



# Agroecology for Structural One Health

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## Abstract

Based on colonial capitalist logics, global biosecurity strategies have long relied upon downstream measures of surveillance and control to reduce disease burden and address the rising risk of antimicrobial resistance (AMR). One Health aims to address this through what it describes as a systems approach, yet in failing to grapple with capitalist hegemony, the framework reproduces the microbial and logical diseases it intends to prevent. Calls for a Structural One Health approach embed the principles of agroecology as a pathway toward food sovereignty, joining the calls of peasants, smallholders, Indigenous Peoples, fishers and forest dwellers globally. This paradigm of food production takes a truly ecosystems approach in embedding place-based production systems within political economies centred on human and more-than-human relations rather than on extraction and division. Working outside the standardized monoculture of industrial agriculture, agroecological food producers the world over embrace biodiversity as an effective safeguard against harmful pathology, creating and living the alternative paradigms necessary for unwinding our interconnected planetary crises. One Health without structural integrity is only as strong a framework as status quo production systems and biosecurity measures, serving to reinforce rather than transform the current dominant global system.

**Keywords** Structural One Health · Agroecology · Biodiversity · Biosecurity · Capitalism · Colonialism · Degrowth

## From Crisis Control to Structural One Health

At the 34th Asia Pacific Regional Conference (APRC) of the Food and Agriculture Organization (FAO) held in Fiji in 2018, in a dialogue with a senior FAO bureaucrat about the opportunities of One Health to address the increasing risks of antimicrobial resistance (AMR) and zoonoses, he replied that he was not optimistic. In his opinion at the time, many countries were promoting One Health on government websites, but were not implementing the systemic reforms needed, largely due to a continued myopia around the pharmaceuticalization of animal and human health as opposed to an ecosystem-based approach.

Two years later, in the first year of the COVID-19 pandemic, in an FAO Committee of Agriculture (COAG) meeting held online, the International Planning Committee for Food Sovereignty (IPC) delivered this excerpt of a longer intervention, noting:

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the critical role played by smallholders the world over to assure food and nutrition security for our communities. We also well understand the risks posed by large-scale industrial livestock production to the environment and public health.

In particular, we highlight the inherent risks in industrial systems that separate animals from feed production, breeding from finishing livestock, that rely on a narrow range of genetics, and that then grow genetically uniform animals in crowded and often unhealthy conditions—conditions that are perfect for growing novel strains of dangerous zoonotic pathogens and increasing the incidence of antimicrobial resistance. We urge COAG member states to adopt Structural One Health approaches to address the root causes of pandemics in your governance of agriculture and forests.

Global biosecurity strategies have long been limited to surveillance and control, ignoring prevention of the origins of disease, infection, and more recently, antimicrobial resistance (Wallace 2016; Dentico et al. 2022). Infection prevention and control is often conflated with biosecurity, and both tend to ‘render technical political questions and concerns’



(Chandler et al. 2016), promoting orthodoxies of sterility and tighter border controls at the national to farm level. Instead, the UN and its member states must examine the economic and ecological structures that breed vulnerability into human and more-than-human populations, in recognition of the ways that humans are ‘co-constituted with Country’ (RiverOfLife et al. 2020: 545). Looking to indigenous epistemologies and ontologies (Martin and Mirraoopa 2003; Wall-Kimmerer 2013; RiverOfLife et al. 2020), and the new materialist and post-humanist literature they have inspired (Latour 1993; Haraway 2013, 2016; Millner 2021) can help broaden the scope of analysis to understand the multi-species entanglements from microbes to pigs and cattle and humans in a way that western empirical-positivist science does not.

Many if not most emergent diseases such as novel porcine and avian influenza are directly born of intensive livestock production, a model that evolutionary epidemiologist Rob Wallace et al. (2021: 195) assert produces ‘food for flu’—because ‘raising vast monocultures removes immunogenetic firebreaks that in more diverse populations cut off transmission booms’. Wallace (2016: 306) further explains:

Pathogen introgressions are oft-related to trade or more gradual expansions brought about by climate change and shifts in land use. Finally, the emergence of pathogens with novel traits by virulence jump or antimicrobial resistance has been connected repeatedly to intensified husbandry and preventative antibiotic use in livestock.

Reliant on standardization, animal monocultures within the capitalist economy rely on divorcing production systems from the environments in which they are situated. However, they are obviously not hermetically sealed from the ecosystems around them. This means that an ecosystems approach (which the UN’s Convention on Biological Diversity (CBD) defines as ‘a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way’) to manage their negative externalities becomes all the more essential. A genuine ecosystem approach would reject the festering wound that is crowded shed-bound animal production in favour of lives spent relating with biodiverse grasslands, forests and soils—healing place-based systems of production wedded to place-based economies.

On the surface, One Health seeks to supplement ‘the germ theory of disease with an ecosystemic theory: that the health of organisms in the field is relational (Zinsstag et al. 2015)’ (Wallace et al. 2019: 222). Yet, while the recent move to bring the UN Environment Programme (UNEP) into a Quadripartite with the World Health Organization (WHO), FAO and World Organisation for Animal Health (WOAH) to better anchor One Health initiatives in ecosystem-based

approaches is welcome, the approach still fundamentally fails to examine the circuits of capital on which novel zoonoses and antimicrobial resistant (AMR) bacteria are hitching an ever-speedier ride (Wallace 2016; Wallace et al. 2021). This failure to examine the role of ownership, concentration, trade, infrastructure, and supply chain length has to date delivered little than more disease emergence and alarming increases in AMR (IPES Food 2022; Dentico et al. 2022). Writing about the difficulty that policymakers face in dealing with both complexity and hegemony, when attempting to enable transformational change, Wagenaar and Prainsack (2021: 13) explain that ‘policy makers are often attracted to the proximate effect instead of the distant cause’. Even in the case of One Health initiatives, the widespread lack of understanding of the role of upstream, holistic and relational prevention measures can make the temptation to support the development of new antibiotics, or to individualize the blame for over-use of antimicrobials, more powerful than the ability of policymakers to liberate themselves from the hegemony of capitalism.

Many allegedly preventative approaches to curb incursions of undesirable life forms serve to further entrench the colonial capitalist *antibiotic* legacy apparent in health and environment governance. A non-exhaustive list of examples includes:

- Regular sub-therapeutic doses of antimicrobials in pig and poultry sheds (Barrett 2005; Dentico et al. 2022);
- Regular and repeated application of agri-chemicals (fungicides, herbicides, pesticides, and fertilizers) in horticulture (Potato Business 2022); and
- The expulsion of the Maasai from their traditional lands in the Ngorongoro district in Tanzania, to form a game reserve in the name of conservation (Hughes 2006).

While the above examples may not happen explicitly in the name of One Health, even many approaches under its banner continue to non-coincidentally take out countless desirable lives through the indiscriminate use of antibiotics as described in Dentico et al.’s (2022) extensive survey of AMR as a legacy of an unhealthy development model. That is why Wallace (2016: 246–247) has called for a Structural One Health that tracks disease along circuits of capital, in order to resolve ‘Lauderdale’s paradox, by which the market rewards efforts to destroy Earth’s remaining resources’, arguing how Structural One Health would instead favour ‘populations that conserve the environments they consume.’

As agrarian scholar activists working alongside legions of smallholders, Indigenous Peoples, fishers, forest dwellers, and farm workers in the food sovereignty movement globally, we choose a *probiotic* approach to food production—agroecology. Viewed through the lens of the three spheres of transformation (O’Brien et al. 2023), agroecology is a



scientifically-justified personal, practical and political way of farming, in full harmony with nature. Using Rosset and Altieri's terminology (2017: 49), we can refer to agroecology as 'an applied science embedded in a social context, problematizing capitalist relations of production and allying itself with agrarian social movements'. Farmers in the agroecology movement are not compelled by Thatcher's intentionally disempowering assertion that 'there is no alternative' (T.I.N.A.) to neoliberal capitalism. Maintaining and building alternatives, we collectively struggle for autonomous food networks through horizontal knowledge exchanges between small-scale food producers, and dialogues of wisdom between diverse epistemologies (Rosset and Altieri 2017). We do so by working to build local and territorial markets and the associated necessary infrastructure such as community-controlled abattoirs, grain mills, and dairy processing, what the first author calls the intrinsic infrastructure of agroecology (Jonas forthcoming), and, therefore also by necessity, through advocacy for targeted reform for enabling policy frameworks from the local to the global levels to achieve an agroecological transition. We embrace the abundance of bacteria in our soils, our guts, and all around us in a biocentric approach to farming. Where an antibiotic approach seeks to kill all but the target species' allocated exchange value by the capitalist economy, agroecology works to support lives in balance, relying on biodiversity instead of monocultures, and economically diverse livelihoods rather than commodity production.

Multiple times throughout history and still in many parts of the Majority World, plagues and pestilence have arisen from overcrowded cities, untreated sewage, and unsafe water and housing. The public health response in countries who can afford it has been to avoid overcrowding while supplying adequate safe housing, sanitation, and clean water. The failure to apply this logic to intensive livestock production, borne of the hegemony of colonial capitalism, has brought us the pandemic era; only a truly systemic response can mend a broken system. Agroecology offers this transformation through its ecological, economic, social, cultural, and political frames and actions.

### **Biodiversity Loss and the Rise of Zoonoses: Casualties of Capitalism**

Where the first author farms in what is now called Australia, as elsewhere, the rise of fast-growing, high-yielding industrial genetics has led to a concomitant loss of rare- and heritage-seed varieties and breeds of livestock. The Rare Breeds Trust of Australia (RBTA) notes how the erosion

of cattle biodiversity in Australia has led to around 83% of the dairy herd consisting of the Holstein–Friesians breed.<sup>1</sup> RBTA also highlights how—among Holsteins—the intensity of selection for milk volume has compromised other natural traits, resulting in metabolic and structural problems, increased production disease prevalence, and reduced fertility and longevity in the breed.

In addition to a dearth of practice or policy supporting agricultural biodiversity, there is also a notable lack of academic or industry research in Australia on the importance of biodiversity in agriculture. Recent initiatives such as the Australian Farm Biodiversity Certification Scheme Trial funded by the Federal Government Department of Agriculture, Water and Environment demonstrate all too clearly how far Australia has to go in understanding the urgent need for transformation of its agriculture, as to date it does not explicitly include any focus on increasing biodiversity in agricultural produce, only in the landscape surrounding production areas. In fact, most government biodiversity strategies are silent on the importance of biodiversity in and for agriculture; references in this field only allude to wild or native plants and animals, as though biodiversity only happens in the shelterbelts, while ignoring farmland itself, which constitutes more than half of Australian land use. Biodiversity has only recently gained more attention through the development of environmental markets, where the increasing financialization of nature threatens to deepen the metabolic rift between agriculture and nature (Foster 1999). The abstraction of biodiversity (and carbon) de-materializes nature in order to commodify and exchange it as fungible assets, creating a new market for capitalist agriculture, which creates ever more threats to human, more-than-human, and planetary health.

The 'land sparing' conservation argument that posits human activity as inherently separate from, and detrimental to, nature leads to a key misconception surrounding the effects of livestock—and farming in general—on biodiversity: that all farmers manage ecosystems equally. There is an inescapable distinction between large-scale industrial livestock farmers, who intensively house one or two breeds of livestock and erode the soil quality and biodiversity of surrounding ecosystems, and the Indigenous Peoples, peasants and small-scale farmers who have managed pasture-based livestock alongside healthy, biodiverse agro-ecosystems for millennia. Generalizations across the spectrum of livestock management practices wilfully ignore the diversities in scale, ecosystem management, livestock genetic diversity, and multi-species entanglements from microbe to market garden that exist across these farms.

<sup>1</sup> <https://www.britannica.com/animal/Holstein-Friesian>.



According to the Centre for Disease Control (CDC 2021) in the United States, three out of four of all new and emerging human infectious diseases globally are zoonotic in origin, and a study published in *Nature* (Rohr et al. 2019) found that conventional agriculture was associated with half of all the zoonotic pathogens that emerged in humans in that time. Wallace (2018) reports:

Highly pathogenic strains of what Bulach et al. (2010) reported are monophyletic H7N3, H7N4, and H7N7 were documented on large broiler and layer poultry operations in Victoria and Queensland as far back as the 1970s (Cross 1986/2003; Westbury 1998). An on-site increase in the virulence of an avian influenza H7N4 strain from low to high pathogenicity in 1997 was documented on a large commercial broiler-breeder operation of 128,000 birds.

Why this association? Because capitalist industrial agriculture is a recipe for biodiversity suppression and erosion, which is ergo a major contributor to the development of new epizootologies. Amassing thousands of genetically identical animals in close quarters creates the conditions for pathogens to thrive and potentially mutate to infect other organisms close by, including people. As Wallace (2016: 242) writes:

Such ills are often managed in comparatively sterile, though at such densities still pathogen-conducive, conditions, requiring continuous applications of vaccine and pharmaceuticals in livestock to reduce now endemic diarrheas and respiratory diseases. Pesticides are applied to crops largely engineered for withstanding still greater petrochemical application, selecting for superweeds and pests.

Always ready to convert a catastrophe into an opportunity, Wallace et al. (2021: 194) demonstrates the ways that ‘disaster capitalism’ (Klein 2007) ‘monetises the process of controlling those very same diseases that are of its own making [...] biosecurity is deployed first and foremost to protect the most lucrative markets in invasive agriculture’.

The role monocultures of livestock and crops play in disease emergence has been known for decades, just as it has been known that smallholder, low-input farming rarely breeds such potential disasters. Biodiversity-rich farms, therefore, are the most effective form of biosecurity we have, as they are an efficacious form of both prevention of outbreaks and system-level resilience when they occur. Post-production processes and long supply chains, often enshrined in careless free trade agreements, are further contributing to the rapid spread of diseases, such as African Swine Fever and Foot and Mouth Disease, and the rise of AMR (Dentico et al. 2022). On the other hand, small-scale pastured livestock production in agroecological systems

selling meat in direct local supply chains reduces the risks of disease emergence and spread, while eschewing antibiotic use except in rare cases of therapeutic need. Diverse smallholdings are also far more able to adapt to climate change, itself a known contributor to the rise and spread of zoonoses, such as Japanese Encephalitis Virus’ appearance in southern Australia for the first time in 2021.

## From Dystopia to Utopia: The Past and Future are Agroecology

Moving now from critique of capital to collectives of *campesinos*, we offer a sketch of the place where and the ways in which first author Tammi Jonas farms with her husband Stuart, sharing the land with two young vegetable farmers and occasional interns, currently including second author Ben Trethewey. Jonai Farms is an agroecological community-supported agriculture (CSA) farm on unceded Dja Dja Wurrung Country, raising heritage breed Large Black pigs and Speckleline cattle on pasture, and growing purple hard-necked garlic. We share rent-free land in relations of reciprocity with Tumpinyeri Growers, a market garden run by proud Ngarrindjeri and Narungga man Josh and settler Rex, in an emergent silvi-agriculture system, establishing what we all hope is a beacon for the principles and practices of agroecology. There are no chemical inputs on our land—no pesticide, herbicide, fungicide, or synthetic fertilizer—and the only time veterinary chemicals are used is to treat sick animals, including antibiotics when necessary (once per annum on average).

Livestock are fed surplus produce from other food and agriculture systems in Victoria (e.g. brewers’ grain and whey), creating a net ecological benefit by diverting many tonnes of organic ‘waste’ from landfill, having rejected commodity grain feedstock many years ago in early attempts to extricate ourselves from capitalist supply chains. While animals are currently slaughtered off site, carcasses return for further processing and value adding in the on-farm butcher’s shop, further strengthening control of the resource base. Surplus nutrient is processed in Audrey, a rotating drum composting vessel built by Stuart, which completes its paddock to paddock cycle as rich fertilizer for Tumpinyeri’s vegetables. A micro-abattoir to service the farm and 15 other locals is in development.

Ninety five percentage of produce is sold to 80 household CSA members, who commit to sharing the abundance and the risks of the farm in a solidarity economy, and the small remainder is sold through the farm gate shop. Our ambition is to be a drawdown farm, demonstrating how an agroecosystem with livestock and abundant biodiversity at the genetic, species and ecosystem levels can express a healthy carbon cycle while building resilience to external shocks.



The farm embraces degrowth to ensure sufficiency for all, and we value conviviality and mindful appreciation of the fruits of our labour, stopping to enjoy three meals together each day. We share the benefits of our use of Djaara Country by paying the rent to Original Custodians.

As a community, we explicitly value relationships over transactions, and reflect on our relations with the unceded lands on which we live to help guide our responsibilities with each other, other farmers and suppliers, and the communities we feed. We embrace all kinds of value—social, ecological, cultural, and economic—where all parties reciprocate commensurate with need, capacity and care. The land benefits from a greater number of ‘eyes per acre’ as Wendell Berry says, and from the integration of a net fertility producer (our livestock enterprise) with fertility consumers (the market garden), ensuring surplus nutrients are never configured as ‘waste’ in a well-functioning ecosystem. Where capitalist agriculture produces the metabolic rift, agroecology instead produces healthy soil to grow delicious food to feed to local communities.

## Structural One Health: The Need to Shift One Health Approaches Upstream

The One Health High-Level Expert Panel (OHHLEP) provides this definition of One Health:

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change and contributing to sustainable development.

By turning a blind eye to the capitalist economy that overwhelmingly controls the activities and well-being of ‘people, animals and ecosystems’, the notion of One Health has yet to work on protecting or restoring biodiversity, ecosystems, and the communities who steward them as upstream interventions to prevent and mitigate health threats. The narrow attention to tackling threats, within a biosecurity paradigm to circulating risks, is not fit for purpose if One Health is to be operationalized seriously. This approach demands protocols that both reify unhealthy dualisms between nature and society and are, in any case, too costly for small-scale farmers to implement, thereby supporting the further imposition

of anthropocentric industrial farming as part of the solution. In a chapter in *One Planet One Health*, Wallace et al. (2019: 224) offer a way forward by looking to smallholders and local communities, writing, ‘the kinds of community resilience at the heart of keeping infectious and chronic morbidities from emerging in the first place are foundationally interconnected with alternate models of agriculture and social organisation that reacquaint economic practice and ecological regeneration’. McMichael (2009: 163) also points to the need to reconcile the economic with the ecological, noting that the food sovereignty movement recognizes:

the epistemic shift that is necessary to reverse the metabolic rift, by revaluing agroecology and a ‘carbon-rich’ future, where a human-scale agriculture performs the life-task of feeding those marginalised by corporate foods, sequestering atmospheric carbon and rebuilding depleted soils across this planet. This epistemic shift represents an ethical intervention by which the economic calculus of capitalist food regimes is replaced by an ecological calculus.

In their attempts to justify the continued ill treatment of the majority of the world’s pigs and poultry, doomed to live out their lives in sheds without access to sunlight, grass, clean air, or the ability to express instinctive behaviours, industrialists insist that only they can feed the world and smallholders simply cannot grow enough food. This doctrine has been bullied into communities across the Majority World to such an extent that many Pasifika communities across the ocean have deeply internalized such hegemony. Sector-wide agriculture, fisheries and forestry meetings and regional dialogues alike echo the ‘fact’: we cannot grow enough food to feed ourselves, so, countries of the Pacific are destined for dependency. Yet these ‘feed the world’ narratives are utterly false and are based on the same problematic logic of One Health, that communities need better capitalism rather than what smallholders, peasants, and Indigenous Peoples have been doing for millennia and are still doing—feeding the majority of the world, and overwhelmingly doing it in ways that are ecologically-sound and socially-just (AFSA et al. 2022).

## Conclusion

We know what comes after capitalism because we are living in the ‘world of becoming’ (Connolly 2011), enacting a degrowth economy of frugal abundance to ensure radical sufficiency for all. Active in our own optimism, we grow food in harmony with nature and work towards just relations between settlers and Country, and settlers and First Peoples. Because we live in a colonial capitalist country, we fight collectively for what we grow and eat through our



work with other local farmers, nationally with the Australian Food Sovereignty Alliance, and internationally with La Via Campesina and the IPC. Finally, unlike our industrial counterparts, we eat what we grow at three convivial meals every day. We are utopians. We take seriously Wagenaar and Prainsack's (2021: 20) admonition that:

the first, necessary, step in utopia as method is to transform our criticism of a particular state of affairs into a genuine estrangement or alienation with that particular situation.

Choosing to feed our community rather than the shareholders of banks is one way we manifest our rejection of capitalism's profiteering cycle of debt. We do this by raising community funds to build more infrastructure on the farm at the speed of our bank balance. We do this also by valuing labour over capital—doing more ourselves with less, and with old and recycled resources. Sharing land, paying the rent, and lighting a beacon for agroecology are more ways. Alienation has never been so joyfully communal. We and the millions of smallholders globally are the future of this one planet, promoting a unified and interconnected Structural One Health, just as we are the past.

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