwhile, on the other end of harvest season, a concentrated number of food processors are able to purchase commodities for a price driven down by excess supply.

To illustrate the relationship, the following chart demonstrates that corn yields increased rapidly during the decades that these corporations amassed profit and influence – multiplying almost 600 percent since the mid-century dawn of the age of industrial agriculture and consolidation.

Source: University of Wisconsin–Madison

It is important to acknowledge that farmers may indeed experience lucrative years and rising commodity prices, often due to increased demand from international export markets. This is an exception, however; it is not a rule. While farmers win on occasion in this system, it is always as the industry collectively spirals downward.

Farmers who seek to permanently raise the price of commodities and otherwise elevate their share of the food dollar find themselves trapped. Realistically, corn farmers have few options to cut their input costs with an industry as consolidated as seed and biotechnology. They need to purchase the genetically engineered seed designed to withstand the herbicides, pesticides, and synthetic fertilizer which they have used for many growing seasons – but use of these chemicals and additional industrial practices, including mechanical tilling, erode soil nutrients until non-GE strands may no longer be able to maintain yields. The conventional farmer is not able to simply save and replant GE seed to save input costs either, for it is protected under utility patent law.

Similar to the biotechnology and seed industry, the farm equipment sector is highly consolidated. Four companies, chief among them John Deere, control at least 45 percent of global farm machinery sales. The farmer who decides to increase their yield to make up for lost income from falling prices may purchase new, productivity enhancing technologies from these companies. Because this decision is invariably made by thousands of farmers every planting season, with everyone reasonably aiming to stabilize their bottom line, a renewed downward pressure on prices is created. “The lower prices, in turn,” according to Darryl E. Ray in a 2003 University of Tennessee report, “become further incentives to adopt more cost-reducing technologies, and prices continue their slide.”

Unless farmers are able to adopt sustainable farming practices or radically alter their business models, they will continue to rely on these patented products year after year, sending half of the checks they write to increase the balance sheets of these corporations.

John Deere’s revenue growth consistently outperforms farm incomes, even as they rise and fall together. Large equipment manufacturers even use patents to prevent farmers from repairing their own heavy machinery (which is more damaging to soil health than previously thought) using independent repair technicians, or continuing to maintain equipment that is no longer supported by the manufacturer. This multiplies the profit streams for companies and perpetuates the need for farmers to continue to invest in the newest available equipment.

The imbalance does not stop there. In recent years, these industries have been acquiring data technology companies to create programs like Monsanto’s Climate View, now owned by Bayer. Farmers who participate in the program supply harvest field data through the sensors on combines manufactured by John Deere and AgCo, which together control 70 percent of the U.S. combine industry, and receive prescriptions sent back to the combine advising farmers which Bayer products to purchase to maximize their yields.

In his recent book, Perilous Bounty, Tom Philpott recounts an interview with an ex-Monsanto executive who “painted a future in which farmers would essentially outsource their decisions to Monsanto, or at least rely on the company to narrow their choices dramatically… This could empower farmers to make better decisions,” he continued, “but the farmers’ interests and the industry’s don’t necessarily align.”

Contrary to the vision of these corporate executives, basic economics instructs that limiting supply would cause commodity prices that farmers receive to rise. The industry, however, is unable to self-correct because no platform exists for all farmers – who are in competition with one another – to agree to cut production in a given year. Even if that scaled coordination were possible, farmers might be pressured to maintain or expand production to justify past investments in heavy machinery or other inputs, and to avoid furloughing staff and laborers. Further, the design of federal crop insurance and commodity programs currently incentivize the maintenance of conventional farming models and levels of production.

Federal crop insurance and commodity programs are designed to maximize yields, directly serving the interests of multinational agribusiness corporations who profit from maintaining a state of overproduction. These subsidies enable the biggest industrial operations to get bigger at the expense of smaller producers, as benefits are siphoned to a limited number of commodity crops and a relatively small number of farmers. The artificial absence of risk for these farmers, as well as bias against alternative operations from financial lending institutions, inhibits what motivation might otherwise exist to adopt diversified production systems as a risk management strategy.

That is why agribusiness lobbyists work to preserve federal support that reduces crop insurance premiums and prevents payment limitations to commodity subsidies. This arrangement maintains the incentive for farmers to overproduce, while also enabling these agribusinesses to signal that their relationship with farmers is indeed symbiotic, rather than parasitic. In reality, however, the public benefits of commodity programs are funneling potential resources away from farms and rural communities. Currently, any farmer or landowner – even multimillionaires and billionaires not actively engaged in farming – can receive unlimited premium subsidies.

As an added consequence, these programs have been fundamental to the acceleration of rural depopulation and the consolidation of farmland. This places small and mid-sized farms, or other low-resource, beginning, and BIPOC farmers, at a competitive disadvantage when it comes to buying land. According to a study by agricultural economists from Cornell University and the University of Illinois, crop insurance contributed to a four to nine percent increase in forage and rangeland values. Another study that looked only at the impacts of direct payments eliminated by the 2014 Farm Bill, found that those payments caused an increase of about $18 per acre in cropland value.

To demonstrate one facet of the impacts of farmland consolidation, 40 percent of farmland in the United States was rented from landowners in 2017. Farmers who do not own but only rent farmland are, sensibly, wary against sinking heavy investments into land which they may be asked to leave at the end of any contract period. This particularly affects small and mid-sized, BIPOC, and beginning farmers who do not have the resources to purchase land at inflated prices. This effectively traps the next generation of farmers and would-be innovators, limiting them to adhere to conventional and unsustainable practices supported by existing farm infrastructure, or only modest and transferable investments.

The trouble with opting out

Financial ruin generated by rising input costs and falling commodity prices (in addition to systemic discrimination against BIPOC producers within USDA) catalyzed the flight of farmers to cities in the twentieth century, particularly those farmers who did not industrialize. That said, a minority of farmers were able to resist the shift to conventional farming or later embraced sustainable production when its comparable, long-term benefits became clear.

Dave Bishop, 70, a mid-sized farmer in Illinois, endured heavy crop loss and debt caused by a severe drought in 1988. “It was traumatic,” he expressed, “to watch something die a little at a time for months and months and months.” Bishop was farming conventionally at the time, but that experience motivated him to deviate from the “get big or get out” mantra of the time – ”get different.” Bishop began to diversify his operations and eventually farm organically. “We dealt with opting out of the system,” he said. “That is possible for farmers to do.”

Farming organically to supply local and regional markets may indeed be considered an almost separate industry to monoculture farming, with its emphasis on sustainable farming practices, values, and markets. These farmers generally rely on a consumer base that is willing and able to spend a bit more than conventional market price for locally produced food that they know will be free of synthetic pesticides, promote greater animal welfare, and avoid GE seed that can trap farmers in unsustainable cycles. Many organic producers adopt techniques with ancient roots that center diversified systems, including crop rotation and the use of composted animal manure, to replace the need for synthetic inputs.

Research suggests that organic farmers save money on seed (which are not patented and can be saved from season to season), improve soil health, sequester more carbon, and harvest higher yields per acre than previously thought. These diversified farm systems may even be considered a natural form of risk mitigation, as opposed to crop insurance: “The next severe drought was in 2012,” Bishop recalled, “which turned out to be our most profitable year to date.”

Despite the proven resilience of this farming model, less than 0.8 percent of farms are certified as organic operations with USDA. Farmers must adhere to strict regulations related to soil quality, animal raising practices, and pest and weed control to become certified organic. In addition, the certification process is expensive and may not yield immediate financial benefit. The National Organic Certification Cost Share Program (NOCCSP) helps to alleviate the costs of certification for small and mid-sized organic farm businesses, although obstacles to certification remain.

While Bishop notes that “certifying our vegetable crops has little to no impact on local sales,” where consumers are able to build a relationship with their farmer, the label does “give us access to larger markets like Chicago where shoppers may not recognize the farm name.” That means these lucrative markets are more difficult to access for small organic farmers without the means to attain organic certification, or whose practices may deviate from the standards.

This demonstrates that existing farm policies place an outsized burden on small and mid-sized organic growers to grow, market, and sell their produce. Meanwhile, no comparable certification or market obstacles exist for conventional farmers – even though industrial agriculture is inherently riskier. Instead, monopsonist dynamics rooted in extreme concentration mean agribusiness corporations, including food processors, are the guaranteed buyers for overproduced and devalued commodity inputs. This difference reflects the dominance of agribusiness, which continues to shape the food system in ways that impede the success of even those farmers who choose to “opt out” of the industrial model.

The pervasive influence of agribusiness does not end there. Farmers who unknowingly come into the possession of patented traits in seeds they save due to cross-pollination with GE plants, may be sued by biotechnology multinational corporations for patent infringement. This is a serious threat, especially for organic farmers, who are required to assume risk and maintain buffer zones on their farms to prevent contamination. While farmers planting several GE crops are required to maintain buffer zones as well, these buffers do not completely prevent drift and contamination. To illustrate their ineffectiveness, the Union of Concerned Scientists found in a 2004 report that 50 percent of non-GE corn and soybean and 84 percent of non-GE canola seeds in the United States were contaminated with low GE residue.

Farmers cannot sue any biotechnology companies for the contamination of their fields, however; the Monsanto Protection Act exempts biotechnology companies from litigation in regard to the making, selling and distribution of GE seeds and plants. This midnight provision, or “biotech rider,” was included in a 2013 spending bill by agriculture biotechnology lobbyists.

In addition to influence over the federal policymaking process, these companies have infiltrated academia. In his 1986 book, Biotechnology: The University Industrial Complex, Martin Kennedy makes the case that the multimillion-dollar, multi-year contracts between private corporations and public universities popularized by biotechnology corporations erodes the integrity of academia. The practice of patenting and commercializing findings from publicly funded research was legalized by the 1980 Bayh-Dole Act, and though it was theorized the Act would increase innovation it has instead led to diminished innovation and the privatization of public research.

The concept of industry-funded research should invite debate around potential conflict of interest, to determine if financial incentive may limit what research topics are considered or even influence conclusions. The Monsanto Papers, internal company documents released over a period of months in 2017, suggest that Monsanto actively avoided testing the real-world toxicity of their products, avoided funding studies which may have yielded unfavorable results, and “ghostwrote” studies attributed to independent scientists. That same year, a survey of researchers in the USDA revealed that up to five percent of scientists received pressure from either within the department or outside USDA to omit or alter findings based on “reasons other than technical merit.”

A new direction is possible

“Food can be weaponized,” said Jacqueline Pilati, founder of Reclaim Seed NYC, a BIPOC-led collective which supports urban growers throughout the city and stewards a free public seed library and seed garden in Queens. “We can nourish and celebrate, but we can also oppress people and limit the choices they have in terms of how they choose to feed themselves.”

Indeed, the consolidation of the biotechnology industry and its infiltration of the seed industry has led to heightened input costs and depressed commodity prices, trapping farmers in a cycle of dependence, and perpetuates a destructive model of farming which threatens biodiversity and soil health. Innovations in biotechnology, meanwhile, are narrowly applied to incentivize the creation of GE traits and affiliated agrochemicals to patent and sell, but it never had to be this way. These advances could have been, and may still represent, an unprecedented opportunity to guarantee universal human health and nourishment.

“We have a lot to learn from [plants],” Pilati mused. “They are abundant, they are generous, they are naturally promiscuous. Plants thrive, plants know that they must be genetically diverse and that their resilience lies in their diversity… What you see happening with seed patenting and consolidation is the opposite of that, but [the food system] needs to be that strong.”

NSAC and our members are driven to strengthen our food system in ways that mirror nature’s resilience through the broad adoption of conservation practices which promote biodiversity and soil health, support small, beginning, and socially-disadvantaged farmers, and promote fair markets and competition within the biotechnology and seed industries.

This will require additional investments in public, farmer-led, sustainable agriculture research, an alignment of conservation practices with crop insurance as proven risk mitigation tools, and antitrust and intellectual property rights reform, among other initiatives. More detailed recommendations and specific policy proposals to achieve these aims are forthcoming in a special report later this year.

#### Kimmerer thinks industrial ag is bad, and combining multifaceted approaches like sustainable ag and interspecies relationships is key.

Anne Martin 16, degree in Environmental Science and Policy, “Exploring Green”, <https://blogs.nicholas.duke.edu/exploring-green/label-it-please/>, March 21st, 2016

I just finished reading a book titled Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teaching of Plants, by Robin Wall Kimmerer.

Her writing is beautiful. Trained as a plant scientist, Dr. Kimmerer combines her scientific expertise of biological processes with her cultural understanding of interspecies relationships. Through these efforts, she builds a rich, multi-faceted perspective through which to see the natural world. Kimmerer shares her powerful sense of responsibility for the Earth, and feeling of fellowship with the world’s creatures. She has a magnificent familiarity and sense of place within this planet’s wild spaces, and intertwines in every story she writes the traditions, beliefs, and thanksgiving ceremonies passed down to her from her Potawatomi family. Utilizing both the results of her own scientific work and the wisdom of her heritage, Kimmerer calls for greater environmental stewardship and appreciation of the land and all its gifts in the way of an impassioned poet.

Her writing moved me, I think perhaps partly because growing up in Iowa, I have spent most of my life watching industrial agriculture wreck havoc on the land. Since college, I’ve spent most of my life working on organic farms and fighting the spread of conventional farming practices.

When Kimmerer spoke of the emotional and spiritual aspects of working in the dirt, of paying attention to living beings, of realizing the importance of reciprocity and our interdependence with plants (and the natural world as a whole), I knew the magic she was describing. I had lived it—seeded, watered, and eaten it.

This year, I’ve been living in Costa Rica studying the barriers facing sustainable food production. I opened my computer a few days ago to read that about Senate’s move to vote to ban state GMO labeling in the United States (the motion did not pass). It was the same day that I finished Kimmerer’s book.

I sat overlooking the jungle that afternoon, far from where this new political battle played out. I looked down at the book in my hand. It has a message, and I suppose my life’s work (so far) does too. In that moment it felt suddenly more urgent. We have to change. We do. And we need to do so quickly.

Kimmerer writes, after looking out over the homogenous, ordered cornfields neighboring her property that, “The truth of our relationship with the soil is written more clearly on the land than in any book. I read across that hill a story about people who value uniformity and the efficiency it yields, a story in which the land is shaped for the convenience of machines and the demands of the market.”

The lack of biodiversity of her neighbors’ fields must have seemed stark indeed next to Kimmerer’s own summer fields, which she fills with dozens of different species. It also probably looked sparse, almost alien in nature, in comparison to the abundance of food filling nearly every available inch of her home’s growing space. Kimmerer takes advantage of the fact that many crops grow symbiotically with each other, perhaps most famously a trio known as the Three Sisters: corn, beans, and squash. In fact, she dedicated an entire chapter in her book to the intriguing tale of these three crops.

For thousands of years, Native peoples of the Americas have revered the Three Sisters. Planted together, corn, squash, and beans grow much better than they would separately. The corn plant grows up first, shooting up towards the sky and providing a trellis upon which the slower-growing bean vine may grow. Meanwhile, the squash plant, the slowest of the three to germinate, stretches out below the other two, branching out sideways. Thick, broad squash leaves protect the soil from the sun, and prevent weeds from competing with the group. Meanwhile, the beans contribute to the effort by helping to feed the trio. Beans house nitrogen-fixing bacteria in their roots, organisms adept at trapping and transforming atmospheric nitrogen into chemical forms that plants can absorb.

With plentiful nitrogen, moist, UV-protected soil, little competition from weeds, and the protection that biodiversity offers from pests, the Three Sisters grow well without synthetic fertilizers, insecticides, or herbicides. Their gift-giving attributes and reciprocity with each other ensure the success of all three.

Of course, there also used to exist thousands of different breeds of corn and squash and beans, helping also to ensure that those diseases or pests adapted to a particular species never made it far. Native Americans adapted their crops to the specific environment and climatic conditions in which they lived to improve yields further. Even here in Costa Rica, people as young as 30 years old tell me that they remember when there many different colors of corn growing here—a rainbow of diversity. To find these seeds now is nearly impossible. What changed?

Kimmerer writes, “In indigenous agriculture, the practice is to modify the plants to fit the land. As a result, there are many varieties domesticated by our ancestors, all adapted to grow in many different places. Modern agriculture, with its big engines and fossil fuels, took the opposite approach: modify the land to fit the plants, which are frighteningly similar to clones.”

To create clones and to place them in rows makes seeding and harvesting much more efficient—row after row of a single organism enables the development and use of massive seeding and harvesting machinery to do the work of farm hands. However, this monoculture system appears ultimately ecologically unsustainable—as it is one dependent on chemical herbicides and insecticides, synthetic fertilizers, and fossil-fueled machinery.

This is a game of time. Erosion plagues fields farmed with conventional agricultural techniques as well. The combination of tilling, poor soil coverage, sun exposure and chemical application (which kills soil microbial life), coupled with summer storms, creates soil runoff. Unfortunately, contaminated sediment, as it is carried down rivers and streams, poisons the water supply from here all the way down to the Gulf of Mexico. This is the same story spreading around the world now.

Given this, it appears that if we are going to continue to be able to grow food on this planet, then we need to begin paying attention to nature once again—relearning how to mimic her in order to provide for future generations.

Natural systems contain a variety of species, filling different ecological niches to protect the soil and retain precious water. Biodiversity also creates habitat for beneficial insects, keeping pests under control. And there is little room for chemical use. The repercussions of our chemical warfare on the land are too large to continue to be ignored—the consequences of synthetic fertilizers and herbicides much too far-reaching and severe to justify their ubiquitous use (just ask any of the citizens living near Lake Erie last year).

#### Kimmerer doesn’t think so, and she agrees industrial ag is bad

Robin Wall Kimmerer ND, “Corn Tastes Better on the Honor System”, <https://emergencemagazine.org/feature/corn-tastes-better/>, sometime after the second publishment of Braiding Sweetgrass.Braiding Sweetgrass

Corn production today uses more natural resources than any other crop. Around 90 million acres are planted in corn, and the last remaining remnants of native prairie and grassland are being plowed under for corn every year. Corn is a hungry crop and a thirsty one. Vast amounts of water are consumed, and a staggering amount of fertilizer. Corn not only consumes a great deal—it produces a huge amount of waste. Much of that fertilizer never even makes it into the plant, instead it is washed downstream, producing toxic algal blooms in waters everywhere along the way and ultimately creating the growing dead zone in the Gulf of Mexico. Dead rivers, lost biodiversity, say farewell to prairies and bobolinks and meadowlarks, to say nothing of precious topsoil leaving the fields and silting the rivers. The economic pressure behind this ongoing expansion of cornfields has little to do with filling empty bellies. In today’s agribusiness, we feed more cars than people.

I don’t blame my farmer neighbor for industrial agriculture. He’s been harnessed to a system that treats him like a cog, too. His family has farmed this valley well for generations and had to adapt to changing pressures in order to stay on the land. The honorable calling of farming is being dishonored by a worldview and economic institutions that relentlessly demand taking more without regard for giving back. He’s been colonized, too.

## 1AR

### Honorable Harvest K---1AR

#### Combining western knowledge and indigenous orientations is key

Robin Wall Kimmerer ND, “Corn Tastes Better on the Honor System”, <https://emergencemagazine.org/feature/corn-tastes-better/>, sometime after the second publishment of Braiding Sweetgrass.Braiding Sweetgrass

Science and technology go hand in hand, each spurring the other forward. Western science is a powerful way of generating knowledge, but it is not the only one. Long before colonists came to our shores, there were scientists here of every kind, including botanists, agronomists, and geneticists, practicing indigenous science and developing regenerative technologies. The nature of these two ways of understanding the world is written in vivid green ink in our respective cornfields.