## 1 Background: The Origin of One Health

Today, it seems possible to talk enthusiastically about One Health without a very clear idea of what it is.

It is September 2004. A group of health experts are meeting at a symposium at the Rockefeller University in New York City, to discuss 'Building Interdisciplinary Bridges to Health in a Globalized World'. A year before, the Severe Acute Respiratory Syndrome (SARS) outbreak was brought under control. The new coronavirus appeared suddenly in 2002, with the first human case of atypical pneumonia reported in Guangdong province in southern China. The outbreak might have started in civet cats (*Paguma larvata*), although the role of bats – *Chiroptera* – cannot be excluded. The international health community is now on high alert for new emergent infectious diseases, especially *zoonoses* that spread from animals to humans. The symposium is organized by the Wildlife Conservation Society (WCS) – first convened in 1895 as the New York Zoological Society – and its members are familiar with *hotspots* like geographical wilderness areas of high biodiversity, live animal or wet markets, and industrial farms, where infections – or *spillovers* – are most likely to occur. Their message is clear: zoonoses are normally viewed as public health matters, and although SARS suggests there are tools to stop a potential pandemic, the group is concerned about the increasing frequency of outbreaks and can prove that human activity is responsible. The increasing population scale of zoonotic infections, and spillovers of emergent infectious diseases, are not random, and are symptomatic of the Anthropocene, a geographical epoch recording human activity as the dominant influence on the planetary environment.[1] The idea of indomitable human impact, now accelerating beyond safe limits to all sustain life, is indicative of many years of human migration, exploration, industrialization, wars, and globalization.

Participants at the symposium wonder why ecological sciences have been ignored despite the growing evidence. They talk about sidelined studies, showcasing conservation as part of the solution. And many are alarmed about emerging cases of 'bird flu', the devastating outcomes if there were ever a large-scale Ebola Haemorrhagic Fever outbreak, or the emergence of a previously unknown disease.

At the Rockefeller University symposium, they agree that a different approach is needed, and they come up with *The Manhattan Principles*:

> [To] Recognize the essential link between human, domestic animal and wildlife health and the threat disease poses to people, their food supplies and economies, and the biodiversity essential to maintaining the healthy environments and functioning ecosystems we all require.[2]

They call it 'One Health–One World™'.

As a modern preoccupation, One Health plausibly sprung from One Medicine. According to this concept, 'veterinary medicine shares with public health a unique practice philosophy based upon identical population concepts'.[3] One Medicine influenced the epidemiology of veterinary public health in the 1940s,[4] and that field was adopted at the inauguration of the World Health Organization (WHO) in 1948.[5] In 2007, the American Veterinary Medical Association defined a One Health approach as ' . . . the collaborative effort of multiple disciplines – working locally, nationally and globally – to attain optimal health for people, animals, and our environment'.[6]

If health is surely significant, then why is it 'One'? Is it equivalent to the population and its politics that makes health 'public'? Or is it, like in *One* Medicine, describing a tangible methodology? Who, then, is a theory of One Health for? Is it just about recognizing the essential links with nature that affect our health, or forging new connections and rebuilding bridges with natural fellows? If we can answer these questions, we might know if One Health is medicine, or public health, or something altogether different. What emerges from this Element are two ideas: one about animal rights, and one about reasonable environmentalism. Although here, these ideas are developed from afar, they tell us a great deal about the environmental challenges ahead.

## 2 Introduction

Zoonoses account for over half of all emerging or re-emerging diseases, many with the potential to be the next pandemic.[7] The 2009 'swine flu' pandemic should have galvanized One Health, One World, with a clear warning:

> In the final analysis, this anticlimactic pandemic might be best remembered as a trial run for the truly vicious killer that may come one day. And it has demonstrated that if influenza's Big One had struck in 2009, we would have been in a world of hurt.[8]

And yet, the 2019 COVID-19 pandemic – a 'metamorphic' socio-ecological phenomenon[9] – showed that for all that had been achieved, often fluctuating interest in pandemic preparedness mostly fell to underfunded national initiatives and these critically lacked an environmental dimension.[10] It is a story on repeat: Acquired Immune Deficiency Syndrome (AIDS) was first recognized in 1981. It started when a simian immunodeficiency virus, probably circulating in a chimpanzee (*Pan troglodytes*), infected a human being (*Homo sapiens*) somewhere in a forested area of Central Africa. That spillover was the index case for Human Immunodeficiency Virus type 1 (HIV-1). By 1984, the public health community was responding to the global crisis by linking clinical and

social research. But they had identified the new disease too late; and there was a sense that opportunities had been missed that could have prevented tens of millions of deaths worldwide. There were gaps in epidemiological data, silos in practice, and hidden determinants of health driving the virus through communities. HIV would become globally endemic. If we were lucky with SARS, then COVID-19 is here to stay.

This Element is a bird's eye view. It tries to answer the question 'what is One Health?' with a general objective in mind: to prove that, in theory, it is different from other population approaches to health, and that in particular, public health responses may have a specific connotation that cannot ethically be reconciled with One Health. This Element will answer this question by analysing the systematic population problem of *interspecific justice*: a phenomenon existing or occurring between different species.[11] The probability of another pandemic is an environmental enigma: 'Disease X' – a 'pathogen currently unknown to cause human disease' – connects every natural space to communities, national interests, and development. HIV was tied to the wilderness in Africa, and SARS to animal markets in China. Swine flu originated in industrial farms in Mexico. Middle Eastern Respiratory Syndrome (MERS) started infecting humans in 2012 and has remained in that region through contact with camels (*Camelus dromedarius*); the chain of infection is still unknown. The catastrophic Western Africa Ebola outbreak in 2013 was likely due to contact with Angolan free-tailed bats (*Mops condylurus*). And then came the COVID-19 pandemic: the link to bats, again, was an indelible reminder of the connections between human health and nature.

This Element is not completed here, but it goes some way in proving that an ethical relationship with nature will reduce the risk of another pandemic, through policies that reflect the fact that we live with, work with, and care for animals. A new definition of One Health arrives much later, but it will make less sense if we skip too far and too fast forward. After all, there is more than one cause of 'our ecologically deranged planet'.[12]

I propose to search for coherency by taking a journey via three themes; these are not presented as polished surfaces but are instead arguments at different stages of research. (For One Health, there is value in study, taken step by step, amid twists and turns – bumps and potholes – of all the possible interdisciplinary paths.) The themes are as follows: historical inspirations for relating our (public) health to natural others (Section 7); the facts evident in existing human rights frameworks and the reasons for One Health emerging in international summits (Section 8); and an explanation of our ethical relationship to nature (Section 9). And to give away their relationship to one another, I suggest each theme raises questions of rights.

If these themes raise many moral issues in-and-of-themselves, I have in mind to reach only one conclusion: *One Health Environmentalism* is a response to a cultural dissonance from nature, that is impacting environmental sustainability and harms both humans and animals; that is, One Health ethics does not arise out of a *practical* – public health – concern of humans for humans, but from a lack of *theoretical* concern for animals. The climate emergencies humanity faces have mental, physical, and social impacts; these are visible as symptoms of poor health in populations, often exacerbated by injustices of social strata and circumstances in which people live and communities can be healthy. But planetary health is also affecting animals, and their health affects us in all the places we live with them. My hope, therefore, is to start a scholarly debate about radical solutions to these environmental crises, which are more difficult to gainsay in the noise of conflicting social and political agendas.

## 3 An(other) Environmental Crisis

One Health connects various phenomena to unhealthy environments. There are many examples.[13] Choking cities contributing to greenhouse gases; expanding and squeezing the life out of green habitats. Communities reliant on high output, monocrop fields and industrial farms that butt against and devour wilderness, leaving wastelands.[14] Biodiversity loss as irreplaceable natural resources are dug up, chopped up, and processed at an ever more alarming rate. What wilderness is left is captured by privateers, exploiting scarcity and necessity, and spitting out discernible 'public bads': the opposite of collective benefits of public goods. The plundering of ecoservices[15] 'crucial for the well-being of humans and nature',[16] often done with the main goal of simply larger profit with no end in sight; an enticement that spreads through economies of meaningless consumerism of some kind, creating vast globalized networks to extract more and more resources. Access to natural spaces becomes harder as it is rendered unsuitable for habitation; species that live there adapt, leave, or die, as it physically disappears or is privatized for personal gain. Industries take little social responsibility through shady political deals; and the goods and processes we come to rely on produce waste that become global pollutants.[17] Ignorant, corrupt, and ideological political (mis)representation, amplified by social media, contributes to social inertia, promotes populist agendas to disrupt coordinated responses, and stokes radical disobedience and then clamps down on the actions meant to protect the environment for us and future generations. These *are* existential threats: some animals – like us – can adapt their behaviour, but only we can change policies or deploy green technologies. Other species cannot

evolve quickly enough; biodiversity is lost, and ecosystems transform into something far more dangerous.

Zoonoses occupy a larger space in this Element, and there is more than enough about pandemics to keep us busy here (and concerned). As well as being an area of utmost urgency,[18] pandemics, as we shall see, are a topic where the environmentalism of One Health and humanitarianism of public health are mostly in conflict, because the driving factors of zoonoses are *interspecific*, involving non-human animals and human activity in the environments we share with them. '[A]ny infectious disease is inherently an ecological system.'[19] It is in these respects that the ' ... [COVID] pandemic is no more a "natural" phenomenon than the famines of the past or the current climate crisis'.[20]

> The cumulative scientific evidence is unequivocal: climate change is a threat to human well-being and planetary health (*very high confidence*). Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all (*very high confidence*).[21]

Anthropogenic climate trends heighten social upheaval and strife. Millions of people have been displaced; the crowded, unsafe, and unhealthy environments they end up in are ideal for spreading diseases.[22] But patterns of urbanization also create cities of concrete and tarmac ideal for resourceful animals that flourish. In places like these, uncontrolled human activity pushes ecologies to and beyond their limits, releasing latent zoonoses; new environments develop, modifying the ranges of animals that can adapt and survive, but which become test tubes for pathogen evolution and emergent diseases.[23] Deforestation causes Ebola outbreaks, industrial farming leads to swine flu, and wet markets incubate novel coronaviruses. Several diseases – such as Dengue, Zika, and Lyme – are expanding from their previous environment because of anthropogenic factors.

We already know about the next pandemic: Highly Pathogenic Avian Influenza (HPAI) was first recorded in 1997 in Hong Kong. It was linked to poultry farms and markets that turned out to be ripe for zoonotic spillover: large numbers of animals with poor welfare, species that do not normally mix in nature, in unnatural surroundings and proximity. (These conditions may also explain the origin of COVID-19: it likely started in captive animals in a Wuhan Market, kept in crowded and filthy conditions.) As well as six human deaths, the Hong Kong HPAI outbreak resulted in the 'total depopulation of all poultry markets and chicken farms'.[24] Globally, cases of HPAI or 'bird flu' (avian influenza A, paralytically subtypes H5N1, H7N9, and H3N8) are becoming more common in wild and farmed birds, thought to involve migrating birds as well as human movement and trade. Human infection is rare, but for those who

catch it, around 60 per cent die, making it a potential pandemic many magnitudes more deadly than COVID-19. HPAI has been found in domestic dogs, foxes (family *Canidae*), bobcats (family *Felidae*), skunks (family *Mephitidae*), raccoons (family *Procyonidae*), bears (family *Ursidae*), otters and minks (family *Mustelidae*), seals and sea lions (families *Phocidae* and *Otariidae*). In October 2022, H5N1 was found in farmed mink in Spain.[25] It was an alarming discovery, because it was evident of inter-mammalian infections; and although no human-to-human infection has been detected yet, that would be the first sign of an imminent pandemic.

Given that bird flu is endemic in nature, how do we prepare for (it as) the next pandemic? In the case of bird flu, international conventions protect migrating birds as they pass through different jurisdictions, so that source of spread cannot be easily contained by traditional means. Public health relies on surveillance, track and trace. Once the alarm is raised, we rely on responses such as quarantine, but only for humans; all other animals risk being culled. To date, millions of captive and wild birds have been infected and have died; many more of them are intentionally slaughtered.

The ecological and geographical global reality is that nature traverses political borders; it frames the world as ethically 'porous',[26] justifying an approach to understand ' . . . both human and non-human indices of health, and the wider study of biospheres, ecosystems, and "social" networks'.[27] While the second part of this claim suggests a One Health 'approach' (Section 4.1), there has been less willingness in the field to address practical trade-offs that might be necessary for environmental fairness or justice. So I want to move back a few steps and focus this Element on a specific purpose: to undertake an ethical analysis of One Health as '. . . a process of constructing a shared understanding of the evidential basis for neglected and critical ethical problems that call for structural change'.[28]

## 4 Methodology

Keeping this Element within a manageable scope, which is original, succinct, and authoritative, is a challenge with two areas as big as public health and environmentalism. This Methodology is much longer than I hoped, but while preparing the ground, I realized that it could have been a (fourth) theme: a story of the struggle to find relevance for a 'new' idea. For my purposes, I merely clear some underbrush, rather than risk taking byways that extend this Element to unconscionable length.

So, to keep this enquiry on track, this Element does not cover many theories of environmentalism and does not circle back to the principles of animal ethics

in detail. Also, you will not find many 'One Health' cases discussed in depth. Only at the end do I give some ideas for ethical implementation (Section 10), but this is mostly about inspiring further thoughts. It is also not my place to try to improve on public health ethics. Before saying anything more, let me make it clear that this Element does not set out to undermine the purposes of public health; it is not a choice of either public health or One Health. I also forewarn the reader that I shall be giving each of the three themes – history, law, ethics – a slant that favours philosophical ways of thinking, and by-passing others.

The thematic approach involves transitions from historical, through legal, and eventually a bioethical method, as though they were interlinked. I anticipate that some readers will view this method with suspicion: what has *this* author accomplished here, in expanding methods in history, legal theory, and bioethics? There are indeed nuances to every methodology, including understanding their limitations.[29] But there are already different methodological assumptions in One Health practice we should be aware – that is at the core of any kind of practical disciplinarity, after all. So each of the following themes is only meant to give a flavour of three kinds of systematic enquiry, and to organize discourse around the significance of each: the historical origins of One Health, its appearance in international law, and its ethical foundations, should stand together to justify both my course and destination.

I will now take a moment to say a few words about definitions. Firstly, all possibilities for the concepts used are not cited; earlier drafts that did so, became unwieldy. Some of the terms I have already used – among others, *anthropocentric, culture, nature* – are notoriously fuzzy and each one could take up the entirety of a volume in the Cambridge University Press Elements series. As such, I do not want to be bogged down in semantics and particularities, so I will be general in my treatment of things like economics, and some suspended assumptions will be necessary for the sake of brevity. For instance, my use of law throughout is simplified as it relates to the international bodies we already have (in particular, the United Nations); I will not address in fine detail jurisprudential controversies, specific places of law, or instances of legislation. International fora have become the basis for conventions on biodiversity and climate accords and use the language of human rights. Rights will be the primary topic in theme three.

I use a few conventions: (non-human) *animals* to distinguish between *human* (beings) and other species (recognizing that humans are primates, mammals, etc.). 'Species' is not an easy concept. Here, I use species generally to mean a natural taxonomic unit, even though the rules are not discrete. Individuals within each species have different capacities, and there are commonalities, that

is, all mammals require air; all vertebrate species are sentient; all Great Apes 'think'. (This is fundamental to theme three, too.)

The meaning of disciplinary and specific technical terms are not always given in this Element, so some basic scientific understanding is assumed. For example, a *spillover* can be defined as the cross-species transmission of a pathogen into a host population not previously infected. But it is a complex and multifactorial phenomenon, involving aspects associated with the biology and genetics of the host, reservoir, vector, and microorganisms involved, and the environmental context. *Zoonoses* spread to humans by direct contact, from food or water, fomites or environmental contamination; humans infect animals with *zooanthroponoses*. There is also the technical language about contextual relations on the land, water, or between flora and fauna – and every location and species found, infers countless researches in biology, ecology, genomics, and many others, that connect ecosystems to the biosphere.

Since I am making conceptual comparisons, I will do away with one health as a proper noun, to match the convention for naming public health, ecology, and conservation.

## 4.1 A One Health Approach

The methodological steps taken here are necessary if only to avoid what Robert Merton called 'The Fallacy of the Latest Word', and the risk that 'wholesale neglect of theoretical contexts soon fall of their own weight'.[30] If these remarks suggest that one health has become a nominalist fallacy – a generalization that fails to explain exactly what it *is* – then to leave the matter thus is to leave it vague and obscure. My other motivation is Stephen Jay Gould's opus, *The Structure of Evolutionary Theory*, in which he claims, 'Theories need both essences and histories.'[31] I think we can borrow from this an entirely appropriate abstract anchor to try to solve the puzzle of what connects us to nature: in theory, then, is there an intrinsic quality to one health? Is it, like evolutionary theory (taking on Gould's challenge), a 'genuine thing'?[32]

The following investigation reveals that there is a tension *within* one health. A keynote speaker at the One Health–One World symposium, WCS President Steven Sanderson described the consequences of globalization as '[rescuing] conservation from development[,] and poverty alleviation from ecological degradation'.[33] In theory and in fact, ' . . . two claims are simultaneously true: there is a threat to the human life support at the same time as several billions of fellow humans have to be lifted out of poverty'.[34] So, if the gist of both one health and public health concerns the same scale of populations and same determinants of health,[35] then why cannot public health do the ethical work?

Public health outcomes, which are measured in terms of social and environmental justice, might include an approach to 'maintain . . . culture . . . for the broader public good'.[36] How does social justice relate to nature or wilderness, and the lives of animals that live there: *what is good for them*?

And so I distinguish between one health *ethics* and a one health *approach*. The one health approach gives a name to something far from new, yet it has become a focal point to encourage people to talk with those they would not normally think to do so: it meant to be multidisciplinary, interdisciplinary, or transdisciplinary – which suggests at least it is not simply uni-disciplinary. However, an approach gives a weak semblance of purpose between those heading in the same direction, whereas ethics indicates a common value – a purpose for the journey.

Inter- and transdisciplinary approaches, developed in the social sciences, have become theory-derived conceptual guides for justifying empirical support for one health. But though there is perhaps modern significance in holism, methodologically speaking at least, it is a long time since social-scientific phenomena were thought to be completely explicable in terms of individual disciplines. Moreover, these theories often lack ecological relevance.[37] In respect to the socio-economic expectations for transdisciplinarity,[38] the approach is as much about convergence in terms of coming together on what we agree about, as well as amalgamating different disciplines, practices, and agencies; achieving that goal presupposes a normative, coordinating principle. However, the one health approach itself does not extend what might be the 'right theory' into diverse areas of practice, and fails to provide a critique perhaps needed, particularly in respect to the divergent values of economics, public health, ecology, and conservation. The problem of an approach, therefore, is that it tells us little about thematic critique: the destinations of history, law, or ethics.

That said, an approach can have tacit importance: in the following, where sources on public health, conservation, or ecology, are cited, the authors or their words are meant – in the spirit of the approach – to be authentic and authoritative, as if we were at a multidisciplinary meeting, *à la*: 'At every step, in order to visualize the consequences, we need to go through some laboratories to learn new techniques, to be confident in the results of some instruments, and to appeal to some experts.'[39]

Joël de Rosnay used the idea of *The Macroscope* (1979) to refocus our gaze outwards from society to nature – a 'symbolic instrument made of a number of methods and techniques borrowed from very different disciplines';[40] this, too, will be used to navigate the great distance I have to cross to find a common one health vocabulary.