Ecologies

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Ecology is commonly understood as a science of interconnections. In essence, it seeks to understand the multiple, overlapping interactions between living organisms and the wider biophysical environment. Although its emergence as a discipline is relatively recent, the attempt to understand such connections has probably been around as long as *homo sapiens* has been. The term 'ecology' was coined in 1866 by the zoologist and naturalist Ernst Haeckel, who defined it as 'the entire science of the relationship of the organism to the surrounding environment, to which we can add all "conditions of existence" in a broader sense' (Haeckel 1866, 286). It took another two decades before the label caught on in scientific discourse, but it was soon institutionalized with the founding of the British Ecological Society in 1913 and the Ecological Society of America two years later. By the mid-twentieth century, ecology was a firmly established discipline comprising several overlapping fields of interest (population dynamics, food webs, energy flows). Since the 1970s and -80s, it has moved towards an emphasis on the inherent mutability and dynamism of ecosystems in place of older notions of ecological 'balance'. As a field of study, ecology has long been (and remains) characterized by a broad assortment of guiding concepts and analytical methods. What binds it together is an elemental interest in 'the processes influencing the distribution and abundance of organisms, the interactions among organisms, and the interactions between organisms and the transformation and flux of energy and matter'.[1]

In popular usage, 'ecology' (like globalization) is often used to express the idea that everything is ultimately interconnected. As the California conservationist John Muir famously remarked in 1911: 'When we try to pick out anything by itself, we find it hitched to everything else in the Universe' (Muir 1911, 211). But this is not what ecology is actually about. Rather, it studies the different types of connectivity *and* disconnectivity between things, for these differences are what make the biophysical world work. Some ecological interactions are strong, others are weak, and some things scarcely interact at all. At a spatial level, some interactions are immediate, while others operate through cascading flows of energy, nutrients, or chemical signals. Temporally, some connections are fleeting, others long-lasting, and their strength can change over time due to any number of factors. As a recent article in the journal *Nature* puts it, 'the dynamics of ecosystems include a bewildering

1 To quote the definition of ecology by the Cary Institute of Ecosystem Studies: https://www.caryinstitute.org/news-insights/2-minute-science/definition-ecology.

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number of weak to strong biotic interactions' (Gellner and McCann 2016). Connection, disconnection and change are integral parts of the ecological puzzle.

These differential connections become yet more bewildering when we consider 'ecologies' in the plural sense of the term (Rademacher et al. 2023). Whereas 'ecology' usually implies the body of (Western-descended) scientific knowledge about the functioning of environmental systems, 'ecologies' tends to be deployed by scholars in the environmental humanities and social sciences to refer to the many different ways of experiencing, knowing, and narrating the relationships between the human world and the rest of nature. Instead of dealing with species distribution or energy flows, 'ecologies' are rooted in cultural values, ideas, historical self-understanding, and socio-political dynamics. At one level, the pluralization of the term arose as part of the broader social critique of reductionist Western science as a form of epistemological domination historically rooted in imperial modes of thought, unequal power relations, and universal claims of validity. At another level, the pluralized term also reflects the wider transformation of ecology from a distinct strand of natural science into a socio-political concept, even a kind of world-view.

Ever since the publication of Rachel Carson's *Silent Spring* in 1962, ecological science has served to inform new ways of thinking about the world and new political movements that challenge what they see as abuses of the environment (and much else). Much to the annoyance of some of its professional practitioners, ecology soon became 'political'. Writing in 1964, the American ecologist Paul Sears called it the 'subversive' science because many of its principles – holism, interdependency, feedback loops – challenged conventional ideas and practices that underpinned the existing social and political order (Sears 1964). Over the following years, ecological concepts were adopted and adapted to support not only environmental agendas per se, but also broader demands for social and economic justice. Eco-Marxists have argued that the exploitation of people and nature are flip-sides of the same coin of capitalist profit-seeking, which simultaneously alienates people from each other and from the natural world. Ecofeminist thinkers have contended that patriarchal authority over women and the anthropocentric subjugation of nature share the same elemental ethic of domination. More recently, the philosophy of 'Deep Ecology' has argued that both human and non-human life have intrinsic value and that humans have no right to interfere with it beyond satisfying their vital needs (Ghazoul 2020, 117–29). Ecology thus retains its subversive potential today, though in recent years the terminology has become so unmoored from its scientific origins as to be applied almost anywhere, from 'business ecologies' to 'digital ecosystems' to 'ecologies of innovation'.

The common denominator of all these different 'ecologies' is an emphasis on interaction and interdependence from the local to the global scale. Yet the very pluralization of the term points to the many disjunctures and contradictions that

are involved – between different places, between different groups or assemblages of organisms, between disparate ecosystem models or ways of understanding the environment. Consequently, when we look at globalization and its history through an ecological lens, what we see is a complex web of dis:connections.

By way of illustration, let us begin with a favourite topic of globalization studies: trade (→ **Capital**). As the historian William Cronon remarked over thirty years ago, 'Among the many human actions that produce environmental change, few are more important than trade. When people exchange things in their immediate vicinity for things that can only be obtained elsewhere, they impose a new set of meanings on the local landscape and connect it to a wider world' (Cronon 1992, 37). Over the past few centuries, the unprecedented growth of global trade has connected distant landscapes with each other more tightly than ever before: mining sites with industrial centres, cotton fields with mill-towns, oilfields with sprawling suburbs. The spread of modern communications and market signals created an ever-denser web of commodity networks that converted more and more natural resources into goods exchanged on global markets: animals into meat, ore deposits into metals, trees into timber.

Translated into the language of ecology, the swelling currents of global trade represent a vast intercontinental flow of energy, nutrients, and fertility between different parts of the world (McNeill 2019). Yet this ecological *Wandel durch Handel* has always cut two ways: integrating some things invariably weakens other connections. Even as global trade spatially links producers and consumers, it also generates potent distancing effects. By detaching places of production from places of consumption, it externalizes the environmental costs of resource exploitation (deforestation, erosion, pollution) and renders them invisible to those who enjoy the benefits. When communities rely mainly on local resources, the feedback loop is immediate. By contrast, when trade enables people to draw on resources from far away, the drawbacks are displaced and the feedback is disrupted. Historically, these distancing effects have had far-reaching ecological implications: a greater tendency to disregard the environmental consequences of consumption; a lifting of the restrictions that local resource constraints previously posed on population growth, cultural expectations and economic behaviour; and a propensity to specialize in producing particular goods for comparative market advantage rather than fashioning landscapes to meet a variety of local needs. In these and other ways, the commodification of nature has involved more than just new socio-ecological linkages between different places. It has also entailed the dissolution or rearrangement of older connections that bound ecosystems together and people with them (Ross 2024; Moore 2015; Hornborg et al. 2007).

Much the same principle applies to the global circulation of organisms over the last half millennium. More than fifty years ago, Alfred Crosby's *Columbian Exchange*

drew attention to the imperial reordering of global ecology through the transfer of species between what he called the 'Old' and 'New' worlds (Crosby 1972 and 1986). Although Crosby focused mainly on the movement of germs, cultivars and animals from Europe to the Americas (and the previously unrecognized role they played in abetting European conquest), there was also a significant counter-flow of organisms (e.g. potatoes, tomatoes, maize) in the other direction. Over the following centuries, this process of biotic transfer encompassed many other parts of the world and an ever-longer roster of species: cattle, sheep, trout, salmon, coffee, cocoa, latex-producing plants, cotton, the list is nearly endless. Of course, not all of these transfers were deliberate: cholera, plague, Rinderpest, and coffee rust fungus were just a few of the unintended travellers that moved along the circuits of global trade. The overall result of such biological rearrangements was the growth of 'hybrid' or 'recombinant' ecosystems around the world (Rotherham 2017; McNeeley 2001).

By the late twentieth century, this process of anthropogenic bio-mixing had progressed so far as to suggest a new era of natural history: the so-called 'Homogocene'.[2] As global trade and travel facilitated the movement of species between previously separate landmasses and water bodies, it diminished the differences between the ecosystems in which they had evolved. But here, too, the counterpoint of biological convergence was the disentanglement of other interrelationships. Wherever exotic species displaced indigenous organisms, they severed existing ecological linkages and routinely separated local people from resources on which they had long relied. Biotic transfers – as well as attempts to manage 'alien' or 'invasive' species – have thus tended to generate new socio-economic clefts, especially whenever they have been undertaken by states, investors, or large landowners with little regard for other groups (Crowley et al. 2017; McNeeley 2001).

The contradictions of mixing organisms around the globe are even more evident when it comes to the unintentional movement of species. As we became all too aware in 2020, the globalization of pathogens and disease pools has historically gone hand in hand with efforts to sever the links of contagion through quarantine, migration restrictions, and biological controls. Quarantine measures are a prime example of global dis:connections, indeed on multiple levels. While they applied in principle to everyone, in practice they often singled out particular social or racial groups for special scrutiny or lengthy confinement. Although they were frequently based on global isolation models, they varied greatly in their design and effect according to local social and environmental circumstances. Whereas their main purpose was to safeguard global movement, they did so by regulating, channelling,

2 The term was apparently introduced by the ecologist Gordon Orians in the 1980s (Rosenzweig 2001).

and slowing down the mobility of people and other living things around the world (Bashford 2016).

Perhaps nowhere are the ecological contradictions of globalization more apparent than in the history of nature preservation and resource conservation. In many respects, the spread of national parks, forest reserves, and wildlife sanctuaries has been a quintessential story of global interconnectedness over the past two centuries. From the mid-nineteenth century onwards, 'scientific' forestry systems that were initially developed in Germany and France were adapted and applied throughout Europe, North America, colonial Asia and Africa; after the Second World War, this 'empire of forestry' went truly worldwide under the auspices of the UN Food and Agriculture Organization (Vandergeest and Peluso 2006). The worldwide spread of wildlife reserves since the 1890s exhibited a similar historical trajectory, based as it was on an increasingly global set of anxieties, norms and practices that spanned oceans and political boundaries. The epitome of such conservationist cosmopolitics was the proliferation of national parks, which nowadays number over 6,500 in more than 100 countries (according to the IUCN's definition of a national park). Ever since the United States applied the label to Yellowstone in 1872, national parks have been, in the words of a recent account, 'more adequately understood as "transnational parks": globalized localities that owe their establishment to transnational processes of learning, pressure, support and exchange' (Gissibl et al. 2012, 2).

On the one hand, then, the rise of modern conservation is a history of global frameworks of knowledge, the circulation of standardized practices, and the application of normative models. Yet on the other hand, it is also a history of exclusion, separation, and isolation. For one thing, the creation of reserved areas frequently involved the removal of people living there, and it nearly always entailed new restrictions on entry or use. The enforced absence of indigenous residents rarely went unopposed and in many areas remains a source of conflict today. Furthermore, from Yellowstone to East Africa to the forests of India, the exclusion of people from ecosystems of which they had long been a part inevitably dissolved previous ecological relationships, sometimes with unintended results.[3] Most fundamentally, the globalization of modern conservation zones was in many respects an attempt to limit or reverse some of the effects of globalization itself: namely, the destruction of 'nature' and the overexploitation of resources caused by the expansion of global trade and industry. National parks in particular have a decidedly ambivalent status as manifestations of globalization. Even as tourists stream in from around

3 In parts of East Africa, for instance, park managers who initially suppressed traditional burning practices later reintroduced them to reverse the spread of tsetse-bearing bush in favour of grasses grazed by large herbivores.

the world to behold their beauty, they essentially serve to disconnect certain spaces from their surroundings, literally to create sequestered islands of 'nature' or 'sustainability' outside of which the forces of global trade and commodification could proceed apace.

In sum, both ecology (in the singular sense) and ecologies (in the plural) are as much about disruption and difference as about interlinkages and convergence. Resorting to binaries is of little help in understanding the natural world, and is even less useful for grasping humanity's role within it. To think 'ecologically' is to focus not solely on interconnections but rather on the interactions between things, which involve differentiated, dynamic forms and degrees of connectedness. In this respect (and many others), we have much to gain by incorporating ecology into our understanding of globalization processes.

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