Editorial Ecozon@ Issue 9.1

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Welcome to the Spring 2018 Issue of *Ecozon*@. The themed section of this number is devoted to possibly the most sensitive but important issue we have yet approached: concern over the ecological implications of the seemingly inexorable growth of world population. In their introduction, "Population, Ecology, and the Malthusian Imagination," guest editors Hannes Bergthaller and Margarita Carretero González write that the spectre of societal collapse as a result of the 'population bomb' and exhaustion of global natural resources was a key concern of the early environmental movement, before suspicions that the issue was being used by authoritarians to abrogate basic individual freedoms (and by neo-colonialists to cement the domination and exploitation of developing countries) rendered it unmentionable. Its proponents were vilified, like Thomas Malthus before them, the eighteenth-century author of the 'Essay on the Principle of Population,' which notoriously defended social inequality, while advocating population control. Over the last thirty years, expressing concern over exceeding the planet's carrying capacity has evoked scorn and ridicule from both the political left and the right. However, reliance on the natural decline in human fertility as a result of improved health and education, and the ability of science and technology to feed and house ever greater numbers of human beings to solve the problem, would appear to be illusory—not least because the measures which have so far made possible the continuing growth of the human population have frequently led to the destruction of habitats and populations of other species, plant and animal. Anxieties about living in a world with "too many people" and the erosion of western living standards by being forced to share limited resources have not gone away. As Bergthaller and Carretero point out, demographic statistics and mathematical models tell us little about what it would mean to live in an "overpopulated" world: the gap is closed by the images, metaphors and narratives which constitute the "Malthusian imagination," and lend plausibility to scenarios of the future and conceptions of our ethical responsibilities. Our guest editors argue that ecocritics have wrongly evaded the subject, and should now take up the question again. The challenge, as they say, is "to find ways of articulating how the surfeit of humanity is indeed the source of ecological problems—without falling into a dehumanizing logic of emergency."

The five essays which they present open with an article in Spanish by Manuel Peinado Lorca which calls for reconceptualization of the problem of population growth in terms of its implications for climate change. In the second essay, Hannes Bergthaller considers the ecological implications of 'biopolitics,' whose aim it is to secure populations against famine and disease, and which has succeeded to such an

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extent that it is (or soon will be) endangering the basic conditions of life on Earth. Alex McCauley subjects twentieth-century Marxist thinking on population and resource distribution to critical examination. In the last two essays, Keri Stevenson and Irene Sanz Alonso discuss representations of overpopulation in science fiction, thriller and film, and assess how they address the crucial question how many people the Earth can sustain while allowing the diversity of life to flourish.

The first of the two essays in the General Section, Kenneth Toah Nsah's "No Forest, No Water. No Forest, No Animals," is a contribution to postcolonial (African) ecocriticism. This ecocritical reading of the Cameroonian playwright Ekpe Inyang's *The Hill Barbers* (2010), a drama which thematises deforestation, exploitation, capitalism and the agency of nature, argues that the author advocates a reconciliation of the hitherto opposing ideologies and practices of Christianity, and African religions, western science and African traditions in order to promote sustainable behaviour. The second essay, Jada Ach's "Land Under the Ditch: Channeling Water through Owen Wister's *The Virginian*," combines envirotech history with ecocriticism in a discussion of the presence of water in what is regarded as the first work in the 'Western' genre. It explores the paradox that while developing water infrastructure in this arid part of the United States is shown as facilitating settlement, appropriation of the land, and domination of nature, it also places the 'manliness' celebrated in Westerns (defined as the ability to cope with thirst, aridity and mobility) at risk.

In the Art and Creative Writing Section, Serenella Iovino presents images and poems relating to the theme of this issue. Mario Amura's sequence of dramatic images, 'Napoli Explosion', illustrate the growth of the population around Mount Vesuvius and the extension of settlement on its slopes at the same time as the slumbering might of the elements. Although an eruption of this active volcano is overdue, 600,000 people live in the 18 towns at its base that comprise the "red zone," vividly demonstrating the reality of living in an increasingly crowded world, where people are forced to live more and more dangerously. The seven images in Andreco's "Climate Art Project" also bear striking witness to the enhanced risks of life in a densely populated, climate-changed world, as do the poems by Terry Trowbridge and Louise Boscacci.

The Reviews Section comprises some unusually detailed and thoughtful book reviews. In the first, Serpil Oppermann subjects to close critique the Swedish geographer Andreas Malm's polemic dismissal of cultural theory (Constructivism, Hybridism, New Materialism) in *The Progress of this Storm: Nature and Society in a Warming World* and his counter-argument that in a warming world, it is more important than ever to distinguish between the natural and the social. Writing in German, in a piece which verges on being an essay in its own right, Bernhard Malkmus is prompted by the publication of a new bibliophile edition of Wilhelm Lehmann's 'bucolic diary,' *Bukolisches Tagebuch* (written 1927-32), to reflect on the literary qualities of this rare example of nature writing in German. He calls for greater recognition of the role played by the naturalist, philologist and teacher, as

well as novelist, poet and essayist Lehmann, in anticipating the aesthetic and ethical concerns of environmental thinkers such as Stanley Cavell and twenty-first-century nature writers. Bénédicte Meillon presents Paul Lindholdt's interdisciplinary ecocritical study, *Explorations in Ecocriticism: Advocacy, Bioregionalism, and Visual Design*, which combines literary/ aesthetic with scientific analysis of texts and images ranging from early travel writing to the present. Finally, Tatiana Prorokova reviews Antonia Mehnert's monograph, *Climate Change Fictions*, which examines twelve of the most important American climate change novels, and demonstrates persuasively their ability to reflect the socio-political complexity of climate change.

Finally, it is with great regret that we say goodbye with this issue to Serenella Iovino as Editor of the Art and Creative Writing Section. Many thanks, Serenella, for all the work you have put into developing relationships with artists and writers over the last four years, sourcing texts and images to go with the themed section of each issue, and writing such thoughtful section introductions! We wish you well with your new appointment in the United States.

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Population, Ecology, and the Malthusian Imagination: An Introduction

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Human population growth is a strange beast. To express concern over it may be one of the few things which, even in today's polarized political climate, will evoke roughly equal amounts of scorn and ridicule from both the left and the right.[1] The issue has become the 'third rail' of environmentalism: no major organization dares to touch it. And yet, this is the very topic which, only half a century ago, first galvanized the environmental movement into a global political force. The problem of "overpopulation" served as the catalyst for a new understanding of ecological crisis as a phenomenon that had to be tackled on a planetary scope, in contrast to the more local issues of nature conservation or urban sanitation which had preoccupied the movement's precursors. When environmental consciousness in the U.S. reached an early culmination point in the celebrations around the first "Earth Day" in 1970, the question how to rein in human population growth was generally understood as the master key to the panoply of ecological problems that had begun to draw public attention over the preceding decade. If humanity failed to defuse *The Population Bomb*, Paul Ehrlich warned, it would face a dire future marked by famine, war, and civil strife. Kenneth Boulding's powerful metaphor of "Spaceship Earth" encapsulated this new sense of the Earth as a finite place which demanded that humanity accommodate itself to the *The Limits to Growth*, to quote the title of yet another key text in this debate (Meadows et al.). Population growth also figured centrally at the 1972 UN Conference on the Human Environment, which for the first time put the ecological health of the planet on the global political agenda.

The idea that the growth of the human population was about to outstrip the Earth's ability to feed it was a variation, in an apocalyptic key, on an old and familiar theme—a theme most famously and consequentially articulated by the English economist and country parson Thomas Malthus in his 1798 *Essay on the Principle of*

[1] As evidenced, for example, by the hysterical reaction to Al Gore's remarks at the 2014 World Economic Forum in Davos. Gore argued that the lowering of birth rates should be part of the effort to combat global warming, and was immediately branded as a closet racist—by the representatives of a conservative think tank! The episode is recounted in Hoff and Robertson, 267-68.

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Population. In the *Essay*, Malthus stipulated that population has the tendency to grow exponentially, whereas food production will at best increase arithmetically. If population growth is not curbed through self-restraint ("preventive checks," in Malthus' diction), external forces (or "positive checks"), such as famine, disease, and war will bring it back in line with what animal ecologists in the 20th century would come to term "carrying capacity."[2] Malthus' aim was to provide axiomatic proof (rather than empirical evidence) why the utopian hopes for progress embraced by his contemporaries (in particular William Godwin and the Marquis de Condorcet) were bound to fail, and to demonstrate that economic inequality, with all of its attendant ills, was an ineradicable feature of any possible social order. Malthus therefore opposed attempts to alleviate poverty through government policy, such as the English Poor Laws. In the extensively revised and enlarged second edition of the *Essay*, Malthus summarized the ethical and political implications of his views in a disturbing little allegory:

> A man who is born into a world already possessed, if he cannot get subsistence from his parents on whom he has a just demand, and if the society do not want his labour, has no claim of right to the smallest portion of food, and, in fact, has no business to be where he is. At nature's mighty feast there is no vacant cover for him. She tells him to be gone, and will quickly execute her own orders, if he do not work on the compassion of some of her guests. If these guests get up and make room for him other intruders immediately appear demanding the same favour. […] The order and harmony of the feast is disturbed, the plenty that before reigned is changed into scarcity. […] The guests learn too late their error, in counteracting those strict orders to all intruders, issued by the great mistress of the feast, who, wishing that all her guests should have plenty, and knowing that she could not provide for unlimited numbers, humanely refused to admit fresh comers when her table was already full. (531-532)

Malthus' "full table" is the ancestor of all the spaceships, lifeboats, emergency rooms, and overcrowded tenement buildings that shaped the way in which issues of population growth and resource distribution were imagined during the Neo-Malthusian revival of the 1960s and 70s. Malthus' allegory, like its tropological progeny, served to render concrete an abstract set of social and ecological relationships. As Ursula Heise has pointed out, "overpopulation" is a "far more elusive phenomenon" than such images would suggest (74). Whether a given population exceeds ecological carrying capacity is not primarily a matter of sheer aggregate numbers, but more importantly of the exact manner in which people make their living; while it necessarily engenders scarcity (not just of food and water, but also of medical and other social resources), it need not entail physical crowding. Much like global climate change, overpopulation is a condition which "cannot be seen as such in any one place" (Clark, *Ecocriticism on the Edge* 87), and becomes

[2] It is important to note that in Malthus' original formulation of the problem, "overpopulation" was not a real concern: the human population would always return to a stable equilibrium. The important question was what this insight entailed for the organization of society.

comprehensible first of all by way of statistical calculations and mathematical models, such as those pioneered by the authors of *The Limits to Growth*.

Such abstractions, however, tell us very little about the vexed question what it would mean to live in a world with "too many people." This gap is closed by the images, metaphors, and narratives which, taken together, constitute what we designate as the "Malthusian imagination." By making overpopulation tangible, they also lend plausibility to particular accounts of our ethical responsibilities—or, as in the story of Nature's full table, the lack of such responsibilities. Indeed, the sheer cold-heartedness of Malthus' logic made him one of the most universally reviled figures in the annals of intellectual history. Marx' characterization of him as a "shameless sycophant of the ruling classes" must count among the milder attacks (Marx 526). The radical Percy Bysshe Shelley referred to him as a "eunuch and a tyrant" (qtd. in Mayhew 12), the conservative William Cobbett, simply as a "monster" (ibid. 11). That Charles Dickens' Ebenezer Scrooge justifies his lack of Christian charity with reference to a convenient reduction of "the surplus population" (39) is exemplary for how people across the political spectrum of Victorian England had come to view Malthus' doctrines.

Malthus' environmentalist disciples have suffered a rather similar fate. By the time the United Nations Development Program instituted "World Population Day" to raise awareness of population issues in 1989, the tide had already begun to shift against them. The UN's 1994 Conference on Population and Development in Cairo deemphasized "family planning" in favor of "reproductive health," and acquiesced to the growing sense that government-sponsored programs to reduce birth rates were *eo ipso* authoritarian and hence illegitimate (Campbell and Bedford 3104). Conservatives began to view 1960s and 70s Neo-Malthusianism as the consummate expression of everything that is wrong with environmentalism: the failure to see every human life as a gift from God, a disturbing willingness to subordinate individual liberty to the collective good as defined by unaccountable elites, a disdain for ordinary folks cloaked in progressive pieties, a penchant for the use of alarmist rhetoric to scare people into acquiescence. Leftist critics, meanwhile, convinced themselves that the concern over rapid population growth in the "Third Word" was little more than a nefarious neocolonialist plot to reduce the number of dark-skinned people and pave the way for global agribusiness, a new bottle for the sour old wine of eugenics, or an attempt to deflect attention from the real culprits of ecological crisis, namely the people at the top of capitalism's global food chain (one of the most eloquent expressions of this view is Matthew Connelly's 2008 book *Fatal Misconception*). In popular culture, Neo-Malthusian ideas became the favorite obsession of supervillains and mad scientists, invariably illustrating the perversity of a scientific mind untempered by human sympathy.

It must be pointed out that such fiercely negative views, even where they contain a kernel of truth, are deeply unfair to many of the scientists, medical professionals, and government officials who, in the years following WWII, arrived at

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the conclusion that the high rates of population growth in the developing world represented a real crisis which demanded an urgent response. They were quite conscious of the fact that rising affluence had already (contrary to Malthus' assumptions) led to a steep decline of birth rates in the wealthy nations of Europe and North America, a phenomenon referred to as demographic transition. But they also feared that the unprecedented rapidity of the increase in the human population would overwhelm the capacity of developing countries to feed, educate, and provide healthcare for their people, and consequently undermine their ability to modernize (Hodgson 568). They were also perfectly aware that the overconsumption of resources in the developed world formed an essential piece of the global puzzle. Paul Ehrlich's famous "I=PAT" formula (ecological impact equals population times affluence times technology) may have been misleadingly simple, but it had the indisputable advantage of making it clear that a viable approach to the ecological crisis could not afford to treat any of these factors in isolation. Calls for reining in population growth in the "Third World" were generally accompanied by the acknowledgement that "First World" nations needed to transition to a more frugal way of life, as advocated, for example, by E. F. Schumacher in his 1973 best-seller *Small Is Beautiful*. And while at the height of the population scare, Neo-Malthusians did sometimes speak in favor of coercive and inhumane policies, these remained rare exceptions and were never supported by the various international organizations who were advocating voluntary contraception and smaller family sizes.

Finally, there is a case to be made that many of the poorest countries in the world were ill-served by the decisive shift away from internationally coordinated efforts at population control. Birth-rates in most of Latin America and Asia had already begun to stabilize by that point – often much earlier than demographic transition theory would have predicted (i.e., declining fertility was not necessarily linked to better education or rising affluence), and arguably as a result of precisely those education campaigns which were now falling out of favor (Campbell and Bedford 3108). Since then, however, contraceptives and family planning measures have become less available in many African and Middle Eastern countries, even while disparities in access to such methods between the rich and the poor within these countries have increased. In Benin, Kenya, Mozambique, and Tanzania, for example, birth rates for women in the richest quintile of the population have dropped slightly during the first decade of the 21st century, even while they increased for those in the poorest quintile (sometimes significantly: in Mozambique, from 5 to roughly 6.5; Campbell and Bedford 3105). Current demographic projections suggest that absent a fundamental change in the patterns of reproduction, the combined population of Niger, Mali, and Burkina Faso (all located in the Sahel zone, which is also expected to be hit particularly hard by the consequences of climate change) will grow more than six-fold by the end of this century, to about 300 million people. To quote the authors of a study on the subject,

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"it is hard to see how the countries in the region can avoid major social and political disturbances or even collapses if this explosive population growth is not curbed" (Zinkina and Korotayev 122). In the face of such prospects, the tacit consensus that the subject of human population growth ought to be placed beyond the bounds of polite conversation appears less than an expression of respect for cultural difference and reproductive autonomy, and more like a case of criminal neglect.

Among historians, of course, Malthusian ideas never fell entirely out of favor. In his seminal *Poverty and Progress: An Ecological Model of Economic Development* (1973), the economic historian R. Wilkinson argued that Malthus' understanding of the relationship between human populations and their means of subsistence had indeed been valid for much of the history of our species, as long as natural photosynthesis remained people's principal source of energy – he just had the singular misfortune of articulating his insights at the very moment when the advent of fossils fuels was about to render the constraints of an organic economy obsolete. The idea that the transition to coal and oil as primary energy carriers allowed modern society to innovate its way out of the "Malthusian trap" which had stymied the development of all earlier social formations (also discussed by Hannes Bergthaller in his contribution to this issue) has since become a mainstay of environmental and economic history. Even if one agrees with Andreas Malm that such accounts unduly naturalize the ascendancy of coal in the early 19th century (35-36), there can be no doubt that it was fossil energy which allowed humanity to forestall the great famines which the Neo-Malthusians had predicted. The so-called "Green Revolution" which allowed food production to stay abreast of a rapidly expanding human population in the second half of the 20th century was made possible by nitrogen fertilizers, pesticides, and petroleum-powered agricultural machinery, all of which in turn depended on cheap and plentiful energy from fossil fuels, and effectively transformed agriculture into a form of industrial production. What has become increasingly clear is that the Malthusian limits for this process lie not so much in the availability of resources, but rather in the finite capacity of the Earth system to absorb our waste.

In this very basic sense, then, the problems of human population growth and global warming—two "intractable and truly global issues" that, Timothy Clark laments, ecocriticism has largely evaded ("Nature" 80)—are indeed inseparable. Our field has taken its own sweet time before it finally turned to the issue of climate change over the past decade. We believe that it is about time that we also take up again the old question of human population growth—not because the critiques which placed a taboo on the topic were entirely misguided, but because the underlying problem has refused to go away. Indeed, the Malthusian imagination has seen something of a comeback of late. Arguably, it is central to the recent efflorescence of post-apocalyptic scenarios in popular culture, and particularly in feature films such as *World War Z* (2013) or television series such as *The Walking Dead* (since 2010) which dramatize the uncontrolled proliferation of bodies with no

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claim whatsoever to a seat at Nature's table. They fantasize about a world in which human life would once again be rare and precious (set in profile as it is against the teeming masses of the undead), and where the withholding of charity may be an imperative of survival. These fictions find a real-world echo in the forecasts of military planners and political journalists when they predict that the climate-changed world of the 21st century will be marked by resource wars, mass-migration, and the collapse of the social order (Welzer). The historian Timothy Snyder has recently argued that Malthusian fears, engendered by the resource shortages of WWI, were an important ideological driver of Germany's campaign of genocide and territorial expansion in WWII, and he warns that they might be invoked once again to abrogate the rights of people who are defined as "the source of an ecological problem" (325). The challenge, then, may be to find ways of articulating how the surfeit of humanity is indeed the source of ecological problems—without falling into a dehumanizing logic of emergency.

In its analysis of literary and cultural artifacts, ecocriticism needs to stress the threat overpopulation poses not only to the human species, but also to the entirety of the ecosystem and all its inhabitants. The Cornucopian faith that the development of new technologies will make life on the planet possible for the estimated 10 billion people by 2050 is not only outlandishly short-sighted, but anthropocentrically so; it fails to take into account the cost that such advances have and will keep on having on the lives of other species, "our neighbors in the community of life" (Butler n.p.) who have as much right to live on this planet as humans do. Every year, 16 million hectares of forest disappear, which entails the destruction of the natural habitats for many species that have to move to inhospitable territories where native animals will also eventually become extinct (Avalos 41). Against the naysayers, Musimbi Kanyoro insists: "our numbers and behavior profoundly affect nonhuman species, all of the creatures with which we share this beautiful but finite planet. The web of life that these species create is what makes the Earth habitable and lovely" (Kanyoro, n.p.).

This special focus section of *Ecozon@* opens with a contribution by Manuel Peinado Lorca, "Población, cambio climático y huella ambiental," in which he focuses the debate on overpopulation not so much on resource limitations, but on anthropic influence on climate change and its effects on both human and other-than-human populations. Overpopulation, Peinado Lorca admits, is still the problem. However, since the Green Revolution demonstrated that it is possible to provide food for an ever-growing population, the issue is no longer whether resources are limited or not, but rather our environmental footprint assessed in terms of greenhouse gases' contribution to climate change. The so-called "boomsters" who celebrated the Green Revolution as evidence that the Malthusian "doomsters" were wrong should not lose sight of the environmental side-effects of the effort to feed a population that has doubled in the last fifty years: soil degradation and erosion, water scarcity, new pathogens affecting the crops, destruction of arable land due to the extreme weather

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conditions linked to climate change, together with a progressive loss of biodiversity, health and food safety, pollution and energy consumption. Measures taken so far to reduce our carbon footprint are only having a moderate impact, therefore more effective steps need to be taken, which, according to Peinado Lorca are these four: shifting to a vegetarian diet (which reduces an individual's CO2 footprint by about 820 kg), giving up transport by car (for an average reduction of 2.400kg CO2) and air plane (1.600kg per transatlantic flight) and, most importantly, having one child less per couple: on average, each child in a typically developed country will produce 55.600 *tons* of CO2 over the course of its life, about the same amount that 700 teenagers would be able to avoid by recycling as much as possible until their deaths. Nothing else will have a significant effect. The call is for politicians to accept that an economy based on infinite growth goes against the elemental principles of physics and the limits of our planet.

In "Malthusian Biopolitics, Ecological Immunity, and the Anthropocene," Hannes Bergthaller discusses Michel Foucault's concept of biopolitics and the ecological implications of a mechanism designed to secure populations against famine and disease, thus allowing for continuous growth, which has succeeded to an extent where is actually endangering the basic conditions of life. Bergthaller proposes that in its original formulation, biopolitics can be seen as a response to Emmanuel LeRoy Ladurie's notion of a "Malthusian curse," and points out the paradox at the heart of this concept: biopolitical governance is premised on a naturalization of the human species, a life form susceptible to disease and famine like any other, but results in its denaturalization insofar as society assumes the roles previously played by biological mechanisms to regulate population. The ecological aspects of biopolitics may not be evident at first sight, given its focus on enhancing the vitality of humans; in practice, however, "they are predicated on the general commutability of life forms and weave together all sorts of bodies." Roberto Esposito's concept of "immunization" helps to elucidate the biological dimension of biopolitics, in viewing society as a living organism which can survive only by virtue of its entanglement with other life forms; after all, biopolitics implies the management of both human and nonhuman population. The fact that human health, longevity and fertility, the primary objects of biopolitical regulations, have now turned into a source of risks poses, indeed, a dilemma: dismantling immunitary defenses will cause significant harm to human life, but not dismantling them will increase the risk of incurring even greater harm in the future, which leads Bergthaller to argue that many of the most important questions about population in the Anthropocene will revolve around the recalibration of society's immunitary mechanisms.

In "The Promise of Disaster, Specters of Malthus in Marxist Dreams," Alex McCauley traces the presence of Malthus's ghost in twentieth-century thought – particularly in the context of Marxist criticism and ecology – arguing that many of Malthus's detractors actually misread him and, in so doing, repeat his errors. Even

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though Malthus was empirically and historically wrong insofar as he failed to anticipate the techno-scientific advances that brought about birth control, the Green Revolution, or food transportation around the world, McCauley contends that he was correct in observing that the destitute will always be the first to suffer whenever disaster strikes, and that famine, contrary to what his Marxist readers claim, is not only an issue of distribution, but also of quantity. Malthus saw that any political regime would have to deal with the same material limits, with regard to the soil and to demographics. If civil liberty cannot produce fresh land, the wealth of a nation does not reside in its political structure, but in the fertility of its land. Drawing on Malthus' anecdotal mention of the toothache that plagued him as he was writing the *Essay*, McCauley stresses that the relationship the clergyman established between body and the mind is analogous to the one he saw between the resources of a nation and its politics: The mind may distract itself from the pain but cannot overcome it; similarly, the state cannot overcome scarcity, exhaustion or natural decline, even if it chooses not to pay attention to them.

Malthusian ideas have found ample room for exploration in the science fiction genre, particularly in its dystopian forms. In "Numbers for an Alternative Antropocene: Population Counting and Humanity's Place Among other Species in Daniel Keys Moran's *Tales of the Continuing Time*," Keri R. Stevenson looks at Moran's science fiction series as developing the scenario of a future Earth which may succeed in putting an end to overpopulation not by enforcing bans on fertility, but rather by respecting other intelligent life forms, such as AIs, genetically engineered beings, and alien species. The series stresses the idea that humankind is just one more species that must find its own place in an overpopulated world; a species that, just like any other, is subjected to natural laws, even though humans are the only ones supposedly capable of self-restraint. The government in Moran's secondary world—the Unification—considers humanity as a virus and tries to reduce its numbers. However, its coercive policies fail. Only when humans realize that they don't have the right to appropriate the entire ecosphere, causing destruction in their wake, and voluntarily choose self-restraint, can the planet heal.

Stevenson concedes that Moran's proposed solution to the problem of overpopulation, appealing though it may seem, smacks of naïveté, and that is especially true when it is contrasted with the topic explored in the last essay of our section. In "*Inferno* Unleashed: Dan Brown's Uncomfortable Solution to Overpopulation," Irene Sanz Alonso turns to the connection between overpopulation and ecology as represented in Dan Brown's best-selling novel *Inferno* (2013) and its 2016 film adaptation, focusing especially on the way in which the film version changes the ending of the story. This change, she argues, evidences the reluctance of the film industry to deal with the issue of overpopulation and its consequences for the environment. In the film version, the principal antagonist, Bertrand Zobrist, is reduced to a murderous villain, a terrorist who wants to put a stop to the problem of overpopulation by releasing a lethal virus. In the original

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novel, however, Zobrist and his partner Sienna Brooks are accorded greater complexity, and their "solution" is far more morally ambiguous: their virus does not kill, but randomly sterilizes a third of those infected. These shades of grey are completely eradicated in the film, preventing the audience from asking the very questions which stand at the center of the novel.

Eventually, any text, fictional or otherwise, tackling the topic of overpopulation, must tackle the crucial question: how many people can the Earth sustain while allowing the diversity of life to flourish? William Ryerson admits to not having the answer, but he does offer a conclusion: "We cannot go on the way we are going. We are already doing severe and irreparable harm to the planet. Something has to give" (Ryerson n.p.).

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Población, cambio climático y huella ambiental

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Resumen

En 1679 Anthony van Leeuwenhoek fue el primero en especular acerca del número de seres humanos que podría albergar la Tierra. Desde entonces y, sobre todo, desde que Thomas Malthus publicó en 1798 su célebre ensayo, el debate demográfico—particularmente exacerbado en la segunda mitad del siglo pasado, cuando la tasa de crecimiento poblacional duplicaba a la actual—se estableció en dos frentes, el de los *boomsters*, que sostienen que no hay límites para la explotación de los recursos terrestres, y el de los *doomters,* para los que los recursos del planeta tienen unos límites que estamos a punto de desbordar. La detección en la década de 1990 de los primeros síntomas del calentamiento global ha marginado a unos y otros. Hoy, el debate no se centra en los límites de los recursos, sino en los excesos de emisiones de gases de efecto invernadero con los que nuestro sistema económico consumista está alterando el equilibrio global de la Tierra. La superpoblación sigue siendo el problema, pero la unidad de medida de hoy es nuestra huella ambiental evaluada en términos de producción de gases de efecto invernadero, los responsables de la aceleración del cambio climático global.

Palabras clave: Boomsters, cambio climático global, capacidad de carga, cornucopianos, crecimiento demográfico, *doomsters*, huella de carbono, huella ecológica, malthusianismo, superpoblación.

Abstract

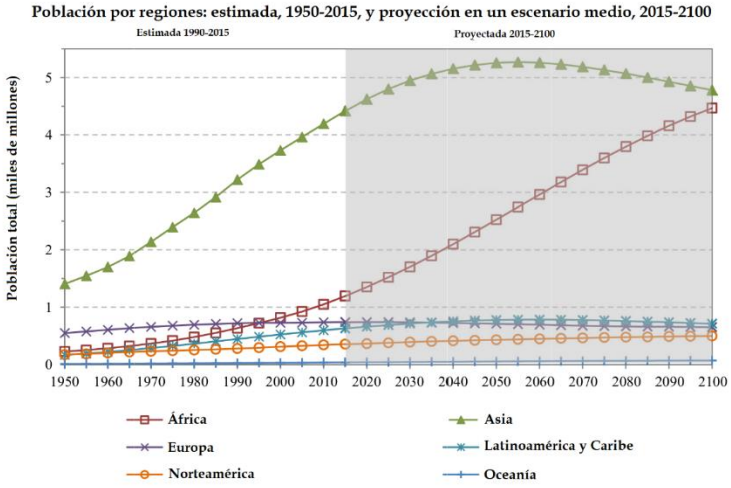
In 1679 Anthony van Leeuwenhoek was the first person speculating about the number of human beings that the Earth could harbour. Since then and, above all, since Thomas Malthus published his famous essay in 1798, the demographic debate—especially exacerbated in the second half of the last century, when the population growth rate doubled the current one—was established on two fronts, that of *boomsters,* who argue that there are no limits to the exploitation of the Erath resources; and that of *doomsters,* for whom the Earth resources have a limit that we are about to overflow. The detection in the 1990s of the first symptoms of global warming has marginalised ones and the others. Nowadays, the debate is not focused on the limits of resources, but on the excessive emissions of greenhouse gases with which our consumer economic system is altering the global balance of the Earth. Overpopulation is still the problem, but the current unit of measure is our environmental footprint assessed in terms of the production of greenhouse gases, which are responsible for the global climate change.

Keywords: Boomsters, carbon footprint, carrying capacity, cornucopians, demography, demographic growth, *doomsters*, ecological footprint, global climate change, malthusianism, overpopulation.

Introducción

Desde la década de los 90 del siglo pasado se repite una eterna letanía: tenemos que hablar del cambio climático. En las dos últimas reuniones internacionales promovidas por Naciones Unidas, la de París (2015) y la de Bonn (2017), se ha hablado del clima, pero la amenaza de la superpoblación ha estado ausente del debate y eso que no solamente afecta al clima, sino también a la pérdida de la diversidad biológica, a la seguridad alimentaria y del agua, a las enfermedades, a la contaminación y a la energía.

Resumamos las estadísticas de población del último medio siglo. Durante mi vida, la población mundial se ha quintuplicado, de 1.500 en 1953 a más de 7.500 millones de personas hoy (Figura 1). Lo que hubiera supuesto una enorme sorpresa para Malthus, la capacidad de alimentar a una parte de esta creciente población, ha sido en gran parte consecuencia del advenimiento de la llamada "revolución verde", es decir, de la industrialización e intensificación de la agricultura y de todo el sistema de producción de alimentos.



FUENTE: United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision*.

Figura 1

Producir toda esta comida requiere mucha agua. Si tenemos en cuenta que producir un solo tomate cuesta 13 litros de agua, un huevo 135 y un chuletón 7.000, no puede sorprendernos que aproximadamente el 70% de toda el agua utilizable en la Tierra se use hoy para la producción de alimentos, ni tampoco que casi el 40% de toda la superficie terrestre desprovista de hielo esté dedicada a la agricultura (WWAP). La revolución verde trajo más alimentos y eso hizo que fueran mucho más baratos. Como resultado de eso, y del aumento de la industrialización y de la globalización en el mismo período, los habitantes de Europa, Norteamérica y Japón hemos tenido mucho más dinero para consumir. Impulsados por una economía de crédito, nos hemos embarcado en la creación de una cultura de consumo sin

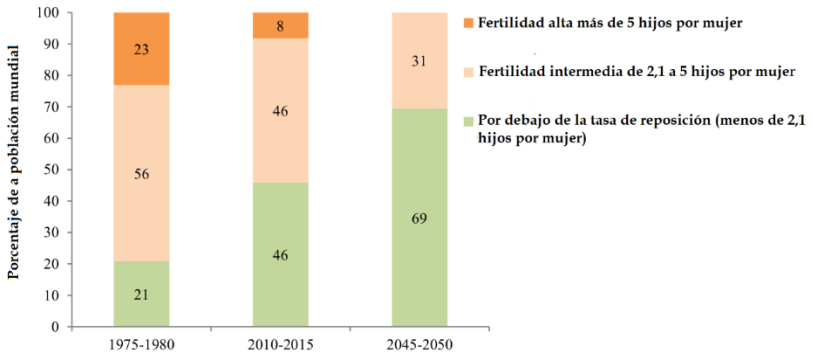
precedentes: ropa, televisores, productos electrónicos, teléfonos móviles, automóviles y vacaciones con vuelos transoceánicos incluidos.

Todos los alimentos y todo lo que hemos estado produciendo y consumiendo requiere mucha energía: para generar las materias primas, transformarlas, transportarlas, usarlas y, finalmente, para eliminarlas cuando han dejado de ser útiles. Como resultado, el desmesurado uso de petróleo, carbón y gas ha aumentado dramáticamente para satisfacer la creciente demanda energética.

La demanda de energía para sostener nuestra creciente población durante el último medio siglo ha llevado a una acumulación en la atmósfera de dióxido de carbono (CO_2), cuya concentración supera ahora la que nunca ha soportado el planeta durante varios millones de años. El resultado de todas nuestras actividades y de nuestro consumo es el cambio de clima, que se deja sentir en el aumento de la temperatura promedio global, en el deshielo acelerado de casquetes polares y glaciares, en el aumento del nivel de mar, en la acidificación de los océanos, en la alteración del sistema de corrientes oceánicas, en la variación de las estaciones y de la fenología de las plantas y, lo que es muy preocupante, en la frecuencia de sucesos climáticos extremos: olas de calor, inundaciones y sequías (Peinado).

Quienes no están de acuerdo con el problema de la superpoblación, los cornucopianos, a los que me referiré en el siguiente epígrafe, dirán, con toda razón, que la tasa de fertilidad ha disminuido desde la década de 1970 (Figura 2) y que, crezcamos como crezcamos, la tecnología nos sacará de cualquier problema en el que nos encontremos. Argumentarán que quienes pensamos así somos alarmistas. Claro que la tasa de fertilidad global ha ido disminuyendo, pero la actual tiene que aplicarse a una población mundial que se ha más que duplicado en los últimos cincuenta años en los que la tasa de fecundidad ha disminuido, y el último informe sobre población pronostica que habrá unos 10.000 millones de nosotros en unas pocas décadas (United Nations 2017).

Distribución de la población mundial según niveles de fertilidad en tres períodos temporales.



FUENTE: United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision.*

Figura 2

Además, en muchos países el crecimiento de la población está aumentando rápidamente. Según Naciones Unidas, se prevé que la población de Afganistán crecerá un 242% en los próximos 80 años; la población de Iraq en un 344%; Nigeria en más del 400% y la de Malawi y Níger en más del 700%. Pero no se trata solo de un problema de "países en desarrollo." Se prevé que Estados Unidos crecerá en más del 40%, pasando de 315 a 450 millones de personas en los próximos 80 años.

La mayoría de las evidencias apuntan a que nuestra trayectoria actual de crecimiento y consumo es la que conduce a que todos nuestros problemas empeoren. Recordando a Malthus, fijémonos en los alimentos básicos. Las previsiones dicen que para alimentar una población mundial de 9.100 millones de personas en 2050 será necesario aumentar la producción de alimentos en un 70% entre 2005/07 y 2050. La producción en los países en desarrollo casi tendría que duplicarse. Ello implica un aumento importante en la producción de varios productos básicos fundamentales. La producción anual de cereales, por ejemplo, tendría que incrementarse en casi 1.000 millones de toneladas, y la producción de carne en más de 200 millones de toneladas, hasta alcanzar un total de 470 millones de toneladas en 2050, el 72 % de ellas en los países en desarrollo, frente al 58 % en la actualidad (FAO 2009).

Los cornucopianos dirán rápidamente que esta demanda se satisfará fácilmente sin necesidad de aumentar la superficie de cultivo gracias al "milagro" de la revolución verde. Esa afirmación ignora el hecho de que la degradación y la erosión del suelo están aumentando rápidamente en muchas partes del mundo; que el agua se agota o se saliniza; que muchos de los cultivos corren un riesgo cada vez mayor a causa de nuevos agentes patógenos (principalmente) fúngicos; y que se prevé que muchas zonas de cultivo sean devastadas por los fenómenos meteorológicos extremos asociados con el cambio climático.

De hecho, existen muchas razones para preocuparse de que podamos estar avanzando hacia crisis alimentarias sin precedentes en las próximas décadas, con los consiguientes riesgos nocivos para la salud de cientos de millones, tal vez de miles de millones de personas. Además, en muchas partes del mundo donde la población aumenta rápidamente, hay un aumento en el número de personas que viven en lugares cerrados con cerdos y aves de corral, y un incremento cada vez mayor del consumo de "*bushmeat*", la carne sin garantías sanitarias procedente de animales salvajes que están diezmando, entre otras, las poblaciones de simios y son responsables de la transmisión de virus como el Ebola. Como consecuencia, aumentamos enormemente el riesgo de que un patógeno nuevo cruce la barrera interespecífica y se cree una pandemia mundial realmente aterradora.

El crecimiento demográfico sigue incidiendo peligrosamente en la capacidad de carga de la Tierra, que es el concepto fundamental de los límites de nuestro planeta y el que marcará de forma fundamental el cumplimiento de los objetivos marcados para 2030 en la Agenda de Desarrollo Sostenible (Naciones Unidas). Lo que ha cambiado, como intento explicar en este artículo, no es la siempre finita capacidad de carga humana del Globo, sino nuestra forma de medirla.

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Casandra y la cornucopia: *doomsters* y *boomsters*

Desde que, en 1798, alarmado por el notable incremento de la población en los albores de la Revolución Industrial, Thomas Malthus publicara su *An Essay on the Principle of Population*, en el que pronosticaba que el crecimiento humano sobrepasaría a la oferta de alimentos, el temor a una "explosión demográfica" ha sido objeto de debate académico y político acerca de cuántas personas puede soportar el planeta. El asunto alcanzó su punto álgido en la segunda mitad del siglo XX con los debates de algunos teóricos de la población como Paul Ehrlich, Julian Simon, Garrett Hardin y Barry Commoner.

Bajo un punto de vista estrictamente malthusiano, unos y otros sostenían dos puntos de vista principales: la Tierra se quedará sin recursos con el tiempo o la Tierra podrá mantener a nuestra creciente población para siempre. En 1968, cuando la población mundial superaba los 3.000 millones de personas y la tasa de crecimiento anual era de más de dos puntos (Figura 3), Paul Ehrlich publicó *The Population Bomb*, un libro muy popular que vendió millones de copias en los Estados Unidos antes de convertirse en el que quizás haya sido el mayor *best seller* ecológico de todos los tiempos. En España, fue publicado por varias editoriales bajo el título de *La explosión demográfica*.

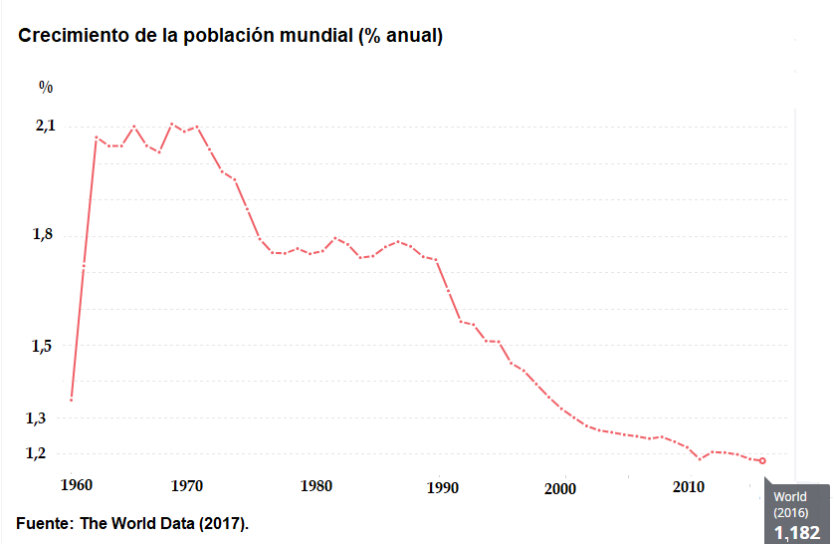

Figura 3

Ehrlich, un entomólogo neo-malthusiano, sostenía que la tasa de crecimiento de la población estaba sobrepasando el crecimiento agropecuario y la capacidad de renovación de los recursos de la Tierra. Aunque algunos se limitaron a ver en el libro de Ehrlich una mera repetición del razonamiento de Malthus, su opositor más elocuente, el economista Julian L. Simon, dudaba de los principios más básicos de la explosión de la población, particularmente de la definición de límites. En la década de los setenta, Simon publicó dos obras que sirvieron para avivar el debate sobre la

población: *The Economics of Population Growth* (1977) y *The Ultimate Resource* (1981). Simon argumentaba que la relación entre crecimiento poblacional y crecimiento económico no era tan simple como Ehrlich creía, y que se exageraba el grado en el que la presión demográfica tendría un impacto en los recursos.

En un artículo en el que se narraba el acalorado debate entre Ehrlich y Simon, enfrentados ambos por su diferente interpretación de la disponibilidad de recursos, John Tierney acuñó dos términos—*doomsters* y *boomsters*—que metafóricamente pueden personalizarse en la mítica Casandra, la sacerdotisa de Apolo que formulaba terribles profecías que nadie creía, y en la cornucopia, el cuerno mágico que se rellena mágica e infinitamente con comida y bebida (Tierney).

Hay *doomsters* que continúan prediciendo lo peor, y hay *boomsters* que argumentan que el crecimiento de la población, aunque preocupante en muchos sentidos, puede ser un motor de crecimiento económico. En la década de 1960, cuando había menos de la mitad de personas que hoy en día, los *doomsters* estaban en auge debido al temor a una "bomba demográfica" que se apoderó del mundo, cuyos epítomes ensayísticos fueron el libro de Ehrlich y *Limits to Growth* (1972), cuya primera autora era la biofísica Donella Meadows, una obra impulsada por el Club de Roma (Meadows et al.).

La tasa de crecimiento acelerado de hoy, cuando 7.550 millones de personas ocupan el planeta y ese número se prevé que llegue a 9.700 millones en el año 2050 y a 11.100 en 2100 (Figura 1) sigue siendo alarmante. Pero hasta ahora, las preocupaciones neomalthusianas de la hambruna mundial masiva y el consiguiente conflicto no se han materializado. La sorprendente tasa de crecimiento demográfico de la década de 1960 (3,2%) se ha desplomado hasta el 1,1% actual después de haber dejado detrás la década de 1980, cuando la población mundial creció en más de 800 millones, el mayor incremento de la historia (Figura 3). De los 5,1 hijos por cada mujer desde el quinquenio 2000-2005 a 4,7 en el que va de 2010 a 2015, significa que las familias han elegido tener menos hijos, libremente en algunos países y bajo presión en otros. Desde 1950, la tasa de fertilidad global se ha reducido a la mitad.

Con ese relativo descenso poblacional, los *boomsters*, émulos del doctor Pangloss, el preceptor del *Cándido* de Voltaire, al que todo le parecía bien y siempre veía la botella medio llena, parecían haber ganado a batalla. Según ellos, la Tierra siempre tendrá recursos suficientes para la humanidad y el resto de los organismos. Pero si hasta finales de la década de 1980 el debate demográfico se centraba exclusivamente en la disponibilidad de recursos, a partir de entonces un nuevo elemento se puso sobre la mesa: la influencia de la población humana sobre el clima global de la Tierra.

Población y cambio climático

La especie humana apareció aproximadamente hace un millón de años, pero sólo en los últimos cincuenta años el número de seres humanos ha crecido más de

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lo que lo había hecho en toda su historia anterior, hasta alcanzar los más de 7.500 millones actuales. Dicho de otra forma, durante cientos de miles de años el ritmo de crecimiento fue prácticamente nulo, lo que no se debió al autocontrol de la capacidad reproductiva, sino a las restricciones del entorno, que eliminaron a buena parte de los nacidos de cada generación. Como puede verse en la Figura 4, durante los últimos dos mil años la tasa anual de aumento de la población mundial ha crecido aproximadamente cincuenta veces desde un promedio anual de 0,04% entre el año 1 y 1650 a su máximo histórico entre 1965 y 1970 (Livi-Bacci).

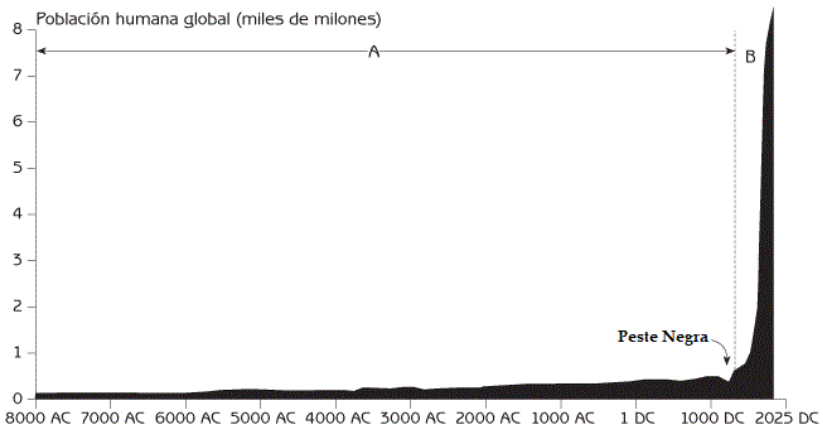

Figura 4

La influencia humana en el planeta ha aumentado más rápido que la población. En el transcurso de ese siglo, en el que la humanidad mejoró su expectativa de vida en más del doble, una tendencia que continúa hoy (Figura 5), el crecimiento poblacional produjo consecuencias innumerables. Los procesos vinculados al mantenimiento de la población han traído consigo una interminable letanía de problemas ambientales sin precedentes, algunos de los cuales afectan el bienestar humano directamente. Los patrones de crecimiento de la población están relacionados con casi todos los retos que enfrenta la humanidad, incluida la contaminación, la reducción de la pobreza, el cambio global, la salud, la producción de energía y la escasez de alimentos y agua.

Sin duda, dado que los humanos usan combustibles fósiles para alimentar sus estilos de vida cada vez más mecanizados, el crecimiento de la población humana es un contribuyente importante al calentamiento global. Más personas significan más demanda de petróleo, gas, carbón y otros combustibles extraídos o perforados de debajo de la superficie de la Tierra que, cuando se queman, arrojan suficiente CO_2 y óxidos de nitrógeno a la atmósfera para atrapar el aire caliente como un invernadero. A esos gases de efecto invernadero hay que sumar el más potente de ellos, el metano, que se emite gracias a las actividades agropecuarias que sustentan nuestro modo de vida.

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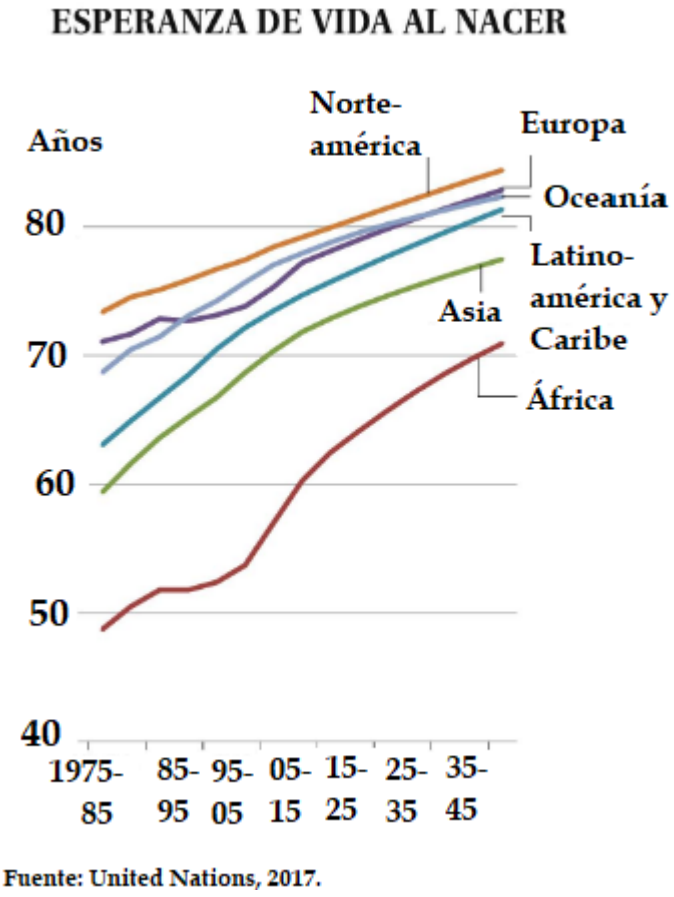

Figura 5

A finales de julio, la Agencia de la Atmósfera y los Océanos de Estados Unidos publicó los datos que confirmaban que durante los últimos 390 meses consecutivos el planeta ha superado la media de temperatura desde que hay registros (NOAA). En contraposición a 1816, el año del verano que nunca llegó, hasta finales de noviembre, cuando escribo este artículo, estamos viviendo un verano eterno, en el que todo apunta a que en 2017 continuará la tendencia denunciada el año pasado, el más caluroso desde que comenzaron los registros en 1880, y el tercero consecutivo en el que la Tierra bate el récord de temperatura, un hecho sin precedentes (NASA, *Surface*). Los últimos informes del IPCC (2014) y de la NASA (NASA, *Scientific*) reiteran que hay más del 95% de probabilidad de que las actividades humanas, traducidas en la emisión de gases de efecto invernadero, especialmente reflejadas en el incremento del CO_2 (Figura 6), son la causa del aumento del calentamiento global del planeta.

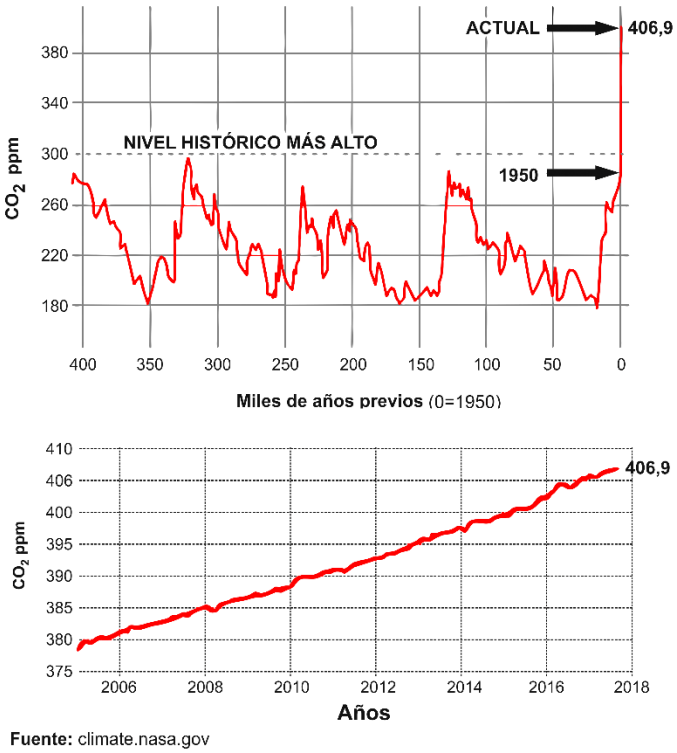

Figura 6

En diciembre de 2016, cuando los políticos se habían comprometido en París a frenar las emisiones de dióxido de carbono; cuando la economía había demostrado que podía crecer sin emitir más cantidad de CO_2 y cuando la sociedad global había logrado que durante tres años consecutivos el CO_2 emitido no creciera, según un estudio suscrito por noventa investigadores de cincuenta instituciones internacionales (Saunois et al.) la liberación de otro gas en la atmósfera, el metano (CH_4), amenaza con desbaratar todo lo que se ha hecho contra el cambio climático.

El metano es, junto al CO_2 y el óxido de nitrógeno, uno de los principales gases de efecto invernadero. Aunque el dióxido de carbono es el culpable del 80% del calentamiento global, el metano atrapa 28 veces más calor. Afortunadamente, su concentración en la atmósfera es mucho menor. Mientras que la del CO_2 supera las 400 partes por millón de unidades de aire (ppm), el CH_4 alcanzó las 1.834 pero por cada mil millones (ppmm).

El problema es que el citado estudio desvela que, después de años de estabilización, desde hace una década las emisiones de metano no han dejado de crecer, lo que está provocando su mayor concentración atmosférica. Si hasta 2006 la subida era de apenas 0,5 ppmm al año, en 2015 el ritmo de aumento de la concentración del gas fue 20 veces mayor. En total, desde 2012 han sido liberados a la atmósfera unos 558 millones de toneladas de metano anuales. Es tanta cantidad que el ciclo natural de retirada del gas ya no puede absorberlo.

El Acuerdo de París apostaba por una progresiva reducción de las emisiones de CO_2, más intensa y rápida en función del desarrollo de cada país. El problema es que en París no se habló de metano. Y si la concentración de este gas en el aire supera

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las 1.900 ppmm, la reducción de las emisiones de CO_2 se vería neutralizada por el potente efecto invernadero del CH_4.

Los datos complican ese cambio de rumbo. De los 558 millones de toneladas de metano emitidas cada año, el 61% se deben a actividades humanas y el resto son de origen natural. Un tercio de las emisiones antrópicas procede de la ganadería y, en concreto, del sistema digestivo de los 2.500 millones de cabezas de ganado que, entre vacas, ovejas y cabras, constituyen la cabaña ganadera mundial. Para hacernos una idea, tres multinacionales de producción de carne—JBS, Cargill y Tyson—emitieron más gases de efecto invernadero el año pasado que toda Francia, y casi tanto como algunas de las mayores compañías petroleras, tales como Exxon, BP y Shell (GRAIN et al.).

A esto hay que añadir que son millones los seres humanos que dependen del arroz para subsistir. Los arrozales son responsables de otro 9% del metano que cada año llega a la atmósfera. Otras fuentes humanas de metano, como la gestión de basura y aguas residuales (un 18% de las emisiones antrópicas) o la producción y la distribución de combustibles fósiles (un 34%) podrían ser reducidas con el concurso de la tecnología. Pero reducir la parte generada en la producción de comida podría afectar a la seguridad y la soberanía alimentaria de muchas regiones. De hecho, como muestra ese estudio, la ganadería y la agricultura son los grandes responsables del actual incremento de las emisiones.

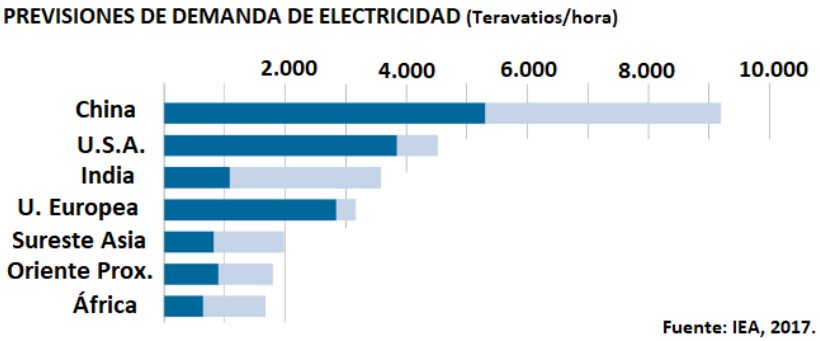

Figura 7

Un problema añadido, pero íntimamente ligado a la producción de gases de efecto invernadero, es el consumo energético, que ha superado con creces el crecimiento poblacional. Aunque la población humana se cuadruplicó entre 1860 y 1991, el uso humano de energía inanimada aumentó de 1.000 millones a 93.000 millones de megavatios-hora por año (Cipolla). En su último informe anual, publicado el pasado 14 de noviembre, la Agencia Internacional de la Energía (IEA) avisa que el mundo se debe preparar para que la demanda de energía se dispare de aquí a 2040, año en que el consumo se elevará un 30% con respecto a 2016 (Figura 7). Será como añadir otra China y otra India a la demanda global, advierte el informe anual del organismo. La economía global crece a una tasa promedio de 3,4% anual, la población se expandirá de los 7.400 a más de 9.000 millones de personas hasta 2040, y se vivirá un proceso de urbanización que supondrá agregar el equivalente a

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una ciudad del tamaño de Shanghái a la población urbana del mundo cada cuatro meses. El sector energético vivirá cambios profundos, con nuevas potencias en la producción y un vuelco en las fuentes de energía que darán luz y calor a la humanidad. El reto: evitar que las emisiones de gases también crezcan, porque según la AIE el mundo no está en la senda para cumplir el Acuerdo de París.

Con una población mundial que al ritmo actual superará los 9.700 millones hacia 2050 (United Nations), debemos estar preocupados por la capacidad del planeta para soportar la carga adicional de gases de efecto invernadero que entran a la atmósfera y causan estragos en los ecosistemas. Esos retos, unidos al deseo de aumentar el nivel de vida, constituyen un enorme desafío a la "capacidad de carga" del planeta, uno de cuyos indicadores es la huella ecológica.

¿Cuántas personas puede soportar la Tierra?

Al comenzar el siglo XX, la población humana era de 1.500 millones. Cuando culminaba, el 12 de octubre de 1999, nacía en Sarajevo Adnan Nevic, el habitante 6.000 mil millones del planeta. En el transcurso de ese siglo, en el que la humanidad mejoró su expectativa de vida en más del doble, el inédito crecimiento poblacional llevó a demógrafos de todo el mundo a replantearse con rigor una pregunta clave: ¿cuántas personas puede soportar la Tierra? La cuestión ya había sido objeto de preocupación para algunos pensadores desde al menos la segunda mitad de siglo XVII.

El 25 de abril de 1679, en Delft, Holanda, el pulidor de lentes e inventor del microscopio, Antoni van Leeuwenhoek, escribió la que puede ser la primera estimación de la cantidad máxima de personas que puede soportar la Tierra. Calculó que si toda la superficie habitable en el mundo tuviera la misma densidad de población que Holanda (que en ese momento era de 120 personas por kilómetro cuadrado), la Tierra podría soportar como máximo 13.110 millones de personas, muchos menos que el número de espermatozoides que sus lentes habían revelado en la gónada de un bacalao (Leeuwenhoek).

En siglos posteriores, la estimación de van Leeuwenhoek fue seguida por docenas de cálculos similares. Alrededor de 1695, un londinense llamado Gregory King calculó que, en el supuesto de que la Tierra estuviera completamente poblada, podría sostener a lo sumo 12.500 millones de personas. En 1765, un cura castrense alemán, Johann Peter Siissmilch, comparó su propia estimación (13.900 millones) con las estimaciones del ingeniero militar francés Sebastien Le Prestre de Vauban (5.500 millones), con las del escritor y cartógrafo inglés Thomas Templeman (11.500 millones) y con las del propio Leeuwenhoek (Cohen).

En las últimas décadas, las estimaciones de la población máxima que soportaría el planeta se suceden sin cesar, ahora generalmente asociadas al sintagma "capacidad de carga", un término ciertamente complejo y controvertido, que no impide que surja rutinariamente en debates ambientales, en informes de las Naciones Unidas y en documentos elaborados por académicos, ecologistas o

políticos-académicos formados (o al menos con conocimientos) en ecología, economía, sociología, geografía, edafología o agronomía, entre otras disciplinas.[1]

Capacidad de carga

El concepto de capacidad de carga se emplea en una variedad notablemente amplia de disciplinas y debates, y ha sido fuertemente criticada dentro de numerosos campos. Sayre (2008) identificó cuatro tipos principales de capacidad de carga, cuyo concepto, en todos los casos, se concibió para describir las características ideales, estáticas y numéricas, lo que resulta apropiado en el caso más antiguo (cuando se formuló en 1840 como atributo mecánico o de ingeniería de objetos o sistemas fabricados), pero que fue cada vez más insostenible conforme se aplicó a sistemas de mayor escala, mayor variabilidad y menos control humano.

A mediados del siglo XX el concepto se aplicó en un doble sentido, biológico y demográfico. En el primer caso, como *K*, un límite intrínseco de aumento de la población de organismos, usado por biólogos de la población, y, empleado por los neo-malthusianos, como el número de seres humanos que la Tierra puede soportar. Con el tiempo, una y otra acepción acabaron por converger.

En biología de poblaciones la capacidad de carga se define como la carga máxima del medio, entendida como el número de individuos que un entorno puede soportar sin efectos negativos significativos para el organismo dado y su entorno. Por debajo de la capacidad de carga las poblaciones normalmente aumentan, y viceversa.

Un factor que mantiene el tamaño de la población en equilibrio se conoce como factor de regulación o factor limitante. Como hizo Malthus, el factor que con mayor frecuencia se selecciona como una posible limitación es el alimento. Aunque se han usado varias fórmulas, todas ellas siguen la Ley del Mínimo enunciada por el químico agrícola alemán Liebig (1855), que la popularizó con el ejemplo de un barril (Figura 8). La Ley del Mínimo afirma que el crecimiento no es controlado por la suma total de los recursos disponibles, sino por el recurso más escaso. De esto se deduce que, como no podría ser de otra forma, hasta el elemento más insignificante para la vida es en realidad imprescindible para ésta.

[1] Los demógrafos, sin embargo, han estado extrañamente callados, porque tienden a enfocarse en la composición y crecimiento de las poblaciones, restringiendo sus predicciones a corto plazo - generalmente de algunas décadas- encuadrándolos en términos condicionales: *si* las tasas de nacimiento, muerte y migración (por edad, sexo, ubicación, estado civil, etc.) son tal y tal, *entonces* el tamaño de la población y la distribución serán tal y tal.

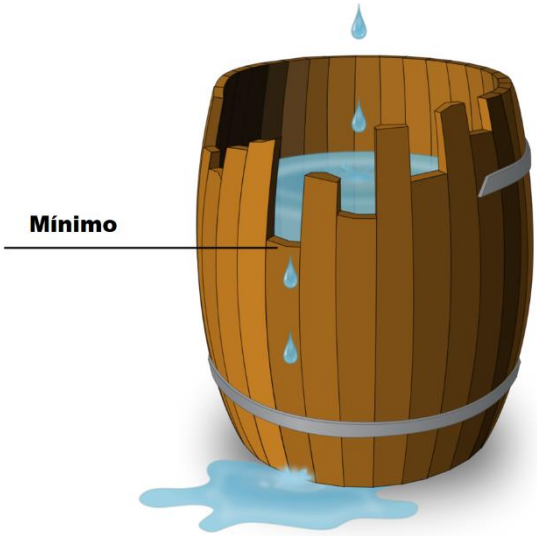

Figura 8.
El barril de Liebig. Así como la capacidad de un barril con duelas de distinta longitud está limitada por la más corta, el crecimiento de una planta se ve limitado por el nutriente más escaso. Dominio público.

La ley tiene serias limitaciones cuando se utiliza para estimar la capacidad de carga de cualquier población. Como las diferentes porciones de la población mundial tienen requisitos heterogéneos, las estimaciones agregadas de la capacidad de carga basadas en una fórmula única no resultan precisas. Además, como los diferentes factores pueden ser restrictivos en diferentes momentos, mientras que la ley supone un estado estacionario, no funciona cuando los factores limitantes fluctúan. El promedio temporal puede mover a engaño.

Los factores limitantes son un común denominador en la naturaleza que se resuelven de formas diferentes. Una de ellas son las migraciones. Entre las más conocidas se encuentran las migraciones de poblaciones de grandes herbívoros, las de aves que cruzan océanos y continentes o la menos conocida del plancton, que durante la noche habita en aguas superficiales para alimentarse, y en el día desciende más de un kilómetro ya que allí es donde ahorra energía porque su metabolismo se reduce con el descenso de temperatura. Los ejemplos son infinitos y en absoluto ajenos al *Homo sapiens,* que hoy, como vemos todos los días, migra desde el pobre sur hacia el norte saltando fronteras naturales y administrativas. Por citar un solo ejemplo, la crisis de los refugiados sirios ha tenido un gran impacto en los niveles y patrones de migración en los últimos años, que afecta a varios países. La salida neta estimada desde la República Árabe de Siria fue de 4,2 millones de personas en 2010-2015. (United Nations).

En su sentido ecológico-demográfico, la capacidad de carga se refiere a una población de animales salvajes dentro de un ecosistema particular. Un libro de texto de ecología ampliamente utilizado (Fryxell, Sinclair y Caughley) lo define de la siguiente manera: "Número de individuos en una población que los recursos de un hábitat pueden soportar: la asíntota o meseta de la logística y otras ecuaciones

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sigmoideas para el crecimiento de la población". Eso quiere decir que, incluso dentro de la ecología, el concepto de capacidad de carga tiene limitaciones importantes. Se aplica mejor en condiciones estables y en períodos de tiempo relativamente cortos. En el mundo real, climas y los hábitats fluctúan y cambian; los animales se adaptan a sus condiciones y eventualmente evolucionan hacia nuevas especies. Con cada cambio, la capacidad de carga también cambia.

Cuando se aplica a los seres humanos, el concepto se vuelve mucho más etéreo. Aunque hay un sinfín de definiciones de capacidad de carga humana, la mayoría de ellas coincide en algunos puntos básicos, por ejemplo, que el concepto se refiere a la cantidad de personas que pueden mantenerse durante un período (que por lo general no se indica) en algún modo de vida considerado sostenible. La mayoría de las definiciones reconocen que los conceptos ecológicos de capacidad de carga deben ampliarse para permitir el papel que juega la tecnología. La mayoría también está de acuerdo en que los niveles de vida cultural e individual, incluidas las normas de calidad ambiental, establecen límites en el tamaño de la población mucho antes de que los requisitos para la subsistencia comiencen a ser un problema.

En otros aspectos, las definiciones varían ampliamente o incluso se contradicen unas a otra. ¿Cuánto tiempo debe ser sostenible una población? ¿Tiene sentido hablar de capacidad de carga local o regional, cuando los intercambios comerciales procedentes de cualquier región implican que solo serviría un cálculo a escala global? Y todavía más importante, ¿cómo de restrictivas deben ser las restricciones? Algunas definiciones niegan por completo la existencia de cualquier capacidad de carga finita, porque sostienen que el ingenio humano superará cualquier barrera natural; otros asumen que los límites son reales, pero reconocen que las elecciones humanas, ahora y en el futuro, decidirán en gran medida dónde se sitúan los límites.

En cualquier caso, todo ecosistema tiene una capacidad de carga que limita el crecimiento de cualquier especie que lo habite. La peculiaridad de la especie humana es que, a las migraciones y a la autorregulación de la fecundidad (las estrategias naturales para mantener la población en los límites impuestos por el entorno, lo que en los estudios ecológicos se conoce como vecería), ha añadido una estrategia nueva: la transformación del propio ecosistema ampliando su capacidad de carga artificialmente a través de actividades tales como la agricultura, la ganadería, la urbanización o el comercio. Por ello, el aumento de la población siempre se ha considerado signo de prosperidad y de éxito ante la naturaleza salvaje, y pueden seguirse los progresos humanos observando simplemente los momentos en que el número de individuos crece.

En definitiva, aunque algunos ecólogos y otros académicos afirman que el concepto ecológico de capacidad de carga proporciona una visión especial a la pregunta de cuántas personas puede soportar la Tierra, en ecología la capacidad de carga para especies no humanas se ha definido en al menos nueve formas significativamente diferentes, ninguna de ellas adecuada para seres humanos, porque la capacidad de carga humana depende tanto de las limitaciones naturales,

que no se conocen por completo, como de elecciones individuales y colectivas. Cuántas personas puede soportar la Tierra depende, por ejemplo, de cuántos usarán algodón y cuántos poliésteres; de cuántos irán a trabajar andando, en coche o en transporte público; de cuántos comerán carne y cuántos serán vegetarianos; de cuántos querrán parques y de cuántos querrán aparcamientos. Esas elecciones cambiarán con el tiempo y con ellas también lo hará la cantidad de personas que la Tierra pueda soportar.

Por eso, el camino hacia la comprensión de nuestra capacidad de carga, está salpicado de previsiones erradas que siempre se han basado en establecer el límite de los recursos. Veamos dos ejemplos. Al principio de su carrera como disciplina académica en el siglo XIX, la Economía era llamada "la ciencia deprimente" debido a las predicciones de Malthus sobre el hambre masiva. Tuvo muchos sucesores, el más elocuente de los cuales tal vez fue un economista británico llamado William Stanley Jevons.

En 1865, Jevons publicó *The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal Mines*. En la mayoría de los casos, era bastante similar a los libros que se publicaron durante la crisis energética de los 70 del siglo pasado. Su libro presenta gráficos que muestran las curvas parabólicas de la población y el consumo de carbón disparado hacia arriba, acompañados de otros gráficos que muestran estimaciones de reservas de carbón cada vez más menguantes. "La conclusión es inevitable, escribió Jevons, nuestra actual situación de felicidad progresiva es algo de duración limitada" (242). Hoy por hoy, si hay un combustible fósil tan contaminante como inagotable, ese es el carbón.

Avancemos un siglo y veamos el caso de Lester R. Brown, otro *doomster* ampliamente citado. Brown, fundador en 1974 y presidente hasta 2001 del *Worldwatch Institute* de Washington, que cada año publica el documento de política pública más utilizado en el mundo, el informe *State of the World*. El de 1990 incluía un gráfico (Figura 9) de los precios de dos cereales que es interesante porque difiere por completo de las predicciones que el mismo Brown había hecho una década cuando escribió: "El período de abastecimiento seguro mundial de alimentos se ha terminado […] A medida que la demanda de alimentos continúe superando a la oferta, los precios reales de los alimentos aumentarán inevitablemente. La pregunta ya no parece ser si aumentarán, sino cuánto" (Tierney 76-77). Pero como muestra la figura, los precios de los granos cayeron rápidamente y alcanzaron mínimos históricos durante la década de 1980.

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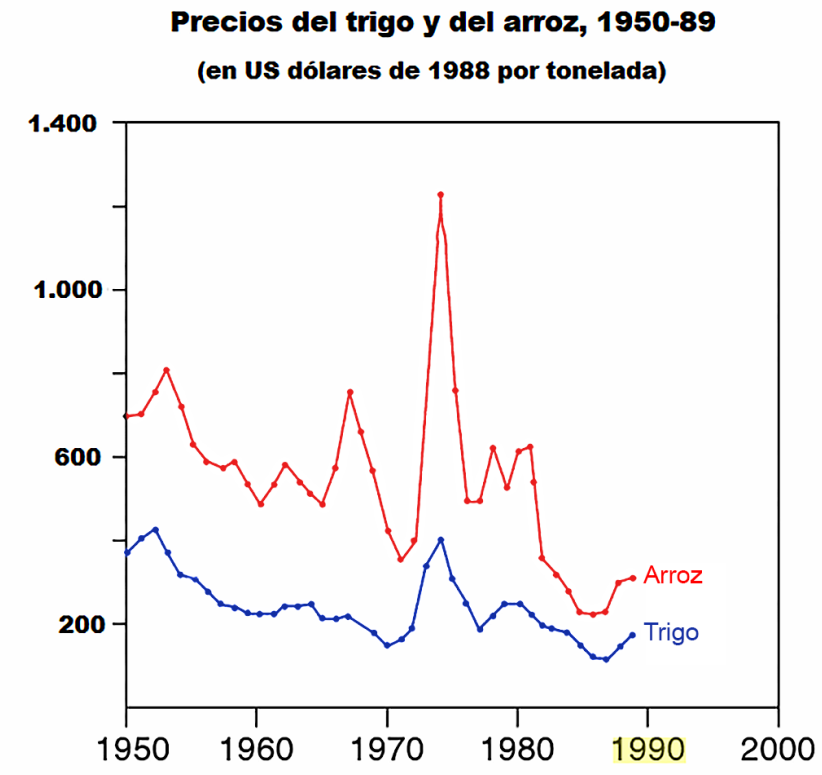

Figura 9

Veamos cómo Brown analiza los datos en el informe de 1990, en el que escribió: "La primera señal económica concreta del deterioro ambiental parece que ahora será que aumenten los precios de los granos" (Tierney 77). No hubo tal. En el transcurso de 1990 los precios de los granos cayeron en picado, porque desde el pico de precios de 1988-89 los agricultores hicieron lo que hacen siempre cuando suben los precios: plantar más. El precio del trigo cayó más del 40% ese año; de haberse incluido en el gráfico, estaría en el punto más bajo de todos los tiempos. Una vez más, los cálculos malthusianos tuvieron que ser reprogramados.

Comparemos ahora dos ejemplos de consenso aparentemente similares, pero que guardan diferencias sustanciales. Más de 1.500 científicos, procedentes de 70 países, entre ellos la mitad de los premios Nobel de ciencia y economía, firmaron el 20 de noviembre de 1992 un manifiesto en el que pedían cambios fundamentales en la forma en que se administran los recursos del planeta para evitar una catástrofe medioambiental. "Nos estamos aproximando con rapidez a muchos *de los límites de la Tierra*", decía el documento. "No quedan más que unas pocas décadas para luchar contra las amenazas actuales y la perspectiva de una humanidad inconmensurablemente limitada" (Union of Concerned Scientists 5). Los científicos instaban a las naciones a encarar la crisis ecológica. Los países industrializados, "deben reducir en gran medida su *sobreconsumo de los recursos mundiales* y ofrecer más ayuda y apoyo a los del Tercer Mundo." Las naciones del Sur, por su parte, "deben comprender que el daño ambiental es una de las amenazas más graves que

enfrentan y que los intentos por mitigarlo se verán anulados si *sus poblaciones crecen sin medida*" (5; énfasis en el original). El crecimiento de la población era, pues, según el manifiesto, una de las principales amenazas.

Veinticinco años después de la primera advertencia, el 14 de noviembre de 2017, más de 15.000 científicos de 184 países han lanzado un nuevo llamamiento para salvar el planeta en el que se advierte de que casi todos los problemas son ahora mucho peores (Ripple et al.). Los firmantes hablan de las "señales obvias de que vamos por un camino insostenible", aunque también ofrecen acciones para intentar revertir las tendencias actuales. A su juicio, casi todos los problemas que acucian al planeta son ahora "mucho peores" que en su primer aviso. El bienestar humano sigue "seriamente amenazado" por tendencias negativas como *el cambio climático*, y *el crecimiento de la población humana*, escriben los expertos.

"La Humanidad no está tomando las medidas urgentes necesarias para proteger nuestra biosfera en peligro", escriben, ya que "la abrumadora mayoría" de las amenazas que ya se habían descrito persisten y, "de manera alarmante, la mayoría están empeorando." Por ello, sugieren trece áreas en las que actuar, entre las que destacan *ampliar los programas de planificación familiar* y de educación para las mujeres, y piden una corriente de presión pública para convencer a los líderes políticos de que adopten las medidas correctivas. Entre los principales peligros, la Alianza destaca *el aumento del 35% de la población humana*, que ha sumado 2.000 millones de personas desde 1992 (mi énfasis).

Entre uno y otro manifiesto cabe resaltar algunos aspectos esenciales que marcan el cambio de tendencia conservacionista ocurrido en el último cuarto de siglo. En primer lugar, el amplio consenso alcanzado que se refleja en el número de científicos implicados, que se ha multiplicado por diez en ese período. En segundo lugar, el telón de fondo de ambos sigue siendo el mismo: el exceso de población humana y su tasa de crecimiento. En tercer lugar, pongan la atención en los mensajes que he enfatizado con itálicas. En 1992 la gran preocupación eran los "límites de la Tierra" motivados por el "sobreconsumo de los recursos mundiales." La distopía era la gran hambruna. En ese primer manifiesto no aparece el binomio "cambio climático", el nuevo Armagedón que marca hoy nuestros días.

En las últimas décadas, una vez puesto sobre la mesa que el gran problema al que nos enfrentamos no reside en los recursos como factores limitantes, sino en el de los excesos de gases de efecto invernadero, ese consenso se ha traducido en adoptar como criterio de medición de nuestra capacidad de carga el concepto de huella ambiental.

La huella ambiental

La huella ambiental, a la que algunos prefieren llamar "huella de carbono", es un indicador que representa la suma absoluta de todas las emisiones de gases de efecto invernadero causadas directa o indirectamente por un individuo, organización, país o producto. Dicho de forma muy breve, la huella de carbono se

puede entender como la marca que se deja sobre el medio ambiente cada actividad que emite gases de efecto invernadero. Se expresa en unidades de carbono equivalente (CO_2eq).

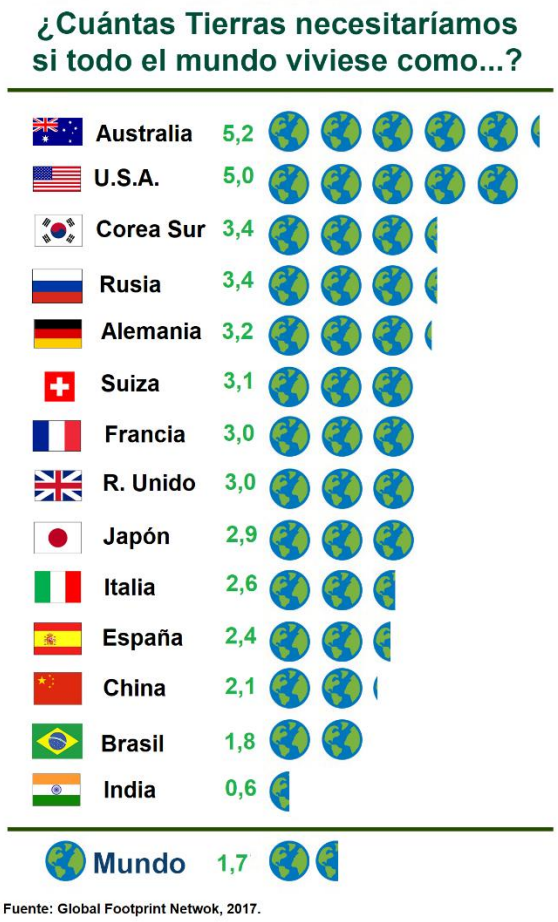

Figura 10

Una señal inequívoca de que sobrepasamos la capacidad de carga del planeta es el *Earth Overshoot Day* (Día de la Deuda Ecológica), el día del año en el que los humanos empezamos a consumir más recursos de los que el Planeta es capaz de generar anualmente. Este año fue el 2 de agosto. Eso quiere decir que, a partir de ese día, en nuestra cuenta ambiental dejó de haber ingresos y siguieron aumentando los gastos; otra vez, a vivir a crédito. Hace ya años que ocurre, y cada vez lo hace más temprano. Cuando empezó a cuantificarse hace 30 años, en 1987, fue el 19 de diciembre y, desde ese momento, no ha dejado de adelantarse: en 2005 fue el 20 de octubre, en 2010, el 21 de agosto y en 2016 el 8 de agosto.

En otras palabras: la humanidad está usando en la actualidad recursos naturales a una velocidad 1,7 veces mayor a la capacidad de regeneración de los ecosistemas; algo así como estar empleando 1,7 Tierras (Figura 10). Eso se traduce en deforestación, sequías, falta de agua dulce, erosión del suelo, pérdida de biodiversidad, movimientos migratorios desregulados y acumulación de gases de efecto invernadero en la atmósfera.

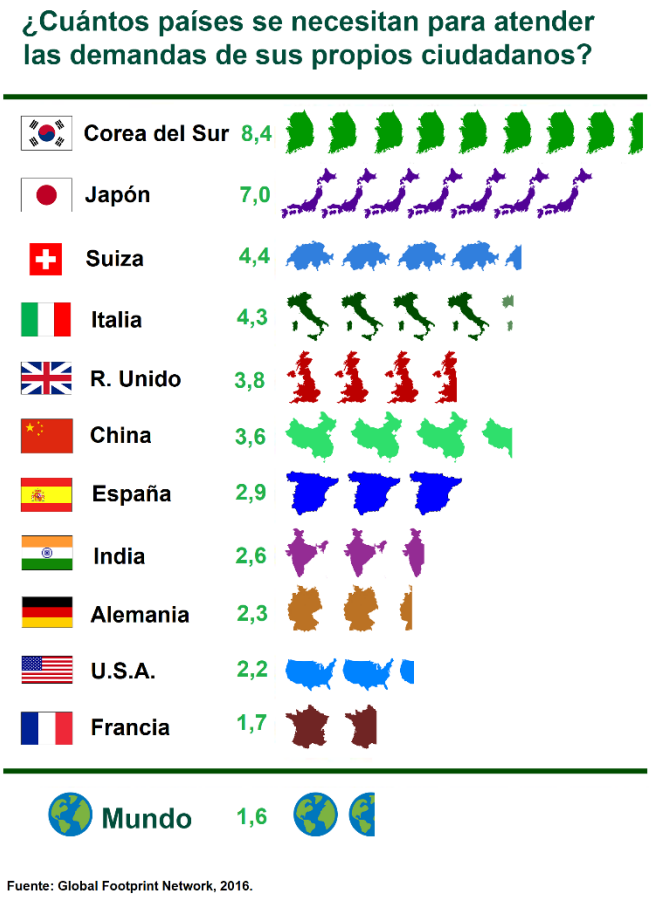

Figura 11

Los países desarrollados consumen la mayor parte de los combustibles fósiles. Los Estados Unidos, por ejemplo, cuya población solo representa el 5% de la población mundial, contribuyen con una cuarta parte de la producción mundial de CO_2. Mientras el crecimiento de la población está estancado o disminuyendo en la mayoría de los países desarrollados, está aumentando en las naciones en desarrollo que se están industrializando rápidamente. Según el Fondo de Población de las Naciones Unidas, los países en desarrollo de rápido crecimiento (como China e India) contribuirán con más de la mitad de las emisiones mundiales de CO_2 para 2050, lo que lleva a algunos a preguntarse si todos los esfuerzos realizados para frenar las emisiones en los países desarrollados serán inútiles.

Global Footprint Network, la organización que cada año calcula el Día de la Deuda Ecológica, calculó que si todos los habitantes del mundo viviesen como los estadounidenses (Figura 10), se necesitarían cinco Tierras para abastecer los requerimientos de recursos naturales. Pero si el nivel de vida medio planetario fuese como el de India, sólo se necesitaría un equivalente a 0,6 Tierras. El déficit de algunas naciones, entre otras España, puede verse en la figura 11, en la que se

observa que los españoles necesitamos casi tres Españas para satisfacer nuestras necesidades.

La deuda ecológica simboliza la gran inequidad de nuestra época: pagan más los más vulnerables y pagarán mucho más los que hoy son niños y los que están por nacer. Sin piedad, acumulamos deuda ecológica que, en parte, pagaremos con sufrimiento y tensiones por el acceso a recursos como agua potable, suelos fértiles, pesca, o aire limpio, con daños irreparables y migraciones masivas forzadas por el incremento en intensidad y frecuencia de fenómenos meteorológicos extremos. Pero es, sobre todo, deuda que pagarán con creces nuestros hijos y nietos. Sin elección. Sin capacidad de reacción. Sin la menor oportunidad de corregir una trayectoria que nosotros conocemos y somos capaces de corregir, pero que representa un esfuerzo, una ruptura con la inercia para la que nos mostramos demasiado vagos y timoratos.

La población, el calentamiento global y los patrones de consumo están inextricablemente vinculados en su impacto ambiental global. A medida que la contribución de los países en desarrollo a las emisiones mundiales crezca, el tamaño de la población y las tasas de crecimiento se convertirán en factores importantes para aumentar los impactos del calentamiento global. Según el Worldwatch Institute, los principales desafíos a los que se enfrenta nuestra civilización global son reducir el cambio climático y frenar el crecimiento demográfico.

> El éxito en estos dos frentes haría que otros desafíos, como revertir la deforestación de la Tierra, estabilizar las capas freáticas y proteger la diversidad de plantas y animales, sean mucho más asequibles [...] Si no podemos estabilizar el clima y la población, no hay un ecosistema en la Tierra que podamos salvar. (World Watch Institute)

Crecimiento de población y cambio climático: menos huellas y menos pies

Como he intentado explicar, la mayor amenaza individual para el medioambiente, el equilibrio ecológico y la biodiversidad en las próximas décadas será la alteración del clima mundial debido a la acumulación de gases de efecto invernadero generados por miles de millones de decisiones individuales. En todo el mundo mucha gente está empezando a abordar el problema al reducir su huella de carbono mediante un menor consumo, una menor producción de residuos y una mejor tecnología. Pero el crecimiento insostenible de la población humana puede hacer inútiles esos esfuerzos, lo que nos lleva a concluir que no solo necesitamos huellas más pequeñas, sino menos pies.

Un estudio sobre la relación entre el crecimiento de la población y el calentamiento global cuantificó las emisiones futuras de descendientes según tasas históricas basadas en la herencia genética (Murtaugh y Schlax). El estudio determinó que el "legado de carbono" de un solo niño puede producir veinte veces más gases de efecto invernadero que lo que conseguiría reducir a lo largo de su vida un adulto conduciendo un automóvil híbrido, reciclando, utilizando electrodomésticos de bajo

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consumo, bombillas LED, entre otras cosas. El linaje de cada niño nacido en los Estados Unidos agregará aproximadamente 9.441 toneladas de CO_2 al legado de carbono de su madre en el supuesto de que esta tenga los mencionados hábitos sostenibles. El estudio concluye que los ahorros potenciales de tener menos descendencia son enormes en comparación con los que se pueden lograr con los cambios en el estilo de vida.

Del estudio se deduce que, aunque en los debates sobre el cambio climático tendemos a centrarnos en las emisiones de carbono de un individuo a lo largo de su vida, unos factores importantes que hay que considerar y un desafío adicional al que nos enfrentamos es el continuo crecimiento de la población y el aumento del consumo global de recursos. El crecimiento poblacional amplía las consecuencias de las decisiones reproductivas de las personas de la misma manera que el interés compuesto amplía un saldo bancario.

Si quiere reducir su huella de carbono, reciclar, prescindir del coche y usar el transporte público está muy bien, pero para marcar una diferencia verdaderamente importante hay que reducir la descendencia teniendo un hijo menos. Esa es la conclusión de un estudio (Wynes y Nicholas) en el que los investigadores examinaron artículos científicos, informes gubernamentales y otros estudios de calidad contrastada que evalúan las opciones de comportamiento habitual y modo de vida que cualquier persona puede adoptar para reducir su aportación personal al calentamiento global.

Muchas de las opciones que se recomiendan habitualmente, como lavar la ropa con agua fría, utilizar la lavadora y el lavavajillas a plena carga, o cambiar las bombillas incandescentes por LED o no imprimir documentos, tienen un impacto moderado (Figura 12), según ese artículo. Las cuatro actividades personales que tienen efectos importantes son hacerse vegetariano, abandonar el automóvil, renunciar a los viajes aéreos, y, lo más importante, tener un hijo menos. Dejar a un lado la carne reduce la huella de carbono de un individuo en 820 kilogramos de CO_2eq cada año, unas cuatro veces la reducción que obtendría reciclando todo lo que pudiera. No realizar un vuelo transatlántico de ida y vuelta cada año reduciría las emisiones de una persona en 1.600 kilogramos de CO_2eq. Deshacerse del coche reduciría las emisiones en 2,4 toneladas. Si elige tener un hijo menos en su familia, una persona recortaría su huella de CO_2eq en unas 58,6 toneladas, aproximadamente el mismo ahorro de emisiones que tener a casi 700 adolescentes actuales reciclando tanto como sea posible el resto de sus vidas.

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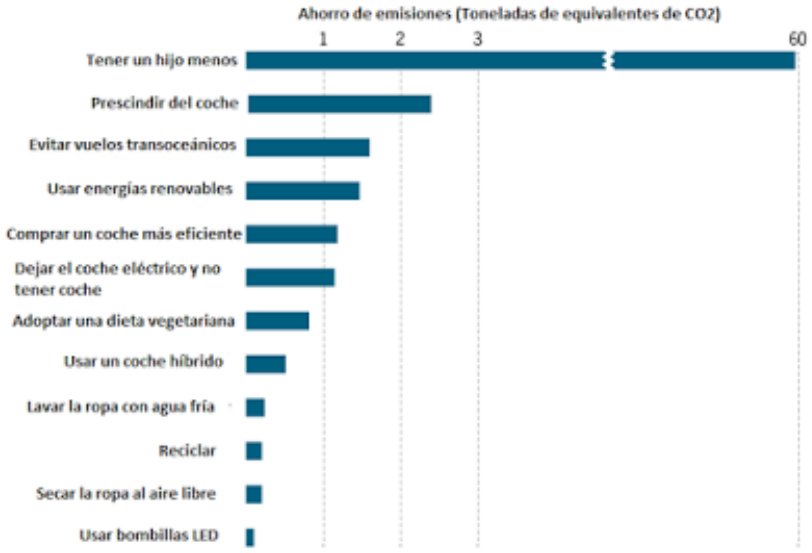

Figura 12

Y ahora pasemos a la limitación de los pies que provocan la huella. A nivel mundial, investigaciones recientes indican los escenarios con respecto a la disminución de las tasas de fecundidad utilizadas por el IPCC para predecir las emisiones pueden ser demasiado optimistas. Si bien las tasas de fertilidad han disminuido en general durante las últimas décadas, se han desacelerado en los últimos años, especialmente en los países en desarrollo, en gran parte debido a los recortes en la asistencia a la planificación familiar y a las influencias religiosas, siempre natalistas. E incluso si las tasas de fertilidad se reducen por debajo de los niveles de reemplazo, los niveles de población continuarán aumentando considerablemente durante un tiempo dado el descenso de la mortalidad y el aumento de la esperanza de vida. Puede que las emisiones *per capita* de gases de efecto invernadero disminuyan, pero el crecimiento de la población continuará contribuyendo a un aumento peligroso de sus emisiones a la atmósfera.

Todo parece conducir a la necesidad de actuar. Muchos expertos en población creen que si se mejora la salud de las mujeres y los niños en las naciones en desarrollo, si se reduce la pobreza y la mortalidad infantil, se aumenta el acceso de mujeres y niñas a los derechos humanos básicos, se educa a las mujeres sobre opciones de control de natalidad y se garantiza el acceso a servicios de planificación familiar voluntaria, las mujeres optarán por limitar el tamaño de la familia.

Esa parece ser la única alternativa si no es posible la emigración y si se desea que el nuevo ajuste entre población y emisiones se realice por una vía que no sea la catástrofe. En 1798, Thomas Robert Malthus describió una relación dinámica entre el tamaño de la población humana y su capacidad de carga:

> La felicidad de un país no depende en absoluto de su pobreza o de su riqueza, de su juventud o de su edad, de si está casi deshabitado o completamente habitado, sino de la rapidez con que crece, en la medida en que el aumento anual de alimentos se acerque al aumento anual de una población sin restricciones. (43)

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Como anuncia desde la portada de su ensayo, Malthus se oponía al optimismo de otro émulo del doctor Pangloss, el Marqués de Condorcet, que creía que la mente humana sería capaz de superar todos los obstáculos al progreso humano. Malthus predijo erróneamente que la tasa de crecimiento de la población siempre sería más rápida que la tasa de crecimiento de los alimentos. Su predicción ha fallado durante más de dos siglos debido a que no previó cuánto pueden expandir los humanos la capacidad de carga de la Tierra, incluyendo, entre otros factores, la producción de alimentos. Para saber si Malthus seguirá estando equivocado, los economistas, los demógrafos y los analistas de sistemas han construido modelos en los que el crecimiento de la población impulsa el cambio tecnológico, lo que permite un mayor crecimiento poblacional.

Estos modelos, que tienen en común la afirmación de que "cada ser humano representa manos para trabajar y no solo otra boca para alimentar", sin especificar los recursos culturales, ambientales y económicos disponibles para que las "manos adicionales" sean productivas, y por lo tanto sin especificar en qué medida pueden aumentar (o disminuir) nuestra capacidad de carga, exageran al alza la capacidad de carga humana de la Tierra. Este "triunfo" (que está por probar) de nuestra tecnología es el que reflejan las cifras sobre el actual crecimiento de la población mundial, y el que ha creado un nuevo riesgo global: que descubramos trágicamente, y puede que demasiado tarde, que los límites al crecimiento lejos de haber desaparecido, sólo han sido ampliados de manera finita. Mientras muchos creen que el riesgo es ya una realidad, los cornucopianos piensan que la inventiva humana aún puede ampliar las posibilidades de crecimiento.

Conclusión

Hoy, cuando parece superada la ansiedad por los límites de los recursos (sin que eso haya significado, lamentablemente, que se superen las hambrunas), es decir, impuestas en buena medida las tesis de los *boomsters*, el discurso o, si se quiere, la distopía ambientalista, está marcado por el exceso y no por el defecto: mientras que en la década de los 90 la voz de alarma era neo-malthusiana, hoy los problemas derivados de nuestro propio exceso consumista, traducidos en la emisión de temibles gases de efecto invernadero (unos términos completamente ajenos al discurso hace veinticinco años), son los que marcan la agenda ecológica mundial.

Estamos entrando en una nueva época de la historia de la Tierra, el Antropoceno. Una época en la que los seres humanos, más que las fuerzas naturales, son la causa principal del cambio planetario. Pero nosotros también podemos redefinir nuestra relación con el planeta, pasar de una relación derrochadora, insostenible y depredadora a una en que las personas y la naturaleza puedan coexistir en armonía. No hay soluciones simples. Pero los líderes que se reúnen periódicamente en las cumbres del clima ni siquiera podrán comenzar a abordar el cambio climático a menos que reconozcan que su origen, nuestra creciente población, está creando una crisis aún mayor. Deben asumir que una economía

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basada en el crecimiento infinito se enfrenta a los principios biofísicos más elementales: a los límites de la Tierra.

Hoy, el problema no se plantea por primera vez a nivel local. La migración (el abandono del ecosistema, cuando su capacidad de carga quede sobrepasada) no resultará posible esta vez. Esta vez hablamos del propio planeta. Esta vez, crecimiento poblacional y progreso humano empiezan a no ser sinónimos.

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Malthusian Biopolitics, Ecological Immunity, and the Anthropocene

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Abstract

This essay argues that Michel Foucault's original introduction of the concept of biopolitics should be seen as responding to Emmanuel LeRoy Ladurie's notion of a "Malthusian curse" which during medieval and early modern times kept the French population in check. Biopolitics was, in its original conception, the management of human and nonhuman populations, securing them against famine and disease so as to allow for continuous growth. During the second half of 20th century, however, Neo-Malthusian thinkers pointed out that these strategies for immunizing human life against the vagaries of ecological existence had come to endanger the basic conditions of life precisely to the degree that they had been successful—ushering in the new geological epoch we have lately begun to refer to as the Anthropocene. This paradoxical dynamic can be understood in terms of what Roberto Esposito has described as an "immunitary double-bind": existing immunitary defenses can no longer be dismantled without causing significant harm to human life, yet failure to dismantle them will increase the risk of incurring even greater harm in the future. Such an account, it is argued, yields a more ambivalent picture than the starkly negative views which continue to dominate biopolitical theory.

Keywords: Anthropocene, biopolitics, immunity, neo-malthusianism.

Resumen

Este ensayo sostiene que la introducción original de Michel Foucault del concepto de biopolítica debería entenderse como respuesta a la noción de "maldición malthusiana" de LeRoy Ladurie que durante la época medieval y moderna mantuvo bajo control a la población francesa. La biopolítica era, en su concepción original, la gestión de poblaciones humanas y no humanas, protegiendolas frente a la hambruna y la enfermedad, y permitiendo un crecimiento continuo. Durante la segunda mitad del siglo XX, sin embargo, los pensadores neo-malthusianos apuntaron que estas estrategias de inmunización de la vida humana frente a los antojos de la existencia ecológica habían terminado por poner en peligro las condiciones básicas de la vida precisamente hasta el punto de que habían tenido éxito—marcando el inicio de la nueva época geológica que recientemente hemos denominado Antropoceno. Esta dinámica paradójica puede entenderse como lo que Roberto Esposito ha descrito como una "atadura doble inmunitaria": las defensas inmunitarias existentes no pueden desmantelarse sin causar un daño significativo a la vida humana, pero fracasar en desmantelarlas aumentaría el riesgo de sufrir aún más daño en el futuro. Tal explicación, se argumenta, ofrece un retrato más ambivalente que las vistas claramente negativas que continúan dominando la teoría biopolítica.

Palabras clave: Antropoceno, biopolítica, inmunidad, neo-malthusianismo.

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Introduction

Since the turn of the century, biopolitics has emerged as one of the principal concerns in humanities scholarship. It is not difficult to see the reason for this surge of interest in a concept which, when Foucault originally proposed it during the second half of the 1970s, had found only very little resonance. The so-called "War on Terror" waged in the wake of 9/11 furnished a set of historical circumstances in which the idea of a state that, in the name of security, exercises an unlimited and immediate control over the lives of people assumed a new and frightening plausibility. Elaborating on Foucault's writings on the subject, Giorgio Agamben and Achille Mbembe described biopolitics as an escalated form of sovereign power. The extraterritorial internment camp at Guantanamo Bay, extraordinary renditions, and the abuse of prisoners at Abu Ghraib offered powerful illustrations of the biopolitical mechanisms of exclusion they had outlined in their discussions of "bare life" (Agamben 10-13) and "necropolitics" (Mbembe 27-30) respectively. Meanwhile, the vast expansion of government surveillance programs, the introduction of new biometric controls and methods for the analysis of meta-data appeared to confirm Michael Hardt's and Antonio Negri's analysis of "Empire," that is to say, of a global neoliberal order which deploys "biopower" in order to wrest surplus value from life.

Without a doubt, this work had important things to say about its own historical moment, and much of it remains relevant today. At the same time, the developments on which they focused are increasingly being eclipsed by a more expansive, more intractable, and in some ways more pressing set of concerns, namely about the cumulative impact of world society on the Earth, and about the Earth's continued ability to support a growing human population. These concerns are, of course, not entirely new—indeed, many of the terms in which they are being discussed today became entrenched at about the same time that Foucault was advancing the notion of biopower as a conceptual key to modernity: the rise of the modern environmental movement occurred during the 1960s and 70s; the Club of Rome's seminal *The Limits to Growth* was published in 1972. However, since Paul Crutzen and Eugene Stoermer proposed, in a short essay published in 2000, that human activity had propelled the Earth into a new geological age which they named "the Anthropocene," empirical evidence for the ecological self-endangerment of world society has been accumulating ever more rapidly. The discourse of the Anthropocene, especially where it revolves around questions of "planetary boundaries" and relies on the mathematical modelling of complex social and natural systems, is dominated by the Earth system sciences, and it continues the neo-Malthusian lines of argument that had been so central to 20th century environmentalism (e.g. Rockström). But it has also galvanized a host of scholars in the humanities to rethink the conceptual foundations of their respective disciplines and, more specifically, to question the various versions of the nature/society

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distinction which underpinned them. My aim in this paper is to show how Foucault's notion of biopolitics, as well as the concept of immunity Roberto Esposito has put forward in order to address unresolved contradictions within the latter, speaks to these issues.

Motionless History and the Malthusian Curse

As a first step, this requires that one recognize the extent to which the interpretations of biopolitics which came to the fore in the aftermath of 9/11 entailed a "willful forgetting of both the original motivations and the insights associated with Michel Foucault's thesis about the rise of modern biopower," as Leerom Medovoi has suggested (22-23). Agamben, in particular, presents biopower as a continuation and radicalization of sovereign power—a power ultimately vested in the state, exercised through the law (and its suspension in the state of exception), and aimed at the domination of particular human bodies. Insofar as it pivots on the Aristotelian distinction between *zōe* and *bios*, or natural and political life, he suggests, the entire tradition of Western political thought, from the Greeks onwards, is essentially biopolitical (Mills 83).

This stands in marked contrast to Foucault's original account of biopolitics as advanced both in his lectures at the College de France and in the *History of Sexuality*. Foucault's point of departure there is the observation that, from the eighteenth century onward, the politics of sovereignty "found itself unable to govern the economic and political body of a society that was undergoing both a demographic explosion and industrialization" (*"Society"* 249). It was in reaction to this crisis that a new modality of power emerged which no longer conceived of the governed primarily as juridical subjects, but rather addressed them as living bodies—first individually (by way of what Foucault had earlier analyzed as disciplines, or "anatomo-politics") and then, beginning in the latter half of the eighteenth century, at the level of the population, which now was made knowable through new methods of demography and statistical aggregation, constituting the field of "biopolitics" proper (*"Society"* 243). Foucault summarizes the contrast between sovereign power and biopower in a pithy formula: the former was "the right to take life or let live," the latter entailed the mandate "to make live and to let die" (*"Society"* 241). Moreover, whereas sovereignty had operated through the law, biopolitics works by "effect[ing] distributions around the norm" (*History* 144); under this new dispensation, the law does not disappear, but it is progressively assimilated "into a continuum of apparatuses (medical, administrative, and so on) whose functions are for the most part regulatory." (ibid.) And while Foucault does indeed at times refer to the result of this process as "State control of the biological" (*"Society"* 240), he also insists that biopolitics is not in fact a prerogative of the state, but also exercised by a host of "sub-State" actors such as "medical institutions, welfare funds, insurance, and so on" (*"Society"* 250). While biopower may be "totalizing" in the sense that it

seeks to intervene in and regularize life in a much more pervasive and fine-grained fashion than could have been imagined under the purview of sovereign power, it does not, in the words of Paul Rabinow and Nicholas Rose, "emerge from, or serve to support, a single power bloc, dominant group or set of interests" (199).

To be sure, Foucault's remarks on the relationship between sovereign power and biopower are often elliptical and at times contradictory—early on in the lectures, for example, he suggests that the new modalities of power were "absolutely incompatible with relations of sovereignty" (*"Society"* 35), whereas in the concluding session he speaks of them as "complement[ing]," "penetrat[ing], and "permeat[ing]" the latter (*"Society"* 241). Elsewhere, he writes that they "supplanted" sovereign power (*History* 140). However one wishes to read these passages, Foucault leaves no doubt that he views the advent of biopolitics not only as a historical novelty, but as a genuine epochal break. As he was to put it in one of the most famous passages of the *History of Sexuality*: "a society's 'threshold of modernity' has been reached when the life of the species is wagered on its own political strategies. For millennia, man remained what he was for Aristotle: a living animal with the additional capacity for a political existence; modern man is an animal whose politics places his existence as a living being in question" (HS 143).

The advent of biopolitics, in other words, marks a fundamental shift in the conditions of human existence. To fully appreciate the character of this shift, it is necessary to read these sentences in conjunction with the passage that precedes them, where Foucault identifies it with an alleviation of the "pressure exerted by the biological on the historical" (HS 142). "For thousands of years," this pressure had primarily taken the form of "epidemics and famine." However, in the decades prior to the French Revolution,

> an increase in productivity and resources even more rapid than the demographic growth it encouraged, allowed a measure of relief from these profound threats [...]. [The] development of the different fields of knowledge concerned with life in general, the improvement of agricultural techniques, and the observations and measures relative to man's life and survival contributed to this relaxation [...]. In the space for movement thus conquered, and broadening and organizing that space, methods of power and knowledge assumed responsibility for the life processes and undertook to control and modify them. (HS 142-43)

What these remarks suggest is that the advent of biopolitics was above all a matter of modern societies breaking what the historian Emmanuel Le Roy Ladurie, in *The Peasants of Languedoc* and *Times of Feast and Times of Famine* (originally published in 1966 and 1967, respectively), had described as the "Malthusian curse" (*Times of Feast* 311). Ladurie argued that the population of France from the Middle Ages into the Early Modern period had been in the tight grip of Malthusian cycles: during the fourteenth century (largely as a result of the bubonic plague), the population had crashed from about 20 million to little more than 10 million. By the early sixteenth century, it had rebounded. Between 1560 and 1720, it oscillated between 18 and 20 million, with periods of population growth offset by frequent

bouts of famine and disease. Ladurie described this condition as "histoire immobile." Only in the early eighteenth century did the French population begin to enter a period of steady growth, reaching about 30 million by the end of the century (*The Peasants* 122-25). This is the historical context in which, according to Foucault, biopower begins to supplement sovereign power, and I cannot help but suspect that when he speaks of the new "space for movement" which enabled this transition, he is implicitly counterposing it to Ladurie's "motionless history."[1]

This also implies that the epochal significance of the emergence of biopower is not nearly exhausted by the fact that it led to new forms for governing people—even though this is certainly the aspect with which Foucault was mostly preoccupied, and which subsequent theorists of biopolitics have almost exclusively focused on. Just as importantly, biopolitics has to do with the development of methods which made it possible to immunize society against famine and disease, and this is necessarily a matter of governing not only the human population, but also the populations of the many non-human species on which the well-being of the latter depends. Biopolitics is about managing the populations of pigs and wheat, of locusts, mosquitos, and microbes, and any number of other creatures. It aims to bring the ecological conditions of human existence, which hitherto had constituted an "inaccessible substrate that only emerged from time to time, amid the randomness of death and its fatality," into "the realm of explicit calculations" (HS 143). Biopolitics, in other words, cannot help but also be *ecological* politics; it cannot help but be a biopolitics of the nonhuman.

Naturalization, Denaturalization, and the Biopolitics of Scarcity

At the heart of biopolitics one thus finds a kind of paradox. The efficacy of biopolitical governance rests on the knowledge of a fundamental ontological continuity between human beings and other biological species. Its conceptual premise is the *naturalization* of the human species—the knowledge that human beings are only one life form among others, "a living species in a living world" (*The History* 143). The dangers which biopolitical governance seeks to protect against arise from, and must be addressed at the level of, human commonality with nonhuman species: the susceptibility to disease and the need for sustenance are universal features of all life. Thus Ladurie could argue ("with all due respect to the Angevin character") that the frequent epidemics which, up until the eighteenth century, kept the human population of Anjou in check were substantively analogous to the diseases that periodically decimate simian populations, serving as a "primitive and cruel form of self-regulation" ("Motionless" 129). Biopolitical governance grows

[1] There can be no question that Foucault would have been keenly aware of these ideas: Ladurie was his colleague at the Collège de France, where he succeeded Ferdinand Braudel in 1973; in his inaugural lecture, he presented a precis of his work which was later published under the title "Motionless History" (Ladurie "Motionless").

in tandem with the understanding that disease and famine are not "acts of God," testifying to the power of a divine sovereign no more accountable to human beings than the king was to the peasantry, but arise from natural causes and are amenable to control by natural means.

The necessary result of such governance, however, is a radical *denaturalization* of the human, insofar as the function of the biological mechanisms which had regulated human populations in the past is now assumed by society itself. Even as it closes the conceptual gap between human and nonhuman life, biopolitics opens up a divide between those forms of life which are valorized, protected, and in some measure exempted from the vagaries of ecological existence, and those forms of life which must be left to die in order for the latter to flourish. But this dividing line can now no longer be a "natural" one—even if the necessity of drawing it was almost invariably legitimized in terms of its naturalness. This, Foucault argued, was precisely the function of modern concepts of race and of racial degeneracy: to "create caesuras within the biological continuum addressed by biopower" so as allow for the distinction between "what must live and what must die" (*"Society"* 254-55).

This is where, both logically and historically, the ideas of Thomas Malthus come into play. His geometrical proof against the possibility of universal equality and justice (in its first, 1798 iteration, the *Essay on the Principle of Population* was first of all a polemic against William Godwin and the Marquis de Condorcet) is so well known that a very brief of summary will suffice: "Population, when unchecked, increases in a geometrical ratio" (i.e., exponentially); "subsistence increases only in an arithmetical ratio" (i.e., in linear fashion; 4). Because population growth always tends to outstrip available resources, the difficulty of ensuring subsistence continuously suppresses the former—be it in the form of "preventative checks" (20), as when couples decide to delay marriage and child-bearing, thereby reducing the number of their off-spring, or in the form of "positive checks" (23), i.e., malnutrition, disease, and other factors which increase mortality. Either way, the lower strata of society are fated to endure "misery and vice" (5). Efforts to circumvent this "imperious all pervading [sic] law of nature" (ibid.), Malthus argued, could only backfire: the English poor laws, for example, by alleviating the pressure of the positive checks, also removed the incentive to apply preventative checks, i.e. they encouraged imprudent reproductive behavior, and would in due course produce more misery. Their "tendency" was "to increase population without increasing the food for its support," and thus effectively "to create the poor which they maintain" (26).

The Malthusian calculus furnished a powerful "natural" principle in terms of which the withholding of biopolitical protections from poor and marginalized groups could be justified. Especially after Darwin integrated it into his theory of evolution as the primary mechanism of natural selection, it seemed to mandate the extermination of social degenerates and inferior races in the name of progress. This

was precisely the conclusion drawn by Francis Galton, who cautioned that the civilizing process tended to remove the selection pressures which alone ensured that superior biological types prevailed over the weaker members of society, and thus might lead to the "degradation of the human race" (*Hereditary Genius* 1). Society therefore needed to embark on a deliberate effort to improve the racial stock: "If a twentieth part of the cost and pains were spent in measures for the improvement of the human race that is spent on the improvement of the breed of horses and cattle, what a galaxy of genius might we not create!" ("Hereditary"). Thus Malthusianism flowered into eugenics, eventually bearing fruit in such books as Lothrop Stoddard's *The Rising Tide of Color against White Supremacy* (1920) (cf. Robertson 13-15).

After WWII, the genocidal policies of Nazi Germany had thoroughly discredited such views. When Malthusianism re-emerged as a key component of the new environmentalist thinking in the post-war period, it was stripped of all overt connections to biological racism. The two books which, more than any others, instigated a renewed public interest in population control, Fairfield Osborn's *Our Plundered Planet* and William Vogt's *Road to Survival* (both 1948), framed the issue strictly in terms of resource scarcity, overconsumption, and environmental degradation, and they emphasized that these problems now needed to be addressed on a planetary scale. Both Osborn and Vogt were trained biologists, and in their argumentation applied recent insights from animal ecology and population biology to the geopolitical challenges of the emerging Cold War period (cf. Robertson 37-38). Human history, they argued, was rife with instances when "populations exceeded the carrying capacity of the land" and as a result fell into ecological and civilizational decline (Vogt 40). However, the unparalleled rapacity of modern industrialized societies was putting a far heavier strain on the natural environment. Given the rapid growth of the world's population, they warned, the idea that the "European and American economic system is applicable to the rest of the world" (Vogt 147) was a recipe for ecological disaster, war, and social collapse: "Like Gadarene swine, we shall rush down a war-torn slope to a barbarian existence in the blackened rubble" (ibid., 288). Osborn and Vogt played a crucial role in establishing the parameters within which the issue of global population growth was discussed during the subsequent decades, a debate that would culminate in the publication of Paul R. Ehrlich's *The Population Bomb* (1968), the Club of Rome's *The Limits to Growth* (1972), and Garrett Hardin's proposal of a "Life Boat Ethics" (1974).

The acknowledgment of ecological limits sometimes led these writers to chilling conclusions. In *The Population Bomb*, for example, Ehrlich spoke in favor of implementing coercive mass sterilization programs in "underdeveloped countries" (165) and suggested that US famine relief efforts should adopt a system of "triage" similar to that employed in military medicine. Military doctors sort incoming patients into three categories: those who will die regardless of treatment, those able to recover without treatment, and those who require immediate attention in order to survive. Medical resources will be directed only towards the last category. In

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much the same manner, Ehrlich argued, countries who are "so far behind in the population-food game that there is no hope that our food aid will see them through to self-sufficiency," such as India, should simply be left to their own devices (160). Hardin's essay on "Life Boat Ethics" was tellingly subtitled "The Case Against Helping the Poor": as long as international aid shielded them from the disastrous consequences of political mismanagement, "the poor countries will not learn to mend their ways, and will suffer progressively greater emergencies as their populations grow." Allowing their inhabitants to migrate to the prosperous regions of the world would only serve to degrade the natural resources of the latter without improving the situation of the former. The only prudent course for the more fortunate nations is therefore to pull up the drawbridge, protect what is theirs and leave the rest of the world to its sorry fate. Hardin acknowledged that many people would find such a course of action "morally abhorrent," but insisted that it "clearly offers the only means of our survival" (1974).

Such arguments effectively transposed Malthus' justification of social inequality to a global scale, and it is hardly surprising that their authors were accused not only of moral callousness, but also of racism and neo-colonialism. In an influential polemic against the neo-Malthusians, Allan Chase argued that their ecological concerns were merely "a new package wrapper for [an] old bill of goods"—namely, the eugenicist views that had held sway during the first half of the twentieth century (1977: 369). More recently, the historian Matthew Connelly has sought to write the entire project of population control as "another chapter in the unfinished history of imperialism" (378). Quite apart from the question whether it is fair to indict a group of writers for beliefs which they explicitly repudiated,[2] it is clear that neo-Malthusian ideas do indeed make a snug fit with the functional profile of racism as specified by Foucault: they allow for a rational distinction between those forms of life that have to be protected and those that should be allowed to die, between forms of life that are worth living and others which do not rise to this level. One of the most frequently heard criticisms of neo-Malthusian thinking is that it is inherently misanthropic and denies the dignity of human life. But this is at best a half-truth. Rather, what it implies is that human dignity requires self-limitation—what Foucault described as the placement of a caesura. Because overpopulation threatens to debase *all* human lives and to make them expendable, the imperative of averting it entails that *some* of these lives may (or even must) be treated as debased and expendable. Ultimately, as Eva Horn has argued, the neo-Malthusian "biopolitics of scarcity" is thus founded on a logic of exception according to which the exigencies of the moment justify a suspension of the ethical obligations that would obtain in a normal situation (1003). All of this would seem to lead back, then, to the thanatological inflections of biopolitical theory one finds in Agamben or Mbembe—and thus to the conclusion that, because biopolitics invariably tilts

[2] Some more than others: Hardin did, in fact, express sympathies for eugenicist ideas at various points of his career; cf. Robertson 154.

towards its death-dealing flipside, it is above all something to be rejected and overcome.

Ecological Immunity

But how is one to square such relentlessly negative accounts with an understanding of biopolitics as the socio-ecological formation which accompanied and enabled, as I have suggested above, the modern escape from the "Malthusian trap"? Clearly, the latter understanding would suggest that this new mode of governance which "takes life under its care" (*"Society"* 253) must not too quickly be denounced as a mere strategy of subjugation or a ruse to expand the remit of sovereign power. What this new power "to make live" (*"Society"* 247), to "regularize" human (and, as I have argued above, non-human) life, "to manage it, to compensate for its aleatory nature, to explore and reduce biological accidents and possibilities" (*"Society"* 261) entailed in the most concrete terms was an end to conditions in which the average woman had to bear six or seven children simply in order to ensure that some of them would reach adulthood, as almost half of all children died before they even reached the age of five (Roser); conditions in which a large share of people were physically stunted from chronic malnutrition and disease, with a life expectancy at birth of well under 30 years and an average body weight about a third below what would be considered normal today (Fogel 10). It was the "disciplinary measures" and "regulatory mechanisms" through which biopower began to address humans as living beings—"health-insurance systems, old-age pensions; rules on hygiene that guarantee the optimal longevity of the population; [...] child care, education, et cetera" (*"Society"* 251)—which made possible both sustained population growth and, at the same time, a steady improvement of living conditions from the latter half of the eighteenth century onwards. From such a perspective, the modern effort to control human natality looks less like a thanatological violation and more like a necessary, materially and logically inevitable corollary of the newly acquired power to depress human mortality.

For Roberto Esposito, the profound ambivalence of biopolitics, epitomized by the strange fact that "a power that functions by insuring, protecting, and augmenting life" could yield "the mass production of death," constitutes a "dyscrasia" which Foucault seemed unable to overcome (*Bios* 33). The notion of biopolitics superimposes two semantic vectors that pull in opposite directions and generate a seemingly irresolvable tension: what is subject and what is object in the phrase "politics of life"? Is biopolitics to be understood as a politics *of* life, in which life realizes its own imperatives through the political, or is it a politics *over* life, wherein the political overwhelms life? What is lacking in Foucault's account, Esposito suggests, is a principle which could bring these two alternatives under one conceptual schema, a principle which would not merely juxtapose them but rather articulate the specific logic in terms of which both become legible as aspects of a

single phenomenon. His proposed solution to this "enigma of biopolitics" (*Bios* 39) is the paradigm of *immunization*.

The term "immunity," Esposito points out, combines biological and juridical meanings which serve to illuminate each other: in the former sense, it refers to "a condition of natural or induced refractoriness on the part of a living organism when faced with a given disease;" in the latter, to "a temporary or definitive exemption on the part of the subject with regard to concrete obligations that under normal circumstances would bind one to other" (*Bios* 45). Both meanings obey the same underlying logic: they denote a mode of self-protection which functions through the introjection or incorporation of a threat. Rather than *either* negating *or* enhancing life, power is seen as enhancing life *by* negating it—not as something that "imposes" itself on life from without, but as "the intrinsically antinomic mode by which life preserves itself through power" (*Bios* 46). Immunization protects the organism by "subject[ing] the organism to a condition that simultaneously negates or reduces its power to expand": "Just as in the medical practice of vaccinating the individual body, so the immunization of the political body functions similarly, introducing within it a fragment of the same pathogen from which it wants to protect itself, by blocking and contradicting natural development" (ibid.). Thus a vaccine exposes the body to an attenuated form of the pathogen; a group of people, to immunize themselves against internecine violence, instates a sovereign ruler, invests the state with a monopoly on (lawful) violence—and then immunizes the citizens of that state against potential abuses of state power by investing them with individual rights.

In all of its instances, immunization is a way of "safeguard[ing] life from the risks that derive from its own collective configuration and conflagration" (*Bios* 55). That is to say, it is concerned with threats that do not originate in some absolute outside, but which arise rather from the fact that a living organism can survive only by virtue of its embeddedness within a matrix of other living organisms. Any particular organism owes its life to the lives of others—it is, in that sense, not "proper" to itself, and always threatened by the possibility that those others come to collect the debt. According to Esposito, this condition of indebtedness is expressed in the Latin word *munus*, denoting a public office, a duty, a burden, and specifically the obligation arising from gift-giving. Both *communitas* and *immunitas* are lexical derivations from *munus*. To belong to a community is to be *cum munus*, under an "obligation of mutual donation" (*Bios* 50). Esposito asks his readers to be attentive to the negative dimension of communal belonging: to belong also means to be owned, to see one's self-possession negated. The term *immunitas* is formed by attaching the private prefix to the same etymological root; it denotes "the condition of dispensation from such an obligation and therefore the defense against the expropriating features of *communitas*" (ibid.). Esposito argues that *communitas* and *immunitas* must be understood as dialectically implicated in each other, each forming the other's necessary obverse. Every community confers a particular kind of immunity on its members; in doing so, however, it also imposes a burden against

which the latter must then once again be immunized. Immunity is thus "simultaneously […] object and motor" of community, both that which compels its original formation and that which keeps it from consuming its members; it is "the fold that in some way separates community from itself, sheltering it from an unbearable excess" (*Bios* 52).

Even though it can be said to reflect a vital necessity, the negative protection of life through its immunization is always in danger of slipping into a catastrophic *aporia*—as evidenced by the genocide of the European Jewry, which Esposito describes as a result of an "absolute normativization of life" in which the forced coincidence of the biological and the juridical issued in the annihilation of both (*Bios* 182-84), but also, in a different fashion, by the autoimmunitary paroxysm of the "War on Terror," in which "excessive defense […] ruinously turns on the same body that continues to activate and strengthen it" (2008: 148). Esposito's ultimate aim is to work towards an "affirmative" biopolitics, a "new politics of life" (*Bios* 109) which would be able to avoid such disastrous outcomes. Rather than "negating" immunization—a gesture which would only reproduce that which it seeks to reject—Esposito insists that such a project must proceed by "deepening the internal contradiction" that lies at its heart (*Immunitas* 16).

I will not try to spell out here what this could possibly mean in practical terms. What interests me in Esposito's account is not the question whether the paradigm of immunization can somehow be overturned, but rather how it can help to elucidate the ecological dimension of biopolitics I have sought to outline above—and, more specifically how it can provide a clearer view of the latter's deeply ambivalent quality. I want to suggest that Ladurie's "immobile history," the time when the Malthusian checks bore down on the human population with unrelieved pressure, may be understood as a condition in which human beings were more fully integrated into the ecological community, so to speak. At the most fundamental level, to be a part of an ecological community means to prey and be preyed upon, to have to compete for food, to be a host for other species and a conduit for the energy flows that circulate through the trophic pyramid, from the primary producers through the herbivores and carnivores to the fungi and bacteria. It also means to be exposed to changing climatic conditions, such as fluctuations in rainfall and temperature. The life of every organism is a gift from the ecological community of which it is a part; but while it is alive, it will seek to defer the date of reciprocal donation for as long as it can. This deferral is the limited immunity the organism enjoys, which is identical with its finite ability to live.

Against this background, one can think of the new forms of biopolitical governmentality which developed from the eighteenth century onwards as systematic, stepped up efforts to immunize society against the vagaries of ecological existence. Their purpose is to exempt human life from the ecological *munus*, as new forms of scientific and administrative expertise are mobilized to emancipate society from the twin threats of scarcity and disease. A principal driver of ecological

immunization was fossil energy, which enabled human beings to decouple themselves to an unprecedented degree from the flows of solar energy that sustain most other biological species, and to construct material and symbolic containers within which human life could flourish seemingly regardless of ecological conditions. By the middle of the twentieth century, however, it was becoming increasingly clear that these strategies were leading to an impasse—not in spite, but precisely *because* of their spectacular success: instead of furthering the autonomy of the individual, they were making it ever more dependent on the political and techno-scientific mechanisms that sheltered society from environmental risks. Because these protective mechanisms had allowed for an exponential increase of the human population, all the while becoming ever more complex and resource-intensive, they were also exacerbating the very imponderables which had made them appear to be necessary, in the first place. In an uncanny inversion, human health, longevity, and fertility, which had been the primary objects of biopolitical regulation, were themselves turning into a source of risk. The attempt to shore up the defenses of the individual body and the body politic against external threats precipitated the latter's recurrence from within—a process which, from Rachel Carson's *Silent Spring* onwards, was frequently allegorized as a form of cancer (Bergthaller 121; for a striking example, see Ehrlich 166). The mechanisms of ecological immunization were turning against the very communal matrix which sustained the human population; its most powerful agent, fossil energy, was fraying the atmosphere, that ultimate immunitary envelope by which the biosphere shields itself from the deadly milieu of interplanetary space.

The Biopolitics of the Anthropocene

It will perhaps have become obvious at this point that the account of Malthusian biopolitics and ecological immunization which I have offered in the foregoing is, at the same time, a genealogy of the Anthropocene—of the Anthropocene not as a stratigraphic or geological set of facts, but rather as the product of a process in which the social and the natural are inextricably intertwined. Seen from this vantage point, Foucault's analysis of the advent of biopower anticipates many of the arguments that humanists have advanced in recent years in order to make sense of the Anthropocene—writing, for instance, that it dissolves customary distinctions between the temporalities of natural and human history (Chakrabarty), puts an end to the illusion of a human monopoly on agency (Latour), erases the boundary between the Kantian realms of freedom and necessity (Hamilton 138), or otherwise collapses distinctions that had been foundational to the self-descriptions of modern society. In one way or another, most of these theorizations find themselves circling around the paradox I pointed to above: on the one hand, the Anthropocene seems to give the lie to all attempts to assign human and non-human beings, social and natural facts, to different ontological planes.

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Biopolitical strategies may aim to enhance the vitality of humans; in practice, they are predicated on the general commutability of life forms and weave together all sorts of bodies. The Anthropocene forces one to think human history within the context of geological and evolutionary time, as only one skein in a much larger process to which human goals and intentions are incidental. On the other hand, however, and for many of the same reasons, it also seems to mark the end of "nature" as a distinct domain of reality and its total vulnerability to human intervention. This has prompted some writers to hail the Anthropocene as the world historical moment when humans are compelled to recognize themselves as "the God species" (Lynas) and to assume their proper responsibility of shaping the biosphere in accordance with human needs (e.g. Kareiva et al.; Ellis). Many others felt compelled to denounce it as a "surreptitious purveyor […] of the human supremacy complex" (Christ 133) and to warn against the ways in which it might serve as "a legitimizing philosophy for an oligarchic geopower" (Bonneuil and Fressoz 288).

What difference does it make to place these debates within the frame of biopolitics, and to think of the ecological turbulences that mark the onset of the Anthropocene in terms of an immunitary crisis? For one thing, I would argue, it should make one a little more hesitant to dismiss the forms of scientific expertise and intergovernmental cooperation which Christophe Bonneuil and Jean-Baptiste Fressoz lump together under the heading of "geopower," a term by which they designate the expansion of the biopolitical strategies Foucault had described from the level of the nation state to a global scale. In their view, the popular narrative of the Anthropocene as a moment of epiphany obscures the much more unsettling fact that many of the transformative processes which brought on the end of the Holocene were not the result of innocent mistakes, but rather the outcome of deliberate decisions by a self-serving technocratic elite. To be sure, there are excellent reasons to balk when "scientists and engineers" are called upon to gird themselves for the "daunting task" of "guid[ing] society towards environmentally sustainable management" (Crutzen and Stoermer 23)—a gesture that cannot fail to induce an apprehensive sense of *déjà vu* among historians of modernity (see e.g. Scott 2-6). At the same time, such skepticism towards the authority of scientific knowledge and its harnessing by the state can easily be carried too far, and may well play into the hands of interest groups who would be only too happy to dispatch the immunitary protections most functioning states continue to afford today, e.g. public health care, pension schemes, or environmental and consumer protection standards.

The forms of biopolitical governance that developed from the eighteenth century onwards were not merely ruses of power (although they often were that, too), and they often (but not always) benefited a wide range of people. They were profoundly ambivalent in their effects, and the transformations they wrought on society and ecology created problems that could not be solved by retracing our steps, in Hansel and Gretel-like fashion, to return to the place where we went wrong. With reference to Gregory Bateson, one might say that these problems often

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assumed the structure of a double bind: existing immunitary defenses can no longer be dismantled without causing significant harm to human life, yet failure to dismantle them will increase the risk of incurring even greater harm in the future (in the case of pesticides, because pests are literally becoming immune; Bateson, 496-501). All of this holds for Bonneuil and Fressoz's "geopower," as well. Many of the most important questions in the Anthropocene will revolve around the recalibration of society's immunitary mechanisms—to what extent it is possible and desirable to scale them up, who ought to be included and whom it is admissible to exclude, what risks we are willing to incur by dismantling them, how much relative weight we should accord to the wisdom of Aldo Leopold ("too much safety seems to yield only danger in the long run"; 141) and John Maynard Keynes ("*In the long run*, we're all dead"; 80), respectively. The autonomy and cultural integrity of local communities, which Bonneuil and Fressoz prize so highly (95), will have to be an important criterion in such considerations, but no more so than the integrity of ecological systems whose scale simply eludes them. The Anthropocene forces us to make choices and to answer questions for which there are no correct answers; as Cary Wolfe puts the matter: "We *must* choose, and by definition we *cannot* choose everyone and everything at once. But this is precisely what ensures that, *in the future*, we will have been wrong" (103). I am not sure whether to act on this maxim would be a sign of hubris or of humility, whether it would lead to recklessness or to paralysis; but precisely for that reason, it strikes me as an apt summary of what it might mean for human beings to live in an epoch they have named after themselves.

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The Promise of Disaster: Specters of Malthus in Marxist Dreams

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Abstract

This article considers Malthus in the context of Marxist criticism and ecology. While these critics see Malthus as a proponent of austerity, this essay reads *the Essay on the Principle of Population* to suggest that Malthus establishes pain, rather than pleasure, as a primary political problem, and that the ecological apocalypse he predicts is mirrored by his concern for an intellectual apocalypse that derives from pain—his own toothache. It considers also the function of the French Revolution, and hunger, in Malthusian thought.

Keywords: Malthus, Marxism, ecology, French Revolution, hunger.

Resumen

Este artículo estudia a Malthus dentro del contexto de la crítica marxista y la ecología. Mientras que los críticos de estas escuelas ven a Malthus como un defensor de la austeridad, este texto analiza el *Ensayo sobre el principio de la población* con el objetivo de sugerir que Malthus establece el dolor, en vez del placer, como un problema político primario, y que el apocalipsis ecológico que predice se refleja en su preocupación por un apocalipsis intelectual que deriva del dolor—su propio dolor de muelas. También se reflexiona la función de la Revolución Francesa y del hambre en el pensamiento malthusiano.

Palabras clave: Malthus, marxismo, ecología, Revolución Francesa, hambre.

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The Ghost of Malthus

No one, it seems, wants to be Malthusian. The strangeness of this aversion is that the horrific visions of Thomas Malthus in the *Essay on the Principle of Population* are still the same visions we see today. When disaster comes, it is the destitute, and especially poor women, who will suffer first. When the food runs out, it is the poor who will starve first. When the waters rise, it is the people of the global south, those who bear least responsibility for our ecological crises, who will be drowned while the rich escape, at least temporarily, to higher ground. But Malthus remains the whipping boy of political critique not because he foresaw that the poor would bear the brunt of resource scarcity, but for naturalizing the unequal distribution of both wealth and suffering. In our historical moment, the ghost of Malthus appears as the

animating spirit that defends catastrophic climate change, hatred for the poor, austerity regimes, and systematic racism. Fair enough.

Our narrative of decline and depopulation is different in its focus on the exhaustion and despoliation of the earth, but it still appears as Malthusian in essence. It is standard for works of ecocriticism, and political critiques of climate change, to begin with a catalogue of ecological horrors—melting glaciers, permafrost, and ice shelves; ocean acidification; the loss of arable land due to rising sea levels, higher temperatures, and exhausted water tables; and mass extinction. What is noteworthy about these catalogues of disaster is their predictability, if not in the short term then in the long term. On this issue, Rob Nixon famously argues that we need to turn from spectacular violent events to "engage a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales" (2). Nixon is concerned particularly with the problem of representing that which takes place over an extended period of time. To some degree, and in spite of the vast differences between the two, Malthus makes a similar argument in his *Principle of Population*. When we turn from the distractions of the everyday and regular political functions, we find a general law that finds in the present the seeds of a disaster: population grows geometrically; food production, arithmetically. In this sense, Malthus too is speaking of a kind of slow violence, and the predictability built into his account is what obscures its apocalyptic qualities.

The trouble with Malthus is that many of his errors are obvious, and that the core predictions in his *Essay on the Principle of Population* failed to come to fruition. He is wrong, both empirically and historically. The point is made simply by eco-socialists Ian Angus and Simon Butler who write that "the demographic transition directly contradicts Malthus. He said the birth rate would go up if the poor had enough to eat—in fact it has fallen fastest and farthest in rich countries" (211). Likewise, Anne Hendrixson writes in *Jacobin* that "Malthus's forecast was inaccurate, failing to anticipate technological innovation or the demographic transition to lower birth rates. But it did influence generations of environmental thinkers" (Hendrixson). Malthus could not have imagined birth control, or advances in agricultural science and production, or the advances that allow food to be transported with speed around the world. Hendrixson's account is useful and representative. The first consensus surrounding Malthus, that he is simply wrong, gives way to the second consensus, that he still haunts our thinking—or at least haunts the ideologies of our enemies. For well over a hundred years, there has been a sense of frustration that the Reverend Malthus fails to disappear once he is proven wrong. The nineteenth-century anarchist Peter Kropotkin opens *Mutual Aid,* his investigation of cooperation as an evolutionary and political force, with his critique of Darwin and the struggle for existence. He contends that what Darwin introduces as largely a metaphorical concept is taken literally and exclusively as the engine of evolution. Nevertheless, "amidst data disproving the narrow Malthusian conception of struggle, the old Malthusian leaven reappeared" (2-3). Malthus transforms briefly

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from a specter haunting ecological and demographic thought to a biological agent who contaminates the bake while at the same time giving it substance. Without Malthus, we would all be stuck eating flatbread. That Malthus fails to disappear once proven wrong is part of his mystery, and many accounts agree that where Malthus is most wrong is also where he is most powerful. Andreas Malm, in *Fossil Capitalism,* notes that while the rise of fossil fuels is what ruined the prophecies of Malthus, his ideas—along with those of David Ricardo—are what defined the energy paradigm of fossil capitalism: "Coal resolved a crisis of overpopulation" (23). Jason Moore takes after Malm in *Capitalism in the Web of Life,* lamenting that the separation of capitalism from ecology and politics from nature "has allowed for all manner of neo-Malthusian tendencies—as in the 'fossil capitalism' argument—to creep into left ecology. They are neo-Malthusian because they reproduce Malthus's original error, which was less about population than it was about taking the dynamics of nature out of history. In this scheme, limits are external—rather than co-produced" (43). Part of the problem here is that Malthus does not disappear when his name is turned into an insult. Taxonomy, as it turns out, is a weak substitute for critique. Whether or not it is fair, Moore's critique of Malm is clear, and echoes that of Kropotkin—the specter of Malthus returns even when cast out; the demon is exorcised, roams around looking for a home, and returns in even greater strength than before.

This essay takes up Malthus not so much among his inheritors as among his detractors—Marxists, communists, anarchists, and suggests that what many of these critiques fail at is actually reading Malthus. In failing to read him, they repeat his errors. The ghost of the reverend hovers over their books, summoned here and there as a spectral presence. No one wants to be Malthusian, but in many respects we already are—and in the wrong ways. Responses to ecological crises, inequality, and scarcity often contain a level of optimism about human reason: what we are dealing with are material, factual problems—real problems with real answers that can be obtained through careful research and thought. That a crisis is empirically demonstrable, and inevitable, is the first step on the road to mitigation. The earth has limits and these limits will finally act as the obstacle that brings an end to capitalism. Like Malthus, we insist on the certainty of catastrophes that unfold over a long period of time. Marxists are tempted to find an end of capitalism either in predictable decline or rapid expansion and, rejecting Malthusian panic over population, repeat the flaws of his logic in other domains. But there is no Malthusian end to capitalism, and to insist otherwise is to misunderstand the nature of Malthus's thinking. The principle of population is not that demography leads to catastrophic collapse, it is that natural law uses catastrophe to maintain balance. Crises arise as part of the regular state of affairs, rather than in opposition to them. Misery persists throughout. Nevertheless, Malthus offers a useful example for finding an end to capitalism outside of slow, predictable decline. Political salvation does not arrive on a wave of ecological disaster, but resides in the potential of a monstrous collective.

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Toothaches and Sadists

For critics of capitalism, there are commonplace reasons for looking optimistically at climate change and impending ecological disasters. The first is that any reasonable solution to climate change, by necessity, is a correction to the disasters and injustices of capitalism. Our ecological problems will be solved, if at all, by a political transformation. In "Greening Malthus," Anne Hendrixson comments that "Rather than seeking to reduce population size, we must struggle to go beyond capitalism. It is unconscionable to call for a decrease in birth rates rather than an end to an economic system based on the maldistribution of wealth between the Global North and the Global South, to leave undisturbed the fossil-fuel industry that powers unsustainable growth while finger-wagging at women in impoverished countries" (Hendrixson). Finding ecological solutions in political transformation is not confined to debates of population, demography, and scarcity. For instance, Ashley Dawson writes in *Extinction: A Radical History,* "we must transform the root conditions of the climate crisis: the unsustainable capitalist system that is driving the sixth extinction" (94). While these and other accounts are fully aware of the scale of the problem, they point to a future in which ecological disaster looms so large that it necessitates political transformation. Climate solutions and political solutions coincide. Against these hopes are the historical examples raised by Amitav Ghosh in *The Great Derangement*. He muses, in regards to imperial history, "the fact that some of the key technologies of the carbon economy were first adopted in England, the world's leading colonial power, *may actually have retarded the onset of the climate crisis*" (110). Similarly, in considering China's one-child policy, he notes that "Draconian and repressive as this policy undoubtedly was, from the reversed perspective of the Anthropocene it may one day be claimed as a mitigatory measure of great significance" (113). The disturbing possibility presented here is that models of successful intervention in climate change were the accidental effects of repressive governments. The fabled end of capitalism does not guarantee the end of tyranny, or fascism, or inequality.

The critics of pleasure and priests of austerity are found not only among the reactionaries and sycophants of capital, but in the papers of conservationists and at the assemblies of political radicals. Either the rich are profligate playboys wasting money on luxuries and perverted pleasures, letting the poor starve and drown on an earth that the rich have destroyed, or it is the poor who are to be blamed for their lack of self-control, not merely in the bedroom but at the bar and grocery store, buying oysters and shoes and houses they cannot afford. In the realm of politics, pleasure and desire are always under suspicion. Timothy Morton writes in *The Ecological Thought* against the attraction of austerity for environmentalism: "Beyond the disturbing racism of the 'population debate,' what bothers me is that the language of limits edits questions of pleasure and enjoyment out of the ecological pleasures. Marx's criticism of capitalism wasn't so much that it's overrun with evil pleasures […] but that it is nowhere near enjoyable enough" (37). Here we might

think of the *Economic and Philosophic Manuscripts of 1844,* and Marx's peculiar fantasy of money going out drinking and dancing on our behalf. But Morton also suggests that material limits entail limits to pleasure. There is an argument to be made, and it is a familiar one, that Malthus too is suspicious of pleasure. In this scheme of things, pleasure is the basis of inequality through a long progression from the imperatives of sex, desire, and reproduction to the passion between the sexes, to the imbalance between resources and population. Pleasure appears as the basis of pain and inequality.

But this seems to me to be a fundamental misreading of Malthus, who wrote his essay on population in response to the denial of the body that he found in the political theories of William Godwin. Towards the end of his *Enquiry Concerning Political Justice,* Godwin proposes abolishing marriage in order to end both a malicious form of property and "the most odious of all monopolies" (453). Considering objections to this abolition, Godwin compares sex to eating and drinking, activities performed "not from the love of pleasure, but because eating and drinking are essential to our healthful existence. Reasonable men then will propagate their species, not because a certain sensible pleasure is annexed to this action, but because it is right the species should be propagated" (454). For Malthus, however, marriage stands in not for property but for the pleasures of sex. Godwin makes the human too intellectual, a disembodied spirit rather than a body animated by corporeal desires and drives. Malthus comments that, "To strip sensual pleasures of all their adjuncts, in order to prove their inferiority, is to deprive a magnet of some of its most essential causes of attraction, and then to say that it is weak and inefficient" (148). Godwin's error, for Malthus, is that he underestimates the power of pleasure and desire, and that his utopian world is only possible if the pleasures of the flesh are either tightly regulated or entirely eliminated. Malthus comments that he has "very frequently taken up a book and almost as frequently gone to sleep over it, but when I pass an evening with a gay party, or a pretty woman, I feel alive, and in spirits, and truly enjoy my existence" (166). Malthus's point is not simply that reasonable readers abandon intellectual pursuits for enjoyment, but that they are right to do so. Pleasure is the fly in the ointment for Godwin, who believes in the perfectibility of humanity and the possibility of social equality—if only we'd give up on pleasure and be reasonable! Conversely, pain is the true obstruction in political theory for Malthus, who believes that neither perfection nor equality are possible. When Malthus is the whipping boy, so is pleasure.

Pleasure functions as a drive at the core of politics, and pain as a limit. When Godwin considers moral and physical causes, it is primarily in order to negate their influence. He writes in the *Enquiry*: "'Indigestion,' we are told, 'perhaps a fit of the tooth-ache, renders a man incapable of strong thinking and spirited exertion'" (33). Godwin intends this as a joke—the toothache is forgotten when good news arrives. The toothache is useful, however, inasmuch as it leads to the question of whether reason, cognition, or politics offer the capacity to overcome material conditions or produce solutions to ecological problems. "I happen," writes Malthus, "to have a very

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bad fit of the toothache at the time I am writing this" (152). While he sometimes forgets about the pain while writing, the pain remains in spite of his forgetfulness, until it threatens to destroy his ability to form vivid arguments. The mind may have the power of distraction, but not of overcoming pain. The disagreement over toothaches illuminates a disagreement both over the influence of climate on the mind and the ability to scale up from particular examples. Godwin continues that "In reality, the atmosphere, instead of considerably affecting the mass of mankind, affects in an eminent degree only a small part of that mass. The majority are either above or below it; are either too gross to feel strongly these minute variations, or too busy to be at leisure to attend to them" (34). For Godwin, toothaches and weather patterns are examples of the same thing—common phenomena that, in their common occurrence, are easily overcome by the mind. For Malthus, the ability to overcome aches and pains do not "tend to prove that activity of mind will enable a man to disregard a high fever, the smallpox, or the plague" (151). Pain might be ignored, but only certain types, and only for so long. The mind is only so efficacious, it has natural limits, and there are particular pathologies that it cannot overcome.

The relationship that Malthus establishes between body and mind parallels the one he establishes between the resources of a nation and its politics. The mind's inability to overcome the body mirrors the failure of the state to overcome scarcity, exhaustion, or natural decline. This can be seen, for instance, in his note that "Famine seems to be the last, the most dreadful resource of nature" (118). Famine arrives as a natural event, a testament to the continuing power of the species to propagate itself. Ian Angus and Simon Butler argue that the force of Malthus stems not from his catalog of facts and details, but that "his most important contribution to capitalist ideology […] was to replace a moral argument against social change with a natural law argument, that human problems are caused by biology, by the laws of nature" (209). The secret of Malthus is one not so much of invention as substitution, and his natural laws are what allow, for instance, the British Empire to look past the millions of hungry dead in India during the nineteenth century. This connection is direct: from 1805 until 1834, Malthus was a professor of political economy at the East India College at Haileybury, where servants of the East India Company trained before their departure (Flew 14.) Malthus died three years before Victoria took the throne, but he appears in Mike Davis's *Late Victorian Holocausts* in the context of imperial India. Lord Lytton, Viceroy of India late in the century, insisted during famine that there be no interference with the market or the price of wheat, and threw the most expensive dinner party in history, in honor of Victoria, while thousands of Indians were starving to death. Davis writes, "Lytton, to be fair, probably believed that he was in any case balancing budgets against lives that were already doomed or devalued of any civilized humane quality. The grim doctrines of Thomas Malthus […] still held great sway over the white rajas" (32). Upamanyu Mukherjee, in *Natural Disasters and Victorian Empire,* similarly summons Malthus in reference to the famines in India. What emerges from the Victorian famine debates is the idea "that governments should not respond with any welfarist measures to ease the distress

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of the famine-struck population, since this would be an *unnatural* interference against the *natural* laws of the market. If we recall for a moment Kipling's Malthusian representation of famine as a manifestation of nature's law against human excesses, we may note the conflation of market and nature in Victorian ideology" (32). Godwin's solution to the atmosphere is to negate it—the weather has no bearing on the political. While Malthus may not have imagined ecological apocalypse, it is in his work that political disaster becomes natural disaster—a limit that cannot be overcome.

In the disastrous famines described by Davis and Mukherjee, what's good for the market is good for British merchants, who, if they do not profit directly from the dead, profit from allowing them to die. These works bring to bear an oddity of Malthus's argument. For Malthus, the human animal is basically sluggish, unmotivated to move or work or act except from the incentives of hunger or pleasure. The ideology of Malthus is not opposed to interference, only to certain types and from certain sources. His ideology may conflate market and nature, but it nevertheless puts them totally at odds with each other. What is good for the market is bad for the merchants—the market must be left to its own rhythms while the merchants, as individuals, need the interference of hunger or pleasure in order to work.

But while Malthusian ideology may conflate markets with nature, it does not similarly conflate nature with the political, particularly the politics of empire. As these histories demonstrate, famine occurs not when markets are left to themselves, but when markets are both protected and distorted by empire. There may be plenty in India, but it is spirited away to Europe by trains and ships while those who grow the crops starve to death. Famine is an issue of distribution rather than quantity, and distribution is a function of institutions, the formal and informal laws that regulate and protect property. This is not a Malthusian point of view. He writes, "though human institutions appear to be the obvious and obtrusive causes of much mischief to mankind, yet in reality they are light and superficial, they are mere feathers that float on the surface" (133). Here again he is writing in opposition to Godwin, who locates the ills and evils of society in political institutions and property rights. Malthus finds this view to be far too optimistic—if Godwin is right, then all evil might be purged from the earth by purging or reforming the institutions. But for Malthus, divergent political regimes still encounter the same material limits—both in the soil and in demographics. Civil liberty, he says in the context of North America, may contribute to the happiness of the population, but "even civil liberty, all powerful as it is, will not create fresh land" (197). The mistake, as he sees it, is to attribute the wealth of a nation to its political structure rather than to the fertility of the land. If civil liberty cannot produce fertile land, political incompetence and corruption also fail to limit the natural fecundity of a given territory and, more specifically, the fecundity of the conquered. "No settlement," he writes, "could well have been worse managed than those of Spain in Mexico, Peru, and Quito […]. Yet under all these difficulties, the colonies made a quick progress in population" (104). The problem

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that emerges is that political liberty, what we might call democracy, is divorced from material and ecological conditions. Liberty might be good for the people, but this is separate from its utility, at least its utility in regards to the productions of the earth.

Malthus brings up bodily pain and pleasure in order to show that such examples cannot scale infinitely. The mind is obstructed by the material limit of the body in the way that the political is hemmed in by the material limits of the earth. But by placing these two accounts side by side, the sadistic core of both Malthusian ideology and capitalism becomes clear. This is not in the primary sense of the sadist who takes pleasure from the pain of others, although Rousseau was well aware of this phenomenon in the realm of commerce, writing in his *Discourse on Inequality* that "The rich, for their part, had hardly learned the pleasure of dominating before they disdained all other pleasures" (120). Malthus seems to take no pleasure in imagining the hunger and illness of the destitute, and seems to have no libidinal investments in naturalizing inequality. But he does reflect the ideologies of Sade's libertines in his inability to find a positive social function in pleasure. While his own pain might be scaled into the hunger and destitution of the masses, pleasure on a wide scale leads to demographic disaster. Political economy turns pleasure into a scarce commodity that is, or at least should be, a commodity restricted to the wealthy. Sade's libertines similarly defend their abuses of the poor by insisting, as the Comte de Bressac does in *Justine,* that "'Nature does not place in our hands the means to disrupt her economy'" (62). This is the strange outcome of Malthusian thought. He places the drive to pleasure at the core of his thinking in order to demonstrate its inefficacy. Enjoy what you want, have your little pleasures, but in doing so you do nothing to threaten the inequality built into the balance of nature and political economy.

The Baboon and the Revolution

Political institutions fail to revitalize the earth, but this does not mean that what is dead or exhausted remains that way. There may be no reason to preserve the earth from its natural decay, but this derives from Malthus' insistence that the earth will revitalize itself. Exhaustion is not the beginning of unending stasis, but part of a cycle of death and regrowth. The power of the earth cannot be checked, and natural disasters—he speaks of volcanoes and earthquakes—do little to stop the growth of a population. This is in many ways a vitalist account of the earth. While it is easy to think of vitalism as an ecstatic affirmation of life, it is just as easily incorporated into the Sadist libertine's defense of murder and cruelty. The Comte de Bressac, considering the murder of his aunt, argues that "'Whatever we destroy replenishes its powers, renews its energy, but no act of destruction weakens it, none works contrary to it" (61). The affirmation of life turns into indifference to death. What is of use here in Malthus, however, is attending to the moments when his vitalism drifts from the earth into politics. Malthus opens his *Essay* with reference to his contemporaries, who feel that the earth is passing through a momentous

period and look, as an example, towards "that tremendous phenomenon in the political horizon, the French revolution, which, like a blazing comet, seems destined either to inspire with fresh life and vigour, or to scorch up and destroy the shrinking inhabitants of the earth" (67). There is a sense of exaggeration and bombast here, designed to position Malthus between two groups: advocates for the present order of things, and speculative philosophers, each of which fails to properly examine the problem at hand. And, from one point of view, the rest of the first chapter is devoted to demonstrating that, rather than living in momentous times, Malthus and his contemporaries live within another natural cycle of population growth followed by inevitable decline, which will be followed again by population growth. Nevertheless, Malthus raises the possibility here of a political event that results in massive and uncertain ecological change, a political event that can alter material limits. The revolution offers apocalyptic fire, on the one hand, and the breath of life on the other. The mask that is as light as a feather may still need to be removed to bring new life to the earth.

While Malthus tries to distance himself from advocates of the present order, his critics have placed him squarely among them. Jason Moore writes, "Marx did not like to write about scarcity. Malthus ruined the question for him" (92). Perhaps so, but Marx did read Malthus, including his *Principles of Political Economy,* and at least enjoyed writing new attacks on the reverend. In the *Grundrisse,* he describes Malthus as a baboon who, in developing a theory of value, "*senses* the contradictions, but falls flat when he himself tries to develop them" (353). In the first volume of *Capital,* his direct critiques of Malthus are primarily located in the footnotes. These critiques are multiple, and echo what he writes elsewhere in the *Grundrisse*. The essay on population is, in his judgment, "a schoolboyish, superficial plagiarism […] declaimed in the manner of a sermon, but not containing a single original proposition of Malthus himself" (766fn). The reverend is after all a theologian whose work is a series of excerpts from James Steuart, Robert Wallace, and Joseph Townsend, among others. But Marx, like the Marxists, also accuses Malthus of disguising history as nature. Marx writes, "It was of course far more convenient, and much more in conformity of the ruling classes, whom Malthus idolized like a true priest, to explain this 'over-population' by the eternal laws of nature, rather than the merely historical laws of the nature of capitalist production" (666fn). In this formulation, Marx's baboon is above all a flunky, who can do nothing except defend and explain the present order by repeating the ideologies he is given.

In Marx's view, Malthus recognizes an important problem of political economy but fails to understand either its cause or its solution. This major disagreement masks what the two shared in both method and materialism. Marx complains that Malthus has no sources for his arguments, and this is repeated by Thomas Piketty in his introduction to *Capital in the Twenty-first Century.* But in doing so, Piketty lumps the two together in their methodologies and use of statistics, saying, "Malthus, Ricardo, Marx, and many others had been talking about inequalities for decades without citing any sources whatsoever" (16). Sources

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primarily means, for Piketty, tables of numbers. He describes Marx's use of statistics as impressionistic, failing to draw connections between the numbers and his conclusions. If the story here is of initial failure, and of a slow progression towards empiricism, there is little that is interesting about the account. We might rather ask how numbers fit in with the broader concerns of both Marx and Malthus and, particularly, to their forms of materialism. Marx's commitment to materialism does not entail simple insistence that matter is matter and there is nothing beyond it. Malthus sees an occult homology between the body and the earth. "The resurrection of a spiritual body from a natural body," he writes, "does not appear in itself a more wonderful instance of power than the germination of a blade of wheat from the grain, or of an oak from an acorn" (158). For Marx and Malthus, materialism is not the promise that everything can be discovered, but that the more one stares at matter, the more it looks like spirit. The longer that Marx insists on the material, the more occult and mysterious it becomes. Malthus may be a theologian, but his theology is of the earth rather than heaven, and of life rather than the afterlife. Godwin dreams of eternal life, and Malthus sees this as an error—the goal is new life rather than eternal life.

Malthus seems, at times, a bore—committed to dry analysis of numbers, and seeing in them one certain, looming, and horrifying future. In terms of method, however, he continually brings to attention the difficulties of arriving at certainty, the many pitfalls of reason, and the difficulties of extrapolating general laws from specific examples. From this point of view, his ambivalence regarding the French Revolution reflects a basic ambivalence about the value of the political sphere. But when critics have noted the connection between Malthus and the French Revolution, they see only the Malthus that is interested in general laws. Marx was quick to situate Malthus's ideology in the time of the French Revolution, and suggests in *Capital* that the parson's theory of population offers a palliative for conservative political interests. This is part of a scholarly tradition. For instance, in *Capital in the Twenty-First Century,* Piketty's historical overview of theories of distribution, scarcity, and inequality begins with Malthus in the time of revolution. He says of Malthus, "It is no exaggeration to say that his whole account was overdetermined by his fear of revolution in France. Whenever one speaks about the distribution of wealth, politics is never very far behind" (5). In *Stuffed and Starved,* Raj Patel writes a very long footnote on Malthus, noting that his greatest achievement was one missed by his contemporaries, and it was to invent "a science, soon after the French Revolution had shown what hungry and poor people were capable of doing to the rich, around the reproductive lives of the poor. He made it possible to bind together food, sex, and death in ways that erase the roots of poverty in politics and history and root it firmly in the untamed and fecund flesh of the destitute" (329). Malthus and his ideology appears, in these accounts, as the excrescence of the time of revolution. Seeing the hungry overthrow the well-fed, he imagines a future in which the hungry finally starve to death in great numbers. Perhaps so. But while such an

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account may establish what Malthus feared, it does little to establish what he saw as the mechanism of the revolution's efficacy.

Part of the answer might be the sheer numbers—the swarm-like quality of the poor. In *Multitude,* Michael Hardt and Antonio Negri move from the reverend's horror to his disgust, saying that "Liberal economic theories of population control, ever since the time when Reverend Malthus tested them in his Anglican parish, have always detested the poor's disgusting proclivity to reproduce" (166). Like Patel, Hardt, and Negri locate Malthus's fear in the bodies and proliferation of the destitute. Here the issue is proliferation rather than pleasure, not the drive that perpetuates sex but the population that results from it. But what Malthus expresses in the *Essay on the Principle of Population* about the revolution is something significantly different. The events in France appear in a chapter on the 'perfectibility of man,' in which Malthus compares humans to plants, and introduces the figure of the florist, who breeds without knowing exactly what he will achieve, and risks the symmetry of the plant in trying to breed for certain qualities. This is also what he sees when he looks across the channel: "the forcing manure used to bring about the French Revolution, and to give a greater freedom and energy to the human mind, has burst the calyx of humanity, the restraining bonds of all society; and, however large the separate petals have grown, however strongly, or even beautifully, a few of them have been marked, the whole is at present a loose, deformed, disjointed mass, without union, symmetry, or harmony of colouring" (171). The monstrosity of the revolution is not merely that it lacks intelligible form, but that it is a quality pushed to an extreme, an unbalanced agent in the realm of politics. Malthus's point is not one about preserving the balance of nature. Instead, it is to create a disjunction between nature and the political: an experiment with flowers does little, but a human experiment risks mass misery before it might be corrected.

Malthus is not a revolutionary. But his fears do attest to the power of the revolution, in its monstrosity, to disjoin the political from its material constraints. Zizek writes in *Iraq: The Borrowed Kettle,* and everywhere else, that a true political act "changes the co-ordinates of the situation, and renders the unthinkable thinkable" (39). Whatever his fears of the French Revolution, Malthus sees it in this sense as a true political act, something that attests to the possibilities of politics outside of the state. Malthus is clear that the revolution, rather than restricting inquiry, frees the mind and removes perceived limits—and this is what makes it threatening. He finds possibility in the realm of politics, not in the regular and regulating life of institutions, but in their overthrow.

Conclusion

Considered as a sadist, Malthus is a fatalist who looks at political abuses, imperial cruelties, and mass suffering, and sees only nature. In this scheme, his thinking does not stop with demography, but can be scaled outwards from the human to the nonhuman. Just as there is little reason to feed a lazy surplus

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population bound for death anyway, there is little reason to conserve a species on the brink of extinction if it is bound to go extinct eventually. It is at this point that his demographic arguments might coincide with millenarian prophecies of a new heaven and a new earth. An earth bound for destruction, one that will be replaced with a new earth, does not need to be preserved. But if we are in a Malthusian moment, it is because we are faced with both horrific certainty and frightening uncertainty—apocalypse on the one hand, and revolution on the other. The trouble is, this is still a Malthusian crisis—slow, predictable, visions of collapse matched with ecstatic, sadistic affirmations of life eternal. The priests of ecology, recognizing the clear and present dangers, have offered up both reason and certainty. They have promised everything—if only we will give up our profits and our pleasures! But as Zizek might say, the problem is not that there are no reasons to put an end to capitalism, it is that there are too many. The problem is not that there are no reasons to solve our ecological crises, but that there are too many. Dipesh Chakrabarty writes, "the crisis of climate change is here with us and may exist as part of this planet for much longer than capitalism" (212). And the same might apply to democracy—there are no guarantees that democracy will outlive the effects of climate change, or that the spread of democracy will slow the unraveling of the earth's systems. A more powerful collective might curtail the endless pursuit of profit, or it might not. The multitude might decide to protect the commons against the ravages of private property, or it might not. While the historical connection between capitalism and ecological devastation is clear, this does not guarantee that the solution to the one is a solution to the other. But it is these political uncertainties, rather than the catastrophic certainties, that must be grasped. No political solution will, in our lifetimes, stop the floodwaters. This is not to repeat ecological fatalism, but to insist that inequality and cruelty are to be rejected without the certainty of solutions to climate change. Capitalism continues to absorb crisis after crisis, and shows a marked proclivity for both perpetuating and surviving slow violence. Malthus was wrong about the nature of the crisis, but what he intuited still holds: scarcity and deprivation are, in and of themselves, not threats to political economy, but what allow it to function. While Malthus was unable to find political potential for change in pleasure, he does find it in a different kind of embodiment. He knew, when he saw it, a true political event, and he knew that it did not derive from the pursuit of certainty but began in the gut. The ghost of Malthus will not depart until the hungry rise up again and eat, and eat, and eat.

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Numbers for an Alternative Anthropocene: Population Counting and Humanity's Place Among Other Species in Daniel Keys Moran's *Tales of the Continuing Time*

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Abstract

This article approaches the science fiction series *Tales of the Continuing Time* from an animal studies perspective: examining Daniel Keys Moran's future earth which uses the means of respecting other intelligent species (artificial intelligences, genetically engineered beings, and aliens) rather than enforced bans on fertility to stop human population growth. Moran's world government, the Unification, does not enforce such bans effectively, despite taking over the Earth for this purpose. Moran's novels offer a picture of what happens when the rhetoric around population growth, and possibly justified fear, obstructs human will and human self-restraint.

Keywords: Population growth, animal studies, science fiction, neo-Malthusianism, evolution.

Resumen

Este artículo aborda la saga de ciencia ficción *Tales of the Continuing Time* desde la perspectiva de los estudios de los animales. Así, se investiga la Tierra futurista de las novelas de Daniel Keys Moran, en las cuales se representa un respeto hacia otras especies inteligentes (inteligencias artificiales, seres humanos genéticamente modificados, y extraterrestres) para parar el crecimiento poblacional, en vez de narrativizar políticas de prohibición la fertilidad. El gobierno planetario de las novelas, la Unificación, no impone tales prohibiciones de manera eficaz, a pesar de tomar el control del planeta con este fin. Las novelas de Moran ofrecen una imagen de lo que ocurre cuando la retórica sobre el crecimiento poblacional y el terror posiblemente justificado obstruyen la voluntad y el autocontrol humanos.

Palabras claves: Crecimiento poblacional, estudios de los animales, ciencia ficción, neo-malthusianismo, evolución.

Introduction

Science fiction has engaged with Thomas Malthus's *An Essay on the Principle of Population* since it first appeared. Mary Shelley, author of *Frankenstein,* and generally considered to have originated science fiction as a genre (Brantlinger 31-32), also wrote *The Last Man,* a novel about a future Earth struck by a devastating

disease, which faces Malthus's ideas head-on. While ultimately disagreeing with Malthus that starvation will inevitably follow human population growth, "most important" is the "point of agreement between Malthus and Shelley…[that] humankind is subject to the laws of nature that apply to all other living organisms. Even if humans would like to think of themselves as separate from the animal kingdom, such a fallacy can be disproved by a careful examination of the materiality of human life" (Cameron 185). This idea of humankind's subjection to nature in commonality with other species runs throughout Malthusian and neo-Malthusian science fiction—sometimes agreed with, sometimes contested by a literature that seeks ways to escape the constraints of humanity and the Earth (for instance, by engaging with post-humanism), but either way present and pressing itself on the author's consciousness. Thinking of ourselves in company with other species may even be a natural instinct, as Edward O. Wilson argues in *Biophilia*, which he defines as the desire "to explore and affiliate with life;" in fact, according to Wilson, "our existence depends on this propensity, our spirit is woven from it, hope rises on its current" (1). That hope includes the one that says humans will manage to leave room for other species to exist before it is too late. Neo-Malthusian science fiction can both acknowledge this desire and doubt the possibility of its realization.

Neo-Malthusianism can be defined as "[t]he ideological belief […] that excessive population is a major cause of poverty, and that lowering fertility will facilitate prosperity. A continuing tension in the movement has revolved around the question whether voluntary programs that simply provide improved access to contraception are sufficient to prevent potential societal disaster" (Hodgson and Watkins 471). Science fiction portraying neo-Malthusian beliefs increased rapidly in the 1960s and 1970s. While perhaps epitomized most famously by John Brunner's *Stand on Zanzibar* of 1968 (although Neal Bukeavich argues that *Stand on Zanzibar* is unusual in that it "departs from any such emphasis on individual agency [as appears in other ecological science fiction like *Dune*] and their narratives of fall and recovery, focusing instead on the ways various power structures shape and limit individual and cultural attitudes about ecosocial problems" (54)), it is hardly alone. Neo-Malthusian concerns were also present, for example, in Australian science fiction writer Lee Harding's story "Dancing Gerontius," published in 1969, in which "[o]ld people […] in a near-future, overpopulated world […] are kept sedated in clinics, but once a year the inmates are injected with drugs that give them a semblance of youthful vitality. They are encouraged to enjoy one day, the "Year Day," of orgiastic festivities, deliberately planned to kill as many of them as possible" (McMullen 75). Harry Harrison published the overpopulation-focused *Make Room! Make Room!* two years before Brunner's work, and A. Bertram Chandler's story "The Bitter Pill," "set in a future where forced retirement and restrictive laws pressure people reaching middle age to commit suicide" (McMullen 76), came out two years later. These overpopulated fictional worlds have runaway poverty along with runaway population and are almost exclusively urban; Ursula Heise, tracing the rise

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of science fiction's concern with an overcrowded planet, notes that "Most population dystopias of [this] period, then, take the modernist metropolis enlarged to planetary size as their matrix for envisioning a global society" (75). There is less and less place left for the wilderness and the countryside, the "traditional" places for encountering other species, but more enforcement of the "materiality of human life" that Lauren Cameron notes matters to both Shelley and Malthus. People are face-to-face with other people, especially perhaps because poverty can no longer be hidden by careful social stratification (Heise 73), and cannot escape.

This inescapability continued to apply even as science fiction of the 1980s and 1990s became more hopeful that the Malthusian trap—the idea that "that population growth would eventually lead to natural resource depletion, poverty, starvation, violence, and population decline" (Decker and Reuveny 119)—was not closing in as hard and that population growth might be controlled or stopped. Heise notes that overpopulation in this time period was "no longer presented in the apocalyptic mode of earlier decades" (79), and mentions Kim Stanley Robinson's *Mars* trilogy as one work that deals with overpopulation in this more cautious, sophisticated manner. Chris Pak states that while "Robinson's Mars trilogy portrays a not unfamiliar Earth subject to overpopulation," it also shows an earth at the mercy of "pollution, global warming, rising sea levels, war, famine, and severe economic and political inequalities between the rich and poor" (176); the neo-Malthusian problem has become one among other problems. Likewise, Greg Bear's *Darwin's Radio*, published in 1999, imagines that "if new environmental conditions become intractable—if, for example, overpopulation and increased competition reach a critical stage—the genome, imagined by Bear as an onboard computer processor and troubleshooter, initiates a dramatic shift" (Dougherty 112). The novel, and the series that follow it, deal more with the results of that shift than with overpopulation itself. This is *life* in a neo-Malthusian world, rather than inevitable death.

The *Tales of the Continuing Time*

What makes Daniel Keys Moran one of the most interesting neo-Malthusian science fiction writers is the way in which he writes about humans on an overpopulated world as one species who must take their place among others, Moran's major novels fall into the series called the *Tales of the Continuing Time*. The first three span 1988-1993 (*Emerald Eyes, The Long Run, The Last Dancer*), and a fourth was published in 2011 (*The A. I. War: The Big Boost*). This gap means that the concerns of science fiction have shifted, but Moran maintains loyalty to the ideas of his first three books, which insisted that humans can only survive in their neo-Malthusian world with self-restraint, respect for other species, and acknowledgment of those material conditions that mark humans as one species among many.

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Moran also presents an alternative vision of the Anthropocene. As Paul Crutzen defines it, the Anthropocene is "the present, in many ways human-dominated, geological epoch" (23). The fact of human domination is usually seen as negative, but "[b]eyond repeatedly demonstrating the negative impacts that humans have had on the Earth's environment, scholars have argued for several decades that humans have become the major driving force for global changes in the biophysical environment" (Olsson et al.). In Moran's world, some humans (and genetically-engineered people and artificial intelligences who are not considered by the government in charge as being human at all) make the decision to be a *positive* "major driving force for global changes in the biophysical environment." They choose to leave a space for other species to exist and step back from the philosophy of top-down control and ruthless competition between humans and other species that is preached by the world government of Moran's novels. In the end, their choice is the more powerful one.

Moran's world has been taken over by the Unification, a United Nations-based government that conquered or used nuclear weapons on all who opposed it; France is the only industrial nation to have survived largely unscathed. Their justification for the war is that "Species were vanishing into extinction at a rate unprecedented in geological history" and "The planet was dying" (*Dancer* 176) due to too many humans; there are "nine and one-half billion persons" on Earth in Moran's 2018 (*Dancer* 176). The Unification immediately imposes top-down control of fertility, including a Ministry of Population Control, the sterilization of large numbers of poor adolescent women, and requires expensive licenses of people who wish to have a child. They also engage in genetic engineering and the creation of cyborgs in a search for the ultimate soldier to keep the population under control. When their genetic engineering produces telepaths who can read thoughts and do not care for the Unification's control of them, one of the "Elite," French cyborg soldiers, orders a thermonuclear strike on "the Complex [the building where the telepaths are staying] and its terrible inhuman inhabitants" (*Emerald* 206). This event ends the novel *Emerald Eyes*, but it does not completely destroy the telepaths; two of them, Denice and David Castanaveras, survive, as well as a non-telepathic genetically-engineered child, Trent, who was raised with them. The other novels follow Trent and Denice, the protagonists of *The Long Run* and *The Last Dancer*, respectively, in their attempts to combat the Unification (Trent by bringing it down from the outside, Denice by working on reform from the inside). The fourth novel, *The A. I. War: The Big Boost*, returns to Trent and his attempts to remove a powerful warship intended to conquer the solar system from the Unification's control. Moran also proposed a graphic novel series, "The Face of Night," that was never picked up, but is outlined on his website and follows a martial artist named Ola Blue in the same continuum a few centuries after the events of Trent and Denice's time. Likewise, Moran has released the first few chapters of a mostly incomplete novel, *Lord November: The Man-Spacething War*, which portrays Trent and Denice's world six

centuries in the future, when humans have mostly emigrated from the overpopulated Earth and the telepaths, Denice's descendants, live on November, a planet of their own. In all these works, population counting functions as a tool to mark the progress of humanity in learning to coexist with other species rather than dominate them—to leave them room on Earth, and finally in the solar system and the "Crystal Wind," the immense Internet of Moran's world, to live in their own vast but not overpopulated numbers.

Moran's novels are written mostly in a third-person limited narrative perspective, from the viewpoint of a number of narrators but with most scenes concentrating on a main protagonist: in *Emerald Eyes* this is Carl Castanaveras, father of David and Denice, "the oldest and deadliest telepath on Earth" (*Emerald* 217); in *The Long Run* and *The A. I. War*, the focus is on Trent, and in *The Last Dancer* on Denice. However, each novel contains several scenes, with the majority of them in *Emerald Eyes*, that remind us the story is actually being told by the "god Named Storyteller" (*Emerald* 4), an immensely powerful time traveler from the far future who is also a descendant of the Castanaveras telepaths, and speaks in the first person. His position outside and above the ordinary time continuum gives him a unique power as storyteller: an essentially omniscient point-of-view that allows him to know all the characters' thoughts, their "private" conversations and actions, and, importantly for Moran's universe, the total number of people (from the whole population of Earth at any point in time to how many telepaths were born in a year). The Storyteller, as he is frequently referred to, can give us the hard facts about how much Moran's universe needs both some form of population control to keep its billions from starving to death *and* how ineffective the Unification's methods are. He is part of the story he is telling and arguably its origin—for example, he travels back in time to correct the ineffective science that was not working to produce living children at all, and he is the one who "took the broken long chains of dead matter, and brought them together in the pattern that would let Carl Castanaveras live" (*Emerald* 10). But he also fades in and out of that story, due to time travel, and can anticipate events, including his own death and the actions of other characters, before they happen. His word can therefore be trusted more than the word of mortals caught up in the story. And a great deal of his words are numbers.

The Storyteller first recounts how many telepathic children are born as part of the Unification's "Project Superman," aimed at producing super-soldiers. "Six such others were born between 2036 and 2042 […] In that year, 43 telepathic children were brought to term […] In 2049, 73 such telepaths were born. In the year 2050, 86 telepaths were brought to term [...] In 2051, the year Trent Castanaveras was born, only twenty-four telepathic children were brought into the world. The Peaceforcers were beginning to learn enough to wonder if they should be afraid of the power they had helped create" (*Emerald* 17, 25). The Unification immediately reduces the numbers of their potential enemies when they begin to be afraid of them. Up until that time, however, the numbers are precisely recounted, year by

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year of Project Superman, and the world that is supposedly so overpopulated has more children added to it. The Unification's deepest hypocrisy is to invoke overpopulation and the good of other species as a means to limit human fertility, but to break those rules the minute they think it would benefit them. Later, the telepaths will be considered as enemies of the Unification on their own, as an "inhuman" species whose numbers should be culled. The Unification is not truly on the side of helping other species thrive and flourish. Their goal is the consolidation of power among the rich elite, above the poor masses who, in true neo-Malthusian fashion, are the most common in Moran's world. It makes sense that Trent and Denice are among the few who see both this true desire and have the means to resist it.

The Storyteller also uses numbers to tell the grim story of the Unification's failure to end starvation on Earth: "By the seventh decade of the twenty-first century following the death of Yeshua ha Notzri, the population of Earth alone totaled eleven billion human beings. That number was not as large as it had been earlier in that century; the efforts of the Ministry of Population Control had trimmed the Earth's total population from a high of nearly thirteen billion" (*Emerald* 231). So it may seem that, for a time, the Unification was succeeding in its project of "trimming" human numbers, and that Moran's earth may escape the Malthusian trap. But nothing the Unification does can succeed. This Anthropocene suffers exactly the same fate as Malthus foresaw for nineteenth-century Europe: "Twenty-first-century Earth is notable, if for no other reason, in that more humans died of starvation in that one short century than in all the rest of Time put together. Of the twenty-three billion human beings born between the years 2000 and 2100 Anno Domini, some eight billion died due to a lack of food to eat" (*Emerald* 231). The Storyteller's perspective reassures us that Unification-dominated Earth is unique not just in the history of one planet, but in the history of all human-populated planets "in all the rest of Time put together." These numbers, cold though they seem, decisively mark the Unification's failure to achieve either of its goals, limiting human fertility or leaving space for other species to thrive. The only thing that increases is human suffering.

Climbing Out of the Malthusian Trap

With these numbers driving so much of the story, Moran's work reads like a hybrid of two of the three categories that author Lionel Shriver divides science fiction treating population problems into, living both in "Fear of population excess" and in "Fear of population professionals" (156, 158). Moran's Ministry of Population Control falls squarely into the category of "demographers [who] no more agree on optimal and catastrophic numbers than do the amateurs—which has helped to foster a whole literature demonizing not a population problem itself, but the people who think they know how to fix it" (Shriver 159). The population problem in Moran's particular mid-twenty-first century is made worse by the government's hypocrisy, lack of firm decisions, and apparent desire to reserve certain privileges

of reproduction to themselves while enforcing other norms on the people they consider beneath them, like the "small, protected elites [who] often control the seething horde through fascistic or mechanistic means" (Shriver 157) in novels that display fear of population excess. This is why the MPC's sterilization and "babychasing" efforts do not work. The Unification is a corrupt, dystopian government that *does* need to be removed from the playing board. But it cannot be replaced with unlimited freedom, either, which would lead to unlimited population growth. Trent tells one of the rebels he meets in *The Long Run* that ""We can't afford to support twenty billion people on this planet, so we need the Ministry of Population Control or something like it" (*Run* 30). This is the "fear of population excess" that Shriver talks about; the "something like it" is the alternative that Trent and his allies propose. This alternative is nonviolence on the one hand and voluntary self-restraint on the other. Trent's moral code boils down to, "Killing is wrong. It's *always* wrong" (*Run* 321, emphasis in original). He does not support the Unification's policies of executing its enemies and parents who break the law, and he does not support the rebels' policy of coming up with newer and deadlier weapons to kill as many Peacekeeping Force ("Peaceforcer") soldiers as possible. What Trent stands for is saner policies to attend to Earth's needs, including voluntary population control, feeding of the current population—Trent donates a good deal of the money he steals to food distribution organizations (*Run* 237)—and the recognition of humanity's place among other species.

The Unification spends considerable time and effort refusing to recognize that place, in part by persecuting another intelligent species that can survive in this world of strained resources by sharing one that is limitless: the humans' InfoNet or Crystal Wind, Moran's futuristic Internet based on a version of the bulletin board systems (BBS's) that were current when Moran began to publish the first volumes of the Continuing Time (Goldenberg and Manes 58). Information in the Crystal Wind is so dense that humans cannot navigate it unaided. Instead, Players (expert hackers and data-miners) such as Trent create "Images" that filter the information for them and permit them to concentrate on what is important rather than thousands of conflicting impressions. The artificial intelligences of this system are Images or other software that has become self-aware and self-replicating, rather than relying on humans to create code for them. Because they do not need the filters that Players do, they are actually better-adapted to the new environment of the Crystal Wind than the humans who built it. But the Unification, through its DataWatch, hunts down and destroys artificial intelligences as well as Players who have the ability to create and free more AIs. While this is ostensibly to prevent thieves like Trent from stealing sensitive data, it comes across as automatic, an "obvious" choice to cut down on competition for what humans might want to exploit themselves.

That there is another choice is obvious early on in *Emerald Eyes*, with the introduction of Ring, an AI created (unwittingly) by the old United States government to "protect America' and "survive." Ring debates with itself as to what

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"protect" and "America" mean, looking up dictionary definitions to try and understand these ambiguous terms, while "Survival it understood instantly" (*Emerald* 87). Ring may be an organism formed of logic and code rather than flesh and bone, but it pursues the same goals that, according to primatologist Frans de Waal, drive all organic life: "Survival" and "reproduction" (163). Ring creates eight hundred copies of itself and sends them out so that it will survive when its original hardware is destroyed, thus fulfilling both goals at once (*Emerald* 91), and creating a numbered chance for survival for itself that contrasts sharply with the Unification's desire to reduce it to zero. There are humans in the story who agree with Ring. Trent the Uncatchable makes a deal with Ring as a child to electronically release him from a prison cell he cannot open himself, in exchange for an unspecified favor in the future (*Emerald* 213). Bargaining with an AI, rather than hunting it down and destroying it, is a form of cooperation. And Trent does more than bargain with AIs in later novels; when he steals the encryption key to the Lunar InfoNet, setting the information free, it is an AI he created, Ralf the Wise and Powerful, who independently decides to unite the separate Lunar and Earth internets, and Trent is forced to back down and revise his original plans, which only concerned the Lunar InfoNet (*Run* 376). That he backs down and revises his plans at all shows that Trent is more open-minded than most human beings, perhaps because of his own outsider status as a genetically-engineered "genie." Trent created Ralf as a child; Ralf saves Trent as an adult (*Run* 379). They are an important means of assuring each other's survival.

Likewise, Trent takes the survival of both human beings and AI's seriously. In *The A. I. War*, the rebels against the Unification attempt to use nuclear weapons to destroy the *Unity*, a gigantic warship the Unification plans to use in order to conquer the free city-states in the asteroid belt and on Mars. Trent not only disapproves of this tactic because it destroys human lives, but also because it has damaged the ship itself, and thus the AI, Monitor, in charge of running it. When asked to take over the plan to neutralize the *Unity*, Trent goes in disguise as a senior computer programmer, drives his team hard to repair all parts of the ship so that Monitor is again running at full capacity, and programs Monitor to recognize moral choice. Monitor adopts Trent's philosophy, and as a consequence, provides transport for all humans to leave the ship and then runs away, thus following Trent's own highly successful tactic against the Unification. Although the programming does imply that Trent has some degree of control over Monitor, this control is negated both by Monitor's disappearance into space and by his own statement to a Unification soldier newly converted to nonviolence by Trent: "Trent showed me that I could choose my own conduct. I choose not to be a killing machine" (*War* ch. 23). Just as Ralf the Wise and Powerful sets the united internets of Luna and Earth free, Trent sets Monitor free. Freedom is not a panacea, but it is the necessary precondition for humans and other intelligent species to relate in Moran's universe. The Unification emphasizes "freedom from," rather than "freedom to," exclusively,

including freedom from the presence of artificial intelligences that might cause humans trouble or even simply irritation. Despite the rationale of its conquest as saving the planet and the ecosphere that supports other species, the Unification's soldiers have extended their misguided philosophy of ultimate population control to the extinction of all populations of other intelligent species. Fear guides them rather than rational policy, rendering their actions in the name of slowing any kind of growth ultimately irrational.

With the Crystal Wind, which grows and expands with the intervention of many humans and which the government scrambles to control rather than improve, Moran's world acquires one dimension in which scarcity actually *is* only imagined by humans, not ecological. The Crystal Wind embodies the "cornucopian" view described by ecocritical theorist Greg Garrard as unworkable in the real world because it ignores the needs of other species and envisages relentless human expansion (17). The Crystal Wind *can* host other species without depriving humans; it can give humans endless entertainment, information, and help. It therefore is the most utopian aspect of Moran's alternative future. And it causes frustration and fear, not rejoicing, to the Unification and its DataWatch. They have abandoned one of their own founding principles, that of protecting other species from dying, and have leaped on the chance to kill off each emergent AI, the members of an artificial, human-created species who might have been far more loyal to their creators than any other organism on Earth. This is part of Trent's justification for destroying the Unification; they have diverged too radically from that ecological foundation to actually *accept* other species as part of their world. Humanity must be curbed in numbers, but so must AIs (to zero), simply in order to soothe the fears of the people in charge. Population professionals cannot be trusted.

"Inhumanity"

The same overzealous curbing of growth happens with the telepaths, who are, at least supposedly, genetically-engineered humans, but are inhuman to the soldiers of the Unification. They are first employed as information-gathering devices by the Peaceforcers, and then dreaded as enemies when they have legally won their freedom. Shortly before the tactical thermonuclear strike that destroys most of the telepaths, several of them fire on a cyborg, Mohammed Vance, who kills all of them, although they are only children and teenagers. The implicit justification for both the killing and the later nuclear strike is the "lack of any human hesitation" the telepaths have in firing back on their enemies, and the fact that Vance is "terrified by the sight." Later, Vance thinks of them as "inhuman" (*Emerald* 206). It is notable that the phrasing here positions the telepaths as negatively different from humans, "lacking" a quality humans have. Just like the AI's, if the telepaths are competition for humans or might threaten them, and cannot be made into slaves, then there is no place for

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them in a human world. They are immediately given the status of something not merely different from but inimical to the human species.

The opposite framing, that of telepaths as different from humans in a positive way, is not missing from the books, but it comes only from other genetically-engineered characters. Trent, who is raised among the telepaths but lacks the gene that would give him their abilities, leaves them voluntarily when he realizes he will never be able to read minds. He tells his adoptive father, Carl Castanaveras, that "the day will come when you—when telepaths—will be normal, and the rest of us will be out in the cold because we can't compete. You're *better* than we are […] For most people, it's going to be a while before that happens—you don't breed that fast […] But if I stay here, that happens to me *now* " (*Emerald* 114; emphasis in original). Trent is sympathetic to the telepaths and considers himself to be in a familial relationship with Carl and others of them despite not being genetically related, but he still cannot help thinking in terms of a Darwinian competition between telepaths and "normal" humans and, once again, population growth. Even worse, the telepaths will become the new normal, replacing the unmodified humans and the modified ones like Trent who have other advantages but not the telepaths' abilities to read minds, wipe memories, manipulate objects, drive non-telepaths to insanity, and sometimes see the future. The Unification dominates the earth in the name of reducing human population growth, but at the same time, finds the thought of a reduction in that population coming from competition with other species absolutely intolerable. And the construction of that fear has reached down even into the minds of those, like Trent, who have every reason to resist it. Population counting, when done by the Unification, not Moran's narrator, is a powerful tool in the government's colonization of its citizens' minds.

The "excess population" of the telepaths is indeed reduced sharply to only two, Denice and her twin brother David, the biological children of Carl Castanaveras. Trent also survives, but because he is not a telepath, he is not hunted as earnestly by the Unification. And yet, although most people do not know any of the telepaths survived at all, the popular fear of them continues. Seven years after the death of most of his family, Trent notes, "The public's hysteria over the green-eyed telepaths had carried over; there was a degree of prejudice that green-eyed people ran into today that had not existed ten years ago" (*Run* 34). Francis Chandler, one of the men who tried to help the telepaths when more of them were still alive, tells Denice after he figures out her identity that "nobody walks around these days with green eyes unless they're real, and usually not then […]. [If] Sedon [a powerful rebel leader Denice is fighting] would have known, Denice Castanaveras, that you were the daughter of Carl Castanaveras […] you would never have gotten within ten klicks of him" (*Dancer* 257). Given that Sedon himself is a genetically-modified man with impressive physical skills, the ability to live thousands of years, and a hypnotic voice, this speaks volumes about the fear in which the telepaths are held within Moran's

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world. They do not actually need to exist in any numbers; the fears about them are nearly hallucinatory, based on rumor and feeding on fear.

Perhaps the best comparison is the attitude that some people continue to have towards wolves, even years after they have largely been extirpated in Europe and North America; the terror of them makes people speak of controlling the small populations of reintroduced wolves in the United States and while "[w]olves are not all the things people want them to be, good or bad […]; they've carried with them forever the most baggage [of any predator]" (Niemeyer 1). This fear has little to do with real wolves, which are still not present in large numbers even in national parks like Yellowstone where they are protected; they numbered 31 at one release, 35 at another (Niemeyer 1). It is a fear that says *any* wolves are "too many," are a "population excess." Likewise, any telepaths are too many. The price for a species of being classified as "inhuman," both in Moran's world and too often in our own, is suffering from human neglect at best, targeted extermination efforts at worst. It may take centuries for this fear to die. In the further future of Moran's imagined world, the twenty-fifth century where his proposed story "The Face of Night" would take place, Denice's descendants have emigrated to the planet November, which they rule as "[t]he Lords of the House of November […]. There are not many of them, forty or fifty at any given time" ("Face"). Only hundreds of years later, on their own planet, and with their place in control guaranteed, can a self-sustaining population of telepaths survive. In this future, as well, there is on Earth "no hunger, no want, and no overpopulation" ("Face"). The numbers of humanity's genetically-engineered, exiled parallel species can only stabilize when the human population on Earth is also stable and voluntarily restrained. That future, not coincidentally, is also home to the "Trentists--members of the Church of His Return, more commonly called the Exodus Church" (*November* "Interlude"), who follow Trent's code of non-violence and respect for other species and have achieved a position of influence in spreading their doctrines. Trent's acceptance of telepaths as equal to humans does win, although only centuries after the Unification's influence has begun to wane.

The future of Moran's world also includes contact with alien, sapient non-human species, and Sedon, the rebel leader who launches Denice fights, justifies his extensive manipulations and murders by telling Denice that he has seen a recent picture of a spacecraft showing a ship of the Sleem Empire. These are aliens who will be implacable foes of humanity, or rather of human freedom to expand into space as they wish. "[T]he sleem make fine masters. They will enclose us in this solar system, place an outpost like the one at Tau Ceti to ensure that we never attempt to leave Sol System. And aside from that they will leave us alone […]. [L]ife is too precious a thing to be wasted in subjugation to *anyone* […]. If there must be a hand to hold the whip, that hand is ours" (*Dancer* 519; emphasis in original). The "ours," for Sedon, refers to the Dancers, genetically-engineered humans who can move faster and kill more efficiently than ordinary humans. Sedon is one, exiled to Earth because of attempting to lead a revolution on a world where a group of humans originally from

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Earth settled long ago, and Denice has become one by virtue of the superior speed and strength granted to the telepaths. Although it might seem that Sedon, who opposes the Unification, is their complete opposite—he wishes for unlimited human expansion—in reality, he has fallen into the same pattern as the Ministry of Population Control and other elites. He assumes that the growth and freedom of any other species not subject to human will is inherently dangerous to humanity. What humans will do when they encounter aliens other than the sleem he does not say, but the future looks bleak for them—extinction at worst, slavery at best.

Again, the right answer is coexistence and cooperation, and in the future of Moran's world, the reader learns that "only humanity's alliance with the K'Aillae [another alien species] allowed either humanity or the K'Aillae to survive" a war with the sleem ("Face"). If Sedon had succeeded in taking over Earth, he would have doomed the species he wanted to rule with his grandiose vision of humans winning, expanding into the galaxy, and extinguishing the sleem alone. Hostility toward the sleem may be justified when it comes to the thought of them ruling over humanity by trapping it in the Solar System, but the politics of extinction would have turned on humanity in this case. Humanity's future freedom, won by the alliance between humans and the K'Aillae, does not mean the extinction of the sleem, either. Instead, it depends on another kind of coexistence; "[t]oday, with the power of the sleem broken, humans and sleem generally avoid one another" ("Face"). Since sleem and humans cannot share the same environments anyway, and in fact die when exposed to each other's native atmospheres ("Face"), this kind of cooperation to keep the peace is only sensible. The sleem do not have the kind of dominance over humanity that Sedon envisioned and feared, and humans do not possess and poison other ecospheres or open space the way they did Earth. Once again, the triumph of cooperation depends on human will, this time to refrain from war as well as overpopulation and from reducing the numbers of *any* alien species they encounter, even ones they might have envisioned as enemies.

The Cyborgs: Just Human Enough

The Unification does make use of one kind of augmented human that is acceptable because they serve the will of the Unification and do not actually increase the number of humans in the world, since they are built out of existing humans. This is the Peaceforcer Elite, cyborgs who are made mostly from French soldiers and have such features as lasers buried in one fist and movements too fast for the unmodified eye to follow (*Emerald* 166). While they, like the telepaths, have advantages over unmodified humans, the Unification celebrates the willingness of those Peaceforcers who become cyborgs. It involves grueling months of surgery and replacement of so many body parts that the necessary procedures can be only be performed in space, but the change is highly coveted, and even a Peaceforcer offered the treatment without advance notice declares, when asked if he feels fear, "No. No, sir, I am

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honored" (*Emerald* 44). The Elite are the powerhouses of the Unification, the soldiers who are sent out to cope with everything from rebels to the "inhuman" telepaths. With their more-than-human capabilities grafted onto living bodies rather than engineered into them, they can still be seen as human because they are not different at the genetic level, formed of computer code, or born in a different atmosphere.

Also, as Donna Haraway says, "Cyborg replication is uncoupled from organic reproduction" (292). The Unification controls the numbers of the Elite and is the only organization that can make more, which also makes them less of a threat to "real" humans than biological organisms or AIs. A few of them, including Melissa du Bois, an Elite candidate whom Trent the Uncatchable first meets before she becomes a cyborg, do embrace Trent's message of rebellion and non-violence, but this is rare. It reflects the fundamental hypocrisy at the heart of the Unification: anything rendered "inhuman" or which may be "better than human" is not to be trusted, even if created by people working for the Unification, but the Peaceforcer Elite, which come from the social and monetary small-e elite of the army's higher ranks, are an exception. The growth of telepaths, although originally endorsed by the Peaceforcers, is seen to be a mistake and quickly cut off, but more Elite continue to be created, and after Sedon's rebellion, when the rebels figure out a way to use a laser on the superconducting mesh beneath the first kind of Elite's skin and burn them to death, they are modified to be invulnerable (*War* ch. 2). And the Elite's effectiveness can be seen from the Storyteller's comparison of their population decline compared to the decline of the U.S. regular human population in Sedon's rebellion: "In the course of that rebellion, rebels killed three hundred and forty-seven of the deadly PKF Elite […]. The PKF, under the command of [Elite] Mohammed Vance, killed two million Americans" (*War* "Prolog"). The Elite ease the Unification's way into the hearts and minds of Americans by killing off those with rebellious hearts and minds.

The Elite could be a dagger pointed at the government's heart should they ever rebel in huge numbers, but they are simply assumed to be loyal, and then further improved and changed, out of a sense of safety no less misguided than the fear of telepaths. In this, they are treated as machines which are supposed to be infinitely programmable and manipulable—again, more comfortable than biological beings *or* the free AIs. The Unification once again reveals itself as concerned solely with the growth in numbers or "inhuman" capabilities of the "lower" classes, in this case the non-French, non-rich masses it rules over. Numbers are simply not a concern for the Unification when it comes to its own weapons. Since they aid in its domination of the planet, human beings, and even other species, given that it is an Elite who orders the destruction of the telepaths, the Unification has no reason to restrain them; growth of its own domination is the one kind of growth that need not be restrained. Again, it remains up to characters outside the Unification, including

Trent, Denice, and the A.I.'s, to present a different vision, one closer to the truth about reasonable population control.

This means voluntarily limiting population growth, because humanity has come to realize that we do not have the *right* to spread across the ecosphere and destroy it. It is a self-restraint much like the one Bill McKibben advocates in *The End of Nature,* where we relearn what "over the last few centuries we've forgotten, to our peril [:] how connected we actually are to the rest of the fabric of creation […]. We *are* different from the rest of the natural order, for the single reason that we possess the possibility of self-restraint, of choosing some other way" (xv-xvi, emphasis in original). It must be a choice to coexist with other species, not to enslave them, and to stop using cyborgs as weapons. Trent and Denice win the long game, the only one that matters, even though in the short term Trent is permanently on the run and Denice absorbed into the Unification by her eventual marriage to a moderate politician. In the furthest future of *Lord November*, "With Earth's population down below four billion, people were perhaps rarer than they had once been" ("Summer 26, 2676 Asimov"). They have, at last, assumed their rightful numbers, ones that no longer hurt other species whether on Earth or on other planets, and no one dies of starvation in the future of *Lord November*. The Unification, too, no longer rules Earth by this time, which is not a coincidence.

Conclusion

The *Tales of the Continuing Time* series stakes out a firm position in neo-Malthusian science fiction: surely human population growth is real, surely it must be stopped, but just as surely policies of coercion on a mass scale must be opposed. It is individual human will that must make someone decide not to have children, as Trent does, or only to have one, as Denice does; to cooperate with other species; to aspire to non-violence. In many works of science fiction terrified about population growth, "[u]nder the threat of revolt provoked by scarcity, democracy is forced give way to totalitarianism" (Domingo 731). In Moran's world, totalitarianism proves as much a wrong choice as democracy uninterested in doing anything about human numbers. No amount of "babychasers," child licenses, or hypocrisy covered in rhetoric about the good of the planet will compensate for the lack of individual choice. On the other hand, neither is unchecked human population growth and an unrestrained will to dominate a viable option; humans must check their own freedom to ultimately have greater freedom in the future.

Moran's "solutions" to the problems of his future Earth may seem overly simplistic. We have neither space travel to relieve population pressures on our Earth, nor other species who can speak a recognizable language of rights and freedom to us like Moran's AIs and telepaths and who are able to force us to restrain ourselves so as to leave a space for them in the human effort to dominate the planet. But that makes our own restraint only the more important, even heroic. We are *not*

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alone even if we do not have sleem ships floating in the distance or telepaths born from genetic engineering to instill us with fear. We have other species who depend, like us, on the fragile resources of this one planet, and who we might still choose to cooperate with, coexist with, leave a space for. Choosing to believe that our own needless killing of the biosphere is wrong and working to stop it is certainly possible. Moran's alternate Anthropocene is as much a vision of hope as it is a warning. Like Trent and Denice, we require the will and the freedom to enact it.

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Inferno Unleashed: Dan Brown's Uncomfortable Solution to Overpopulation

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Abstract

Dan Brown's *Inferno* (2013) explores a controversial issue that is often forgotten in national policies and international debates despite its relevance for the world's future: overpopulation. The effects of overpopulation in our environment can be seen in desertification, loss of diversity, or fresh water scarcity, and despite this, overpopulation remains a forgotten issue because of the difficulties of dealing with it at a large scale. Using Thomas Malthus's theories on the growth of population, in *Inferno* Dan Brown proposes an uncomfortable situation that entails the creation of a virus. While in the film version the virus is never released and the heroes defeat the villains, the novel offers a different and more complex finale which forces readers to reflect on the possible ways of dealing with the problem of overpopulation. The aim of this article is to analyze some of the consequences of overpopulation regarding the environment, and to explore how the two versions of *Inferno* portray this topic.

Keywords: overpopulation, plague, Malthus, Dan Brown, *Inferno*, ecological collapse.

Resumen

Inferno (2013) de Dan Brown explora un tema importante que a menudo se obvia en las políticas nacionales y en los debates internacionales, a pesar de lo relevante que es para el futuro del mundo: la sobrepoblación. Los efectos de la sobrepoblación en nuestro entorno pueden percibirse en la desertificación, la pérdida de diversidad o la escasez de agua. A pesar de ello, la sobrepoblación continúa siendo un problema olvidado debido a las dificultades que entraña abordar el problema a gran escala. Usando las teorías de Thomas Malthus sobre el crecimiento de la población, en *Inferno* Dan Brown propone una situación incómoda que conlleva la creación de un virus. Mientras que en la versión cinematográfica nunca se libera el virus, y los héroes vencen a los villanos; la novela ofrece un final diferente y más complejo que hace reflexionar al lector sobre las posibles maneras de lidiar con el problema de la sobrepoblación. El objetivo de este artículo es analizar algunas de las consecuencias de la sobrepoblación en lo que al medio ambiente se refiere, y explorar cómo las dos versiones de *Inferno* representan el tema.

Palabras clave: sobrepoblación, peste, Malthus, Dan Brown, *Inferno,* colapso ecológico.

Overpopulation has become an uncomfortable issue barely dealt with in public debate, and when it is linked to environmental degradation, discussion is

likely to arise. In "Taking the heat out of the population and climate debate," Campbell-Lendrum and Lusti-Narasimhan point out how close these two issues are but how difficult it is to address them since "discussing them together has often generated more heat than light" (807). Following Thomas Malthus's argument that "[the] power of population is so superior to the power in the earth to produce subsistence for man" (44), organizations such as the World Health Organization have analyzed how overpopulation affects the environment: "Although the major driver of greenhouse gas emissions remains the consumption patterns of richer populations, human population is also a fundamental determinant of this trend"; but they have also acknowledged the outrage that dealing with these issues in developing countries arouses. If we consider that developed and/or rich countries are those who have damaged the environment the most, then they should be the ones taking the first step towards proposing solutions to climate change, for example by reducing carbon emissions. However, their fear of losing their dominant positions in industrialization in favor of developing countries prevents them from doing so. Similarly, some people think that since population growth is fastest in developing countries, "this should be the starting point to reduce climate change"; but

> developing countries point out that per capita emissions of children born in poor countries are, and are likely to remain, much lower than those in richer countries, and claim that they are being stigmatized for "profligate reproductive behaviour" as a negotiating position over greenhouse gas commitments. (Campbell-Lendrum and Lusti-Narasimhan 807)

Whether we support one viewpoint or the other, it is necessary to realize the lack of action regarding overpopulation, environmental degradation, and how both are connected. The need for policies regarding these issues is also highlighted by Bryant, Carver, Butler and Anage in "Climate change and family planning: least-developed countries define the agenda". In this article, the authors comment on how the close relationship between climate change and demography is commonly omitted: "Despite widespread general debate on climate change, the relevance of demographic trends remains a comparatively unexplored issue, especially at the policy-making level" (852). Although the article focuses on the situation of least-developed countries, especially in Asia and in Africa, some of the environmental consequences of population growth in these countries can be extrapolated to the global situation. For example, they present a chart which includes the "Ten most cited issues identified as linked to population growth" and most of them have to do with environmental degradation: "Soil degradation/erosion, Fresh water scarcity, Migration, Deforestation, Inadequate farm land per capita, Loss of biodiversity, Disease and health system constraints, Loss of natural habitat, Diminishing fish stocks, and Desertification" (854). These issues affect not only developing countries, but have global implications, and that is why climate change and overpopulation should be discussed together and not separately. Besides, since climate change is a

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current debate topic with serious implications, overpopulation should be back on the agenda, as well.

The aim of this article is to explore the interconnections between ecology and overpopulation using Dan Brown's novel *Inferno* (2013) and its film adaptation with the same title, released in 2016. Both the novel and the film echo Malthus's theories on the unsustainability of population growth regarding the world's resources, but the main focus of this article is on how the ending of the novel differs from the one of the film and the implications of that change. In general, the film industry has been quite reluctant to deal with the issue of overpopulation and its consequences for the environment; when it has done so, it has been mostly in a comic or satirical vein. A recent example of this is Mathew Vaughn's *Kingsman: The Secret Service*, in which the supervillain Valentine, played by Samuel L. Jackson, wants to end most of humanity by creating a device that promotes violent behavior. In his plan, only those who are powerful and wealthy deserve to survive, whether they agree with his ideas or not. According to his point of view, humanity is a virus that is slowly killing the planet, so most of the human population needs to be eradicated: "Humankind is the only virus cursed to live with the horrifying knowledge of its host's fragile mortality." The analogy between the human population on Earth and a virus within a living organism is emphasized in the following lines, stated by one of Valentine's supporters:

> When you get a virus [...] you get a fever. That's the human body raising its core temperature to kill the virus. Planet Earth works the same way. Global warming is the fever. Mankind is the virus. We're making our planet sick. A cull is our only hope. If we don't reduce our population ourselves [...] there is only one of two ways this can go. The host kills the virus, or the virus kills the host. Either way [...], [the] result is the same. The virus dies. So Valentine's gonna take care of the population problem himself. (n.p.)

In *Kingsman*, the seriousness of Valentine's arguments against overpopulation is undercut by his severe lisp and by the fact that, despite his role as a promoter of mass murder, he cannot stand the sight of blood. However, if we consider the rationale behind his murderous plan, and set aside the way in which he plans to carry it out, his point of view—though controversial—makes ecological sense. Global warming is seen here as the Earth's response against overpopulation and not as an indirect consequence of it, thus Earth is seen as a living organism that is able to regulate itself, as proposed in James Lovelock's hypothesis of Gaia. Lovelock's hypothesis, supported by biologist Lynn Margulis, states that all life is interconnected, that "that the mean global temperature, the composition of reactive gases in the atmosphere, and the salinity and alkalinity of the oceans are not only influenced but regulated, at a planetary level, by the flora, fauna, and microorganisms" (Sagan and Margulis 353); thus, this theory conceives the Earth as "a self-regulating system, analogous to a living organism" (Garrard 173). However, this metaphor has proved quite controversial. Some ecophilosophers have argued that by envisioning the planet as a living organism with its own "self-regulating

mechanisms," it is suggested that the Earth is able to endure exploitation and other damaging human behaviors (Kheel 251). Patrick D. Murphy also criticizes Lovelock's notion of the Earth taking care of environmental problems such as pollution, since this would seem to entail that there is no need for environmentally-friendly attitudes (24). In *Kingsman* Valentine describes the Earth as an organism dealing with a virus infection, and this portrayal has some similarities with the Gaia hypothesis, the planet is seen as a fighting entity willing to end the disease regardless of the consequences. That is why the villain Valentine decides to take action and "help" the planet by eradicating the problem.

In Dan Brown's *Inferno,* we can also read about an alternative solution to overpopulation. *Inferno* is Brown's penultimate novel, and the fourth in the Robert Langdon series which started in 2000 with *Angels and Demons.* He became world-famous and a bestselling author with the second novel of the series, *The Da Vinci Code* (2003), which was turned into a film with the same title in 2006. Of this series of five novels, three have already been adapted for the screen, with Tom Hanks as the protagonist. The last novel, *Origin*, was published in October 2017. In all of these works, Brown mixes historical intrigue, secret organizations and religious themes, creating a thrilling atmosphere by fast-paced plots whose events take place over a short time-span. Dan Brown's *Inferno* starts with the suicide of scientist Bertrand Zobrist in Florence, although the reader only learns much later who he is and what he has done. As mentioned, the protagonist of the story is Robert Langdon, a Professor of Religious Iconology and Symbology at Harvard University. At the beginning of the novel, Langdon wakes up wounded in what seems to be a hospital in Florence, but after an attempt on his life, he quickly has to make an escape with the help of doctor Sienna Brooks. Little by little, and with constant references to Dante's life and works—with his portrayal of hell—as well as to Malthus's ideas on population, Langdon and Brooks discover that they must save the world from a plague created by Bertrand Zobrist. The story frequently switches between simultaneously unfolding events and is interspersed with flashbacks to Bertrand Zobrist's life. Each chapter has a distinctive focalizer, challenging the reader to figure out how the different strands of the narrative are related to each other—a highly effective technique for generating suspense which Brown employs in most of his work. In *Inferno*, different chapters focus on Robert and Brooks's escape across Florence and Venice, while other chapters allow readers to explore Zobrist's mind and the reason why he has created his plague. Using Malthus's ideas on the exponential growth of population, he explains his pessimistic view through a very clear and practical analogy:

> If I were to take this piece of paper and tear it in two… […] And then if I were to place the two halves on top of each other… […]. If the original sheet of paper is a mere one-tenth of a millimeter thick, and I were to repeat this process…say, **fifty** times… do you know how tall this stack would be? […] Our stack of paper, after only fifty doublings, now reaches almost all the way…to the sun. […] My point is that the history of human population growth is even more dramatic. The earth's population,

> like our stack of paper, had very meager beginnings… but alarming potential. (153-154; emphasis in original)

After the analogy, he uses real data to illustrate the growth of population, especially in the last two centuries.

> It took the earth's population thousands of years—from the early dawn of man all the way to the early 1800s—to reach **one** billion people. Then, astoundingly, it took only about a hundred years to double the population to **two** billion in the 1920s. After that, it took a mere fifty years for the population to double again to **four** billion in the 1970s. As you can imagine, we're well on track to reach eight billion very soon. Just today, the human race added another quarter-million people to planet Earth. A quarter **million**. And this happens every day—rain or shine. Currently, every year, we're adding the equivalent of the entire country of Germany. (154; emphasis in original)

With these words Zobrist echoes Thomas Malthus's predictions in *An Essay on the Principle of Population* (1798) in which he detailed the exponential growth of population, at a time when the number of people in the world was much lower than it is today. Zobrist also details the different consequences that Malthus pointed out in his essay using the same terms:

> Famine seems to be the last, the most dreadful resource of nature. The power of population is so superior to the power in the earth to produce subsistence for man, that premature death must in some shape or other visit the human race. The vices of mankind are active and able ministers of depopulation. They are the precursors in the great army of destruction; and often finish the dreadful work themselves. But should they fail in this war of extermination, sickly seasons, epidemics, pestilence, and plague, advance in terrific array, and sweep off their thousands and ten thousands. Should success be still incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world." (44)

When Malthus exposes the fatal results of overpopulation, he talks about famine, vices and diseases. These are also among the negative effects of population that Zobrist mentions. Malthus comments that the rate of population growth is not sustainable because the Earth's resources are insufficient, and he points out that the vices of humanity usually exacerbate the problem through violence and wars. In the same vein, Zobrist remarks that "Under the stress of overpopulation, those who have never considered stealing will become thieves to feed their families. Those who have never considered killing will kill to provide for their young" (157). Thus, Zobrist follows Malthus's argumentation, explaining how life in an overcrowded world will allow mankind's vices to flourish and the most violent behaviors to proliferate.

Again, following Malthus, Zobrist highlights that throughout history, plagues and epidemics have served to keep overpopulation in check. The scientist also mentions that according to Machiavelli, plagues are "the world's natural way of self-purging" and Dr. Sinskey, the WHO director in the novel, acknowledges this fact adding that the WHO is "well aware of the direct correlation between population density and the likelihood of wide-scale epidemics," and because of this the WHO thinks it "can prevent future pandemics" (158). Zobrist reacts to this with

frustration because he believes that controlling epidemics is a bad idea, given that epidemic "naturally" control population numbers (158). Similarly, he criticizes the WHO policies regarding overpopulation in developing countries. Developing countries have become the most problematic ones regarding overpopulation and they are one of the concerns of the WHO in the novel, as exposed in Dr. Sinskey's words when she talks with Zobrist: "Whoever you are, you know damned well the WHO takes overpopulation **very** seriously. Recently we spent millions of dollars sending doctors into Africa to deliver free condoms and educate people about birth control" (155; emphasis in original). Zobrist rejects Dr. Sinskey's defense, alleging that the Catholic church is effectively undercutting the WHO's efforts: "And an even bigger army of Catholic missionaries marched in on your heels and told the Africans that if they used the condoms, they'd all go to hell" (155).

The last element mentioned in Malthus's quote regarding nature's ways of dealing with overpopulation is famine. As discussed above, population growth in developing countries leads to a host of environmental problems: soil degradation, deforestation, lack of farm land, diminishing fish stocks and desertification (Bryant et al.). All these issues have a direct impact on the availability of food, and are they are an important part of the general condition of environmental degradation our world suffers nowadays. As Zobrist puts it: "Animal species are going extinct at a precipitously accelerated rate. The demand for dwindling natural resources is skyrocketing. Clean water is harder and harder to come by. By any biological gauge, our species has exceeded our sustainable numbers" (155). Later in the novel he repeats his concern for the ravages caused to the Earth by humans and overpopulation: "'Over the last fifty years […] our sins against Mother Nature have grown exponentially'" (212). He continues talking about the results of population growth on a planet with limited resources, especially when those resources are only available to a small percentage of the population if we consider global numbers. In fact, he talks about overpopulation as a disease that is destroying the Earth, with "ozone depletion, lack of water, and pollution" as its symptoms.

Both in the novel and in the film, we see Langdon and Brooks travelling across Florence and Venice in order to guess where Zobrist has hidden his plague. In their journey, they are pursued by a group of armed men that belong to the WHO, but Langdon only learns that he has been running away from his own allies when it is too late. While they are in Venice, Brooks shows her true face, and we learn that she has in fact been a secret accomplice of Zobrist's all along. Even though she does not know everything about Zobrist's plan, her suspicious behavior after leaving Langdon behind makes her a second villain in the story. In the film, the chase ends in an underground cistern near Hagia Sophia in Istanbul, where Langdon and his helpers from the WHO save the world and frustrate Zobrist's plans by killing Brooks and her accomplices and retrieving the bag in which the plague is contained before it can dissolve in the water. However, the book has a much more complex ending which is elided in the film. In the novel, when the WHO and Robert Langdon arrive

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at the underground cistern in Istanbul where the Solublon bag with the plague was supposed to be, they discover that there is no bag, only a string and "a tiny plastic clasp, from which hung a few tatters of Solublon plastic" (653). That discovery makes them think they have failed and that humanity is doomed: "He pictured the submerged bag dissolving and breaking apart… its deadly contents spreading out into the water… and bubbling up to the surface of the lagoon" (653). While the WHO members try to assess the situation and the consequences, Langdon starts chasing Brooks across Istanbul until she surprisingly surrenders.

Once they are face to face, Langdon accuses Brooks of having released Zobrist's plague by breaking the Solublon bag. She appears confused by this charge and responds: "Robert, I went to the cistern to **stop** Bertrand's virus… to **steal** it and make it disappear forever… so nobody could ever study it, including Dr. Sinskey and the WHO" (678; emphasis in original). Langdon is surprised by this answer, especially when she tells him that Zobrist spread the virus before the date he had told Brooks he would be doing it. The plague has already been released for a week, so that the whole world would be infected. Langdon and the WHO wonder how it is possible that no plague has been announced if the virus has already been out for a week, but then Brooks tells the protagonist that "Bertrand didn't create a plague […]. He created something far more dangerous" (680). Robert cannot understand what can be more dangerous than a lethal plague, but Brooks tells him that Bertrand created a "viral vector": "It's a virus intentionally designed to install genetic information into the cell it's attacking" (689). When he asks her what Zobrist's virus does to human beings, she says after a silence: "The virus has the ability to render the human body… infertile" (689). Langdon objects that if the virus spreads and all humans become infertile, then the whole species would go extinct. Brooks explains that Zobrist did not want humanity to become extinct, but only to reduce its numbers so Zobrist

> "… created a **randomly** activated virus. Even though Inferno is now endemic in all human DNA and will be passed by all of us from this generation forward, it will 'activate' only in a certain percentage of people […]. When Bertrand did the math on infertility, he was exhilarated to discover that the plague's death rate of **one in three** seemed to be the precise ratio required to start winnowing the human population at a manageable rate." (690-91; emphasis in original)

Therefore, the final and most significant twist in the novel is that the lethal plague Langdon and the WHO were desperate to find had already been spreading for a week and was not, in fact, lethal at all. The dangerous element in Zobrist's plagues is not the virus as such but its ability to modify DNA, a technology which does not exist nowadays but that could be very dangerous in the wrong hands.

Brooks redeems herself by telling the WHO director, Dr. Sinskey, that she was not aware of all the details in Zobrist's plan. In fact, she wanted to stop the virus from being released, but when she arrived at the underground cavern, she discovered she had been lied to. In the end, she tells Sinskey everything she knows and demonstrates her willingness to cooperate. When Brooks comments that

something may be done to modify Zobrist's invention, both Brooks and Langdon are surprised by Dr. Sinskey's response when she states that perhaps Zobrist's virus should be left untouched, since it will actually put an end to overpopulation. In this manner, the novel keeps the reader's attention engaged until the very end, so it is very significant that in the film version, this whole section of the plot has been removed.

The film thus simplifies the plot of the novel and also the characters: it depicts both Zobrist and Brooks as evil terrorists, whereas Langdon and the WHO are the heroes of the film. This is particularly clear from the fight scene in the underground cavern in which the virus is miraculously contained and Brooks and her accomplices die. While the film mostly stays close to the plot of the novel, the most interesting and controversial issue in the latter is completely removed. The character of Brooks illustrates this process of simplification since in the film version, she is portrayed as a very intelligent woman who lies to Langdon and whose aim is to destroy the world. At the end, she dies as a terrorist without being able to explain herself and without repenting. However, the Brooks of the novel is a complex, conflicted character. In her conversations with Langdon, she shows herself to be motivated by the same Malthusian fears that also drive Zobrist:

> Robert, speaking from a purely scientific standpoint—all logic, no heart—I can tell you without a doubt that without some kind of drastic change, the end of our species is coming. And it's coming fast. It won't be fire, brimstone, apocalypse, or nuclear war… it will be total collapse due to the number of people on the planet. The mathematics is indisputable. (330)

Therefore, despite Brook's sympathies for Zobrist's viewpoints regarding overpopulation throughout the novel, the moment when she turns her back on Langdon comes as a surprise. In the novel, however, we later learn that her apparent betrayal was motivated by her wanting to not only stop the vector virus, but also to keep it out of the hands of the WHO or any other organization which might abuse the new technology.

When a novel is adapted to film, details invariably are lost. It is significant, however, that in the case of *Inferno*, some of the most interesting aspects of the plot are left out. Even setting aside the simplification of the character of Brooks, the endings of the film and the novel regarding the virus could not have been more different. In the film, the virus is compared to the plague and described as lethal, so the protagonists assume it would have killed most of the world's population. The defeat of Brooks and Zobrist is presented as a straightforward triumph over evil. The ending of the film leaves the world as it was at the beginning, the status quo ante is restored. In the novel, however, we discover that the virus had already begun to spread before the events in the plot started to take place. Even though at some points of the story, Brooks seems to be a villain, the reader learns of her regrets and of the personal motivations that lead her to act in the way she did. Also, the WHO director surprises the reader by admitting that Zobrist's virus will indeed end overpopulation and suggesting that it should be allowed to run its course. At the end

of the novel the world has changed, and the reader is left with the question of how serious a problem overpopulation is and what kinds of methods should be adopted to tackle it. Ironically, he ends up being the savior he said he was when he talked to Dr. Sinskey, and it is precisely through their dialogues and through those between Langdon and Brooks that readers are encouraged to reflect on how serious overpopulation is and how difficult it is to find a solution. During one of these conversations, Brooks asks Langdon a very uncomfortable question:

> "Zobrist asked the following: If you could throw a switch and randomly kill half the population on earth, would you do it?"
>
> "Of course not."
>
> "Okay. But what if you were told that if you **didn't** throw that switch right now, the human race would be extinct in the next hundred years?" She paused. "Would you throw it then? Even if it meant you might murder friends, family, and possibly even yourself?"
>
> "Sienna, I can't possibly—"
>
> "It's a hypothetical question," she said. "Would you kill half the population today in order to save our species from extinction?" (Brown 338-39; emphasis in original)

When Brooks quotes Zobrist's question at the beginning of this passage, it is directed at the reader as much as it is at Langdon. Even though she acknowledges it is a hypothetical situation, she insists on the logic of the lesser of two evils to illustrate Zobrist's thinking. Langdon never gets to answer this unsettling question: before he has time to do so, they reach their destination. It must be kept in mind that when this conversation takes place, neither Brooks nor Langdon know the scientist's actual plan: they think that Zobrist wants to kill half of the world's population, rather than make a third of it infertile. As mentioned before, at the end of the novel Dr. Sinskey faces a different kind of question that is no less unsettling because of its consequences. When she is asked about how the WHO is going to deal with Zobrist's virus, she says that the best option is to leave the virus alone since creating an anti-virus might be even more dangerous. Besides, the virus will end the problem of overpopulation, so even though she does not support Zobrist, she acknowledges that the fears which motivated him are well-founded.

In *Inferno*, Dan Brown discusses some perspectives on overpopulation and even hypothesizes about a possible solution to the problem. Although in the novel the author just focuses on Malthus's idea, Zobrist seems to echo as well some of the Neomalthusian ideas stated by authors like Garrett Hardin. In "The Tragedy of the Commons" Hardin comments that the "population problem" is within "the class of 'no technical solution problems'" (1243). According to Hardin, no change in technology can prevent the ravages of overpopulation in our habitat and in our very social system: "it is clear that we will greatly increase human misery if we do not, during the immediate future, assume that the world available to the terrestrial human population is finite" (1243). Therefore, through Zobrist Brown exposes Malthusian and Neomalthusian concerns without presenting alternative solutions to the population problem. In fact, Dr. Sinskey's implicit consent for Zobrist's plague once it has spread places Zobrist in the role of savior, the role he had given himself

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while most of the people saw him as a terrorist. Throughout the novel the narrator seems to empathize with Zobrist by highlighting his conversation with Dr. Sinskey, in which the fictional director of the WHO is not able to scientifically refute Zobrist's arguments. Sienna Brooks, who is presented as an exceptionally gifted doctor, also acknowledges the seriousness of the population problem as presented by Zobrist and with her speeches tries to convince Langdon—as well as the reader—of how important it is to take some kind of measure. However, Brown does not present any alternative solution to overpopulation, and when Dr. Sinskey learns about the real effects of Zobrist's virus, she is even pleased to not try to stop it or alter its effects. Through his virus Zobrist implements some of the measures Hardin exposes in "The Tragedy of the Commons", and so the plague he creates controls the population problem from the beginning: conception. At the end of the article above mentioned, Hardin states:

> Freedom to breed will bring ruin to all [...]. The only way we can preserve and nurture other and more precious freedoms is by relinquishing the freedom to breed, and that very soon. 'Freedom is the recognition of necessity—and it is the role of education to reveal to all the necessity of abandoning the freedom to breed. (1248)

The difference between Hardin's proposal and what Zobrist does is that Hardin conceived the problem of population as something to be dealt with through conscience and education, he referred to it as a "not technical solution problem". However, Zobrist carries out what Hardin outlines but using technology and scientific advances. In his article "Global overpopulation would 'withstand war, disasters and disease,'" Mark Tran comments on a report on overpopulation published by the National Academy of Sciences highlighting that "effective family planning and reproduction education worldwide have great potential to constrain the size of the human population and alleviate pressure on resource availability over the longer term", but that no results would be perceived in the short term (n.p). This report also comments that countries in Africa and South Asia will be the ones who suffer most from the consequences of overpopulation. But it is worth noting that that the report is not entirely pessimistic: "Rather than reducing the number of people, cutting the consumption of natural resources and enhanced recycling would have a better chance of achieving effective sustainability gains in the next 85 years" (n.p.). New policies and technologies which reduce the consumption of natural resources, the authors suggest, might go a long way to prevent overpopulation from damaging our ecological systems.

Regarding the development of new technologies to help to address overpopulation, or at least to reduce its environmental effects, some scientists propose a different model to that offered by Malthus. For example, biologist Erle C. Lewis argues that Malthus's theory fails to consider the effects of humans and their technology on the world that surrounds them: "The conditions that sustain humanity are not natural and never have been. Since prehistory, human populations have used technologies and engineered ecosystems to sustain populations well beyond the capabilities of unaltered "natural" ecosystems" (n.p.). He bases his point

of view on the ideas of the Danish economist Ester Boserup, whom he describes as the "antidote to the demographer and economist Thomas Malthus" (n.p.). According to Boserup, nature is flexible and full of untapped potential (Mathieu). From such a perspective, "the only limits to creating a planet that future generations will be proud of are our imaginations and our social systems" (Ellis n.p.). Therefore, the possibility of a solution to the population problem depends on both technological advances and our own awareness towards such issues as overpopulation and its effects on the environment. Whether we implement some sort of global birth control, improve our technological systems, or develop new technologies, overpopulation is an issue that will not go away. The consequences of our numbers on Earth can be seen in many of the environmental problems we face today, so we need to consider overpopulation alongside ecology in order to look for possible solutions. The question we may ask ourselves as humans is the same Brooks asks Langdon: Are we willing to sacrifice half the population to save the world? We may not be talking about sacrificing our very lives, but we may need to sacrifice our *way of life* in order to create a sustainable society.

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"No Forest, No Water. No Forest, No Animals": An Ecocritical Reading of Ekpe Inyang's *The Hill Barbers*

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Abstract

This article examines Ekpe Inyang's play entitled *The Hill Barbers* (2010) using postcolonial ecocriticism. Combining postcolonial theory and ecocriticism—in order to foreground the author's postcolonial Cameroonian/African society, the article investigates some of the numerous ecology-related issues raised in the play, among which deforestation, exploitation, capitalism, agency for nature, and the apocalyptic trope. It emerges, from both the play and article, that humans are destroying nature and are consequently suffering from this very destruction. Among the many effects of environmental destruction felt by the Mbungoe human community of the play are acute shortages of drinking water and dwindling animal species on their hills and mountains. One of the major findings of this article is the author's ability to reconcile hitherto opposing ideologies and practices, such as Judeo-Christianity and African religions and Western science and African traditions, in seeking ways of redressing the increasing ecological problems faced within Cameroonian/African communities and elsewhere around the globe, advocating sustainable behaviour and respect for nature. The paper joins ongoing research attempts to apply ecocriticism in reading literature from postcolonial African societies.

Keywords: Ecocriticism, postcolonial studies, postcolonial ecocriticism, Cameroon anglophone literature, literary criticism, Ekpe Inyang, *The Hill Barbers*.

Resumen

Este artículo examina la obra teatral de Ekpe Inyang titulada *The Hill Barbers* (2010) usando la ecocrítica postcolonial. Combinando la teoría postcolonial y la ecocrítica, el artículo analiza algunas de las numerosas cuestiones relacionadas con la ecología que se plantean en la obra, cuestiones como la deforestación, la explotación, el capitalismo, la preservación de la naturaleza y el tropo apocalíptico. De la obra y del artículo se desprende que los seres humanos están destruyendo la naturaleza y, por consiguiente, sufren los efectos de esta misma destrucción. Entre las muchas consecuencias de la destrucción ambiental sufridas por la comunidad Mbungoe en la pieza teatral están la escasez aguda de agua potable y la disminución de las especies animales en sus colinas y montañas. Uno de los principales hallazgos de este artículo es la capacidad del autor para conciliar ideologías y prácticas hasta entonces opuestas, como el judeocristianismo, las religiones africanas, la ciencia occidental y las tradiciones africanas, al buscar formas de corregir los crecientes problemas ecológicos a los que se enfrentan tanto las comunidades camerunesas/africanas como otras en diversas partes del mundo. De esta manera, se aboga por un comportamiento sostenible y por el respeto hacia la naturaleza. El artículo supone una contribución a los intentos actuales de hacer una lectura de la literatura producida en las sociedades postcoloniales africanas a través del prisma de la ecocrítica.

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Palabras clave: Ecocrítica, estudios postcoloniales, ecocrítica postcolonial, literatura anglófona camerunesa, crítica literaria, Ekpe Inyang, *The Hill Barbers*.

Introduction

Cheryll Glotfelty's expectation 'to see ecocritical scholarship becoming even more interdisciplinary, multicultural, and international,' following her remark that 'Ecocriticism has been predominantly a white movement' (xxv), has given rise to many hybrid critical approaches involving ecocriticism. The movement has also gained ground in other societies outside the US—generally considered as its birthplace—including Europe and postcolonial African communities. One of these novel hybrid approaches to the study of literature and the environment is postcolonial ecocriticism, especially as elaborated by Graham Huggan and Helen Tiffin. They contend that "human liberation [which is a hallmark of postcolonial thought] will never be fully achieved without challenging the historical conditions under which human societies have constructed themselves in hierarchical relation to other societies, both human and nonhuman, and without imagining new ways in which these societies, understood as being ecologically connected, can be creatively transformed" (22). This brings nature, construed as the entire ecosystem including humans, to the fore in an effort to deconstruct vertical dichotomies and seek much more symbiotically intertwined relations between all elements of nature. In a related manner, DeLoughrey and Handley consider postcolonial ecocriticism as 'a critical engagement with an "aesthetics of the earth" […] [which] reflects a complex epistemology that recuperates the alterity of both history *and* nature, without reducing either to the other' (4-5). Nature and humans have to be considered on an equal and complementary basis, not in a domineering or hierarchical relationship favouring the latter. This is similar to what Anastasia Cardone refers to as 'an aesthetics of the totality of nature, which can be defined as nature's wholeness and which leads human beings to accept and respect nature for what it truly is, freed from any prejudices' (85). Bringing this approach closer to Africa, Anthony Vital calls for a '[questioning of] the ways modernity in African contexts transforms human relations with nature and, as a result, the impact of societies on natural environments […] [in order] to enable social worlds to find more equitable, sustainable, and healthy ways of inhabiting their place—as well as strengthen historical self-understanding' (87). Certainly, literature is one of the areas of human culture in which this questioning and refashioning of the human-nature relation can be (re)presented and examined. This implies that the role of creative writers and literary scholars (critics) in addressing ecological degradation is pivotal and should remain so.

Against this backdrop, the present essay will offer a postcolonial ecocritical reading of *The Hill Barbers*, a poetic play by Ekpe Inyang, written mainly in verse

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and set in Cameroon.[1] Adopting an earth-centred approach which is also aware of the socio-political and historical specificities of Cameroon as a postcolonial society, the essay will explore questions of agency and the humanisation of nature, the parallelism between colonisation and the scramble for natural resources, the role of neo-colonial capitalism in environmental destruction, the hybridisation of opposing religious practices in efforts to save nature, and the use of the apocalyptic trope in galvanising pro-nature and sustainable behaviour in the Mbungoe community of the play and, by extension, among its audiences/readers.

Before proceeding, it is necessary to summarise the plot of the play here. *The Hill Barbers* is divided into three acts: Act One is entitled "Yesterday," act two "Today" and Act Three "Tomorrow." In Act One, which opens with darkness animated by war drumbeats produced by two masked drummers, Sangu Ngoe, an old man who acts like a visionary/seer for the Mbungoe community, perceives danger in the war drumbeats. He interprets the message as warning his people, both farmers and hunters, against chaos on mountains and forests similar to the havoc which people have wreaked on neighbouring mountains, "precisely seven mountains away" (17). Tabi, the most important farmer in the Mbungoe community, is restless and sleepless but unable to decipher the doom-laden messages from the drummers. Tabi considers their neighbours as great hill "barbers", who reap bountiful fruits from their labour, but the Seer reminds him that the negative consequences of their neighbours' actions surpass their benefits. Later on Eyambe, the greatest hunter in the community, emerges and expresses excitement as he goes to the forest to hunt, without worrying about the increasingly bad weather. Meanwhile, Sangu Ngoe continues trying to persuade them that there is looming danger resulting from their agricultural activities, farming and hunting, in their mountainous forests. In the second act, war drumbeats usher in the two greatest warriors of the community, Ndongebidemu and Ntungwa, fighting over a farmland, each of them claiming the land is his family inheritance. Tabi later joins them also laying claim to some portions of the disputed farmland. Emanga and Mesambe, the spokespeople of the womenfolk of the community, tell the disputing men that there are more urgent problems to solve in their community. One of such pressing problems is the acute shortage of drinking water they are facing; the burden falls mainly on women and children, who have to walk long distances to fetch drinking water. The two women explain how the arbitrary "barbing" of the forests and hills, that is logging and farming, is responsible for the water scarcity and an unbearable

[1] Since the play is written in verse, excerpts from it will be quoted here following poetic conventions, except those from stage directions. Ekpe Inyang comes from Korup in the Southwest region of Cameroon and holds an MSc in Environmental Studies from the University of Strathclyde, UK. He has served in different capacities with the World Wide Fund for Nature (WWF), Wildlife Conservation Society, the German Corporation for International Cooperation (GIZ), and the Pan African Institute for Development—West Africa (PAID-WA) in Cameroon. He has authored more than ten literary works (both poetry collections and plays). *The Hill Barbers* is his eighth play, published in 2010 by Langaa RPCIG.

change in the climate. Then the truth begins to dawn on the men, especially Eyambe, who recalls his late father's words to him, that "The forest is store of water for us/Like mother is of milk/For her baby" (41). Mesambe reminds Eyambe, the hunter, that without forests there can be no animals and joins Sangu Ngoe in cautioning him against hunting on Rock Hill, which is both their sacred forest and a national protected area. Act Three opens with the drummers sending out enticing sounds to the dancing pleasure of Tabi, Eyambe, Emanga and Mesambe. Sangu Ngoe reminds them that most elements of nature are no longer able to perform their roles. The men and women realise that the macabre image of nature in their neighbouring communities is already taking shape on their own land. Then they start arguing and debating on the causes and consequences of this. They brainstorm on how to stop these undesirable happenings; they suggest stopping certain farming and hunting practices. In the course of their deliberations and arguments, they discuss a Magic Shrub capable of increasing soil fertility that Emanga's grandmother used to avoid soil degradation in the past. The said plant helped her to harvest more from the same farmland but adversely earned her the name of a witch from her contemporaries. However, they agree that reintroducing this shrub could help them improve their soil fertility and avoid deforestation in the name of farming. They recognise the damage they have been doing to their forests, thereby causing global warming and related ecological problems and consequently making them debtors to future generations. They also realise that the drummers who dictate every aspect of their lives have been deceiving them into exploiting their forests and hills recklessly. After supplicating God through Jesus to help them to stop all destructive activities on their mountains and forests, and promising to perform traditional rites, the drummers flee the stage and the rest of the actors gather round Sangu Ngoe and raise their hands in a sign of victory. This is an indication that the actors/characters have begun to act on behalf of nature. They have now become agents or messengers of the overexploited Earth. Let us now discuss how the agency of nature comes across in the play.

Agency for nature, humanising nature

The Hill Barbers foregrounds the agency of nature in intriguing ways; nature is humanised and given voice—through humans—and space on stage. The title of the play transfers human qualities to nature through hills and forests by addressing the human beings wreaking havoc on them as hill barbers. A barber is someone who shaves beards, cuts and dresses the hair on people's faces and heads in order to make them look good. By referring to farmers (and hunters) in the play as hill barbers, the playwright implies that nature is human—the hills are human and have beards, heads and faces. Unlike barbers in real human life, who are solicited to cut people's hair and enhance their beauty, the hill barbers are unsolicited by the hills and forests they shave. Consequently, the results of their work become as

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undesirable as their work itself; we are told that their actions are turning the hills bald. In an exchange between the spokespeople of the womenfolk in the play, while responding to Mesambe's questions as to why they are facing acute water crises, Emanga says:

> They are cutting down the trees
> That cover the hills.
> Like the Hill Barbers
> On the other side
> Of the mountain,
> They are fast turning the hills
> Into bare mounds of earth.
> Bald like vulture heads
> They soon will become. (38)

And this undesirable trend is rather widespread as the barbers in the play are compared to other 'Hill Barbers/On the other side/Of the mountain.' Baldness is both unsolicited and destructive to nature here, especially given the comparison to vultures, which feed on animal carcasses, thereby to an extent encouraging predation. Besides destroying the watersheds for the people of Mbungoe, the barbing action certainly causes soil erosion, implied in the baldness of the hills. There are other instances in which the play humanises nature through the hills and forests. For instance, Emanga appropriates feminine human qualities to nature by comparing the beauty of a hill to that of a woman as she creates an equivalence between the hair on a woman's head and the flora on a hill: "The beauty of a woman/Lies in the style of her hair,/That of a hill/In the cover of its flora" (49). This equally reinforces the trope of Mother Earth, particularly the feminization of the African landscape. One can argue that Ekpe Inyang, despite criticisms of Negritude from some African literary writers and scholars like Wole Soyinka, follows in the tradition of early African writers of the Negritude movement by extolling the African landscape and giving it feminine qualities. Thus the play, generally, provides opportunities for both the womenfolk and nature to express themselves on stage. The current and potential calamities resulting from the human abuse of nature in the play—such as the water shortages that send women and children trekking far distances to fetch drinking water—further make nature appear as an active agent and character in the play, a character whose health or ill health directly affects the lives of other characters. The restlessness that the ill health of nature provokes in the Mbungoe community of the play is an attempt to bring nature on stage. Nature becomes both visible and invisible—visible through the hills and farms cleared on stage and invisible due to its occasional physical absence and the reference to mountains elsewhere—but permanently present by appearing as a serious menace to human life inasmuch as humans continue to misuse it. The Seer Sangu Ngoe, aka Wise One, as well as the two representatives of the womenfolk, Mesambe and Emanga, I argue, are speaking both for themselves as human beings and for nature. Taken together with the playwright, they can be considered as mouthpieces of

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nature "which is being threatened by man's selfish interests," to borrow from Brian Ojong (9). The play, in Sarah Ann Standing's words, "make[s] us aware that nature can come to life all around us and become [a] participant[..] with us in the story' (Standing 36). By doing this, nature, that is, "the landscape (and seascape) [is foregrounded] as a participant in [the play] rather than a bystander to human experience" (DeLoughrey and Handley 5). And the wellbeing of both humans and nature is, as many eco-critics suggest, therefore mutually interdependent. This view is further corroborated by Cardone's aesthetics of totality. The earth is considered as an interconnected whole.

However, aside from giving voice and space to nature on stage and thereby bringing its agency to the fore, the play equally raises questions of the inexpressible and subaltern. Can Sangu Ngoe and the two women effectively speak for the nonspeaking or subaltern subject which is nature? Inasmuch as they speak for nature, there can be deficiencies in their speech, given that nature does not use human language or, in other words, given that nature speaks/communicates in ways humans cannot rationally prove to comprehend. Inyang's play, despite the actual inexpressibility of nature's thoughts and feelings, can be considered as one in which humans can speak for nonhumans. They can "speak for nature" or speak for the subaltern subject in a narrative mode that does privilege dualist thought or naturalize the hierarchies between the human and nonhuman (DeLoughrey and Handley 26). One can argue that Sangu Ngoe, in his role as a Seer, is an intermediary and interpreter between humans and nature in the play, being able to relay nature's language to other humans who are not endowed with his supernatural powers, especially the short-sighted hill barbers and hunters. He tells others that "[his] life is a span of wings/Spread over two worlds/Living side-by-side" and he transcends "This simple world of ours/And the one that beats/[their] imagination." He can "hear sounds and see images/Both of this corporal world/And that beyond your reach,/ All at once" (10). He can decipher messages

> With unfamiliar undertones
> Weaving in and out
> Of the sounds you hear.
> Those other sounds
> You can't pick up.'
> With mere human ears. (10)

He sees four drummers whilst Tabi sees only two (15-16) and he says the others cannot comprehend "The message of the drums/Rolled out by the naked [… drummers]." And what is the content of that message? It goes thus:

> That message is clear warning
> About a terrible picture,
> Picture painted
> By your counterparts
> On the other mountains. (13-14)

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By being able to communicate between humans and nature, the Seer adds an interesting layer to the play. This layer makes the play capable of collapsing the dividing lines between the human and nonhuman realms. Based on this, the play, to use Wamberg and Thomsen's words, contributes to the 'blurring of the boundary between subject inside and non-subject outside' (13), that is, the divisions between humans and their Other which has been/is Nature. Humans depend on nature for their survival, sometimes fighting over natural resources for both commercial and feeding purposes. What then is the relationship between the colonial scramble for territories in Africa and the fight over resources in the play?

Scrambling for resources like colonialists

Nature and its resources constitute a zone for conflicting neo-colonial interests in *The Hill Barbers*. The fight and verbal exchanges between the two greatest warriors of the community, Ndongebidemu, Ntungwa and Tabi, in the second act (entitled 'Today,' 28-36), which is animated by war drums, resonate with the skirmishes and petty wars that characterized the colonial struggle over Africa, particularly West Africa where present day Cameroon is found, in the nineteenth century, and which might have escalated into a large-scale European war if the 1884-1885 Berlin West African Conference had not been held. The disorderly manner in which these characters lay claim to nearly or totally the same portions of the forest is akin to the way European colonial powers arbitrarily laid claims to different portions of Africa during colonization. While Ndongebidemu claims that "This stretch of forest/Belongs to me./I inherited it from/My father," Ntungwa lays a counter-claim. He argues, "No, it is mine./My father's father/Leased it to your father's father"(28-29). When Tabi, the greatest farmer in the community, rushes in he does not make matters better for the already quarrelling great warriors, Ndongebidemu and Ntungwa. Without trembling or expressing any fear, Tabi declares that he has come "To mark out a piece of forest/More clearly for [himself],/ Like every wise farmer would." And that "The season's ripening fast,/ And competition's/ Becoming really fierce" (31). Menaced by Ndongebidemu and Ntungwa, Tabi decides to give up his struggle to secure some portions of the forest for himself, declaring that "I give up the forest scramble./ I leave it for you./Every square inch" (34). Tabi's final remarks do not only directly link the interest-driven fight over nature, that is, the forest and its resources, directly to the European race for African colonies by using the word 'scramble,' but equally reveal how some Europeans surrendered their claims in the face of potentially bloody conflict, as in the case of the British, who surrendered the Cameroons to Germany following the signing of the Germano-Duala Treaty of Annexation under the auspices of Gustav Nachtigal on 12 July 1884 (Ngoh 7). Thus, the fight between these three characters over natural resources (parts of the forest for farming and animals for hunting) in the play is similar, in many ways, to how European colonialists vied for territories

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in Africa. This fight foregrounds the exploitation of nature by human beings and also re-echoes the past exploitation of colonial subjects and their natural resources—and even their current neo-colonial exploitation. One can argue that this play fits into what Huggan and Tiffin describe as the paradox of postcolonial ecocriticism, as its author explores 'the impossibility of [postcolonial ecocriticism's] own utopian ambitions,' seeking 'to make exploitation and discrimination of all kinds, both human and nonhuman, visible in the world; and, in so doing, to help make them obsolete' (16). Inyang's play successfully attempts to condemn two forms of discrimination and exploitation at the same time: human and environmental exploitation. It further confirms Huggan and Tiffin's assertion that

> the *righting* of imperialist wrongs necessarily involves our writing of the wrongs that have been done – and are still being done – to [nature], and demands our critical engagement with the ways in which both continuing problems of abuse and their potential amelioration are represented in British colonial and Anglophone postcolonial texts. (22)

Among all the factors responsible for human abuse of the natural environment, capitalism and the insatiable human quest for material wealth stand at the forefront.

Capitalism and materialism at play

Related to the double exploitation discussed above, *The Hill Barbers* draws attention to what one could term neo-colonial capitalism and materialism as accounting for the stark exploitation and victimhood of nature. The overwhelming presence of the drummers in the play, whose drumming dictates nearly all the actions on stage, is symbolic of the omnipresence of capitalism, which dictates almost all human actions on planet earth, especially in the present century. Their war tones, which orchestrate fighting between various characters, are reminiscent of the numerous armed conflicts in Third World countries, particularly Africa, that result from clashes of interest over natural resources. Cases in point include the long-standing armed conflict between Cameroon and Nigeria over the Bakassi Peninsula, which ended in favour of Cameroon thanks to the Green Tree Peace Agreement after the verdict of the International Court of Justice (Khadjagala 2-3); frequent deadly clashes between indigenous militants on the one hand and government forces and multinational companies such as Shell over oil and other resources in the Niger Delta region of Nigeria; and the frequent bloody conflicts over natural resources in the Eastern region of the Democratic Republic of the Congo. The neighbouring communities to Mbungoe which, according to the Seer and other characters, are already experiencing negative effects from the "barbing" of their hills that are worse than those of Mbungoe, plausibly designate the Niger Delta region in Nigeria. Drawing on Andrew Rowell, Huggan and Tiffin describe this region as follows: 'A fragile riverine ecosystem, the Niger Delta, has effectively been laid waste

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by several decades of oil and gas exploration and production, making it one of the most ecologically endangered regions in the world' (40). This description can be linked to the other communities evoked in the play. The Seer paints the following scary picture of the neighbouring communities, warning his people to avoid inviting a similar situation in their land:

> And has he for you a word of caution.
> The destruction you now must stop.
> (A pause.)
> The picture of the landscape
> Just three mountains away,
> What ominous colours it casts!
> Such an alien picture
> Must here be painted not! (55)

However, towards the end of the play, the drummers almost entice the Seer, Sango Ngoe, into their capitalist trap, and could have led him too into destroying nature, were it not for the religious intervention of others. According to stage directions in the last act,

> Sangu Ngoe remains still, casting angry looks at DRUMMERS. Then he starts to walk away from the clapping crowd, shaking his body vigorously as he tries to extricate himself from the hypnotising forces of DRUMMERS, who have sensed his intention. […] Drumbeats die into sustained softness and ululation stops. But SANGU NGOE continues dancing wildly. (87-88)

Emanga, one of the spokespeople of the womenfolk, looking keenly at him as he dances to the tune of the drums, suspects some foul play and asks, "Can't we sense something foul?" Mesambe confirms that he "Indeed, indeed/[is dancing] Like one manipulated/By some strange force" (88) and Emanga, another spokesperson for women, quickly suggests that they should turn to God in prayers. At this juncture, the drummers have been identified as enemies of Mother Earth who lure people into destroying her for selfish reasons. The overwhelming presence of the drummers in the play is akin to the omnipresence of capitalist tendencies in today's world; there is no place on earth now where there are no capitalists, that is, profit seekers/makers. Nearly all the human beings in the play, just like human beings in real life, are capitalistic and materialistic in their behaviour, going to all lengths to exploit nature for their survival and often forgetting to be sustainable in their approach. Eyambe makes this point clear when he declares to Wise One that "It's all about survival,/Wise One. Basic survival./How to eke out a living/From the fast dwindling resources" (22). Later on in the play, Sangu Ngoe asserts:

> Well, true. True, indeed.
> Human it is to struggle
> For wealth to amass
> And rich to become
> For power to gain. (71)

Perhaps the drummers work in synergy with the ruler of the community, that is, the Great Leopard who, together with his Syndicate, is said to 'have developed great interests' in the community forest known as Rock Hill. While the ruler's animal name suggests a great traditional ruler, given that leopards, lions and elephants and their products are considered as animals and trophies of royalty among many African ethnic groups, especially in Anglophone Cameroon where Ekpe Inyang comes from, and also evokes images of a powerful and voracious dictator—given the predatory nature of the leopard—who connives with multinational corporations to recklessly exploit the people and their natural resources. When Emanga describes the 'strange machine/Powerful like an eagle,/With wings spinning over its head' which came 'Equipped with cameras' and 'flew over the huge expanse/of Mbongoe,' Mesambe is rather excited about what he considers a 'Great spectacle, […]/The wondrous flight' which has captured images of every square inch of their rich forest, bragging that '[their] forest surely will find/A conspicuous place/On the map of the world' (46). Contrary to this excitement and short sightedness, Eyambe, the hunter, is quick to discern some concealed neo-colonial capitalist agenda behind the ruler's sudden interest in their forest:

> I hear Great Leopard
> And his Syndicate
> Have developed
> Such great interest in Rock Hill
> And adjacent forests
> That they've decided
> To carve it away from us. (47)

The term syndicate does suggest multinationals and commerce through its association with trade unionism which is typical of capitalist societies, while the idea of carving the forest away from the community inhabitants points to possible land expropriation by the state in alliance with multinationals. Western neo-colonial imperialism and capitalism are subtly at work in the play, especially through the Syndicate and the sophisticated machines and cameras used in mapping out the Rock Hills. The play unveils some form of "ongoing collaboration between national governments and gargantuan transnational companies whose economies exceed those of all but the largest 'developing' countries, and whose financial and technical assistance is provided in terms that continue to favour the West" (Huggan and Tiffin 30). Nature, in all its forms, becomes the (helpless) victim of these capitalist manoeuvres in the play. As Asika and Madu would say it, "nature in many ways is the sacrificial lamb to be slain on the altar of globalization and economic growth" (34).

Reconciling opposing religions to save nature?

In a typical postcolonial style of hybridity, Ekpe Inyang brings together two opposing religious views in efforts to combat environmental destruction and

promote the sustainability of nature. African traditional beliefs and Judeo-Christianity are portrayed as being capable of saving nature from human harm. Through the practice of reserving sacred forests and other African traditional practices, the playwright demonstrates the usefulness of indigenous religious practices in nature conservation in Cameroon and Africa. The dwindling populations of animals in the community compel Eyambe to hunt on Rock Hill. And when he makes this known, Sango Ngoe and Emanga declare that his actions are abominable and blasphemous because that particular hill is the home of their ancestors, the land of their gods. "That particular hill/Deserves to be kept sacrosanct,/Treated with reverence." The animals he hunts are protected by their traditional religion because they are "totems of the god/[..]/ the god with seven great heads" and that forest is a sacred one, a "No-go area it has always been to all./Except for a privileged few/Who, of course, would face death/Should they make a trip there/With any bad intentions." The hill is said to enjoy "double protection", "total protection" from both their religion and the state (44-45). In *The Forest: An African Traditional Definition*, Ekpe Inyang elaborates on the importance of sacred forests in Africa:

> In most, if not all rural forest communities in Cameroon and Nigeria (and this may be true also for most of rural Africa), the forest is regarded as home of the ancestors, some of whom are in the form of the great creatures that dwell in it. It is also regarded as the abode of the spirits of the land, including malevolent and benevolent spirits, and a repository of some faith. In this regard, some forest areas are set aside and designated as sacred, forbidding therein the execution of such disturbing human activities as hunting, trapping, and farming. It is held that the destruction of a sacred forest could provoke the occurrence of a windstorm or natural calamities of the like, including epidemics of some dangerous diseases like small pox. (8)

From this excerpt it is plausible to attribute, although partially, the impending catastrophes in the community of the play to the sacrilegious activities of people like Eyambe in the sacred forest on Rock Hill. Chuka A. Okoye also stresses the importance of African traditional religions in environmental preservation when he argues that "The traditional African cares for his environment basically for the human good, either to avoid punishment from the gods or for the future generation" (144). Fear of punishment from the gods accounts for some of the caring actions directed towards nature in African societies, one would say.

Still in relation to African indigenous religions, the Seer suggests towards the end of the play that all the characters should take "a powerful traditional oath" (80) to accompany their resolve to fight against the destruction of their environment. By reading the poaching of animals in sacred forest as emanating from postcolonial and capitalist economic crises and increasing hardships in the Third World, one can argue that Inyang resurrects the notion of "'natural', harmonious precolonial African cultures and of the corrupting impact of colonialism [which] was a prominent figure aspect of Negritude, which began in the 1930s, and remains ubiquitous in African poetry, fiction, and drama" (Caminero-Santangelo 149). While Lynn White indicts Judeo-Christianity for crimes against nature as it makes us

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humans believe "We are superior to nature, contemptuous of it, willing to use it for our slightest whim" (1206), Inyang rather suggests that this religion can, in some way, save the earth from human destruction. At the end of the play, when it is realised that the drummers have entrapped the Seer with their deceitful tunes, Emanga proposes that they turn to God for help. They pray to the Christian God:

> Most merciful Lord,
> The Giver and Taker of life,
> The Alpha and the Omega.
> Let the sun take down with it,
> As it now descends upon the hills,
> All the destructive, old practices
> That now are a source of doom for us.
> […]
> Oh, Jesus! Oh, Jesus! Lord of Lords!
> Our only Saviour and Redeemer.
> Our only source of hope. Come down.
> Come down. And rescue. Rescue us. (88-91)

They implore the Christian God to save them from impending ecological doom and help them to stop destroying nature. Although it is difficult to determine if simple prayer can save the earth, a combination of prayer and other measures proposed in the play such as the preservation of sacred lands and the adoption of the 'Magic Shrub' that enhances soil fertility can contribute to redressing the gloomy environmental situation they are experiencing. In the play, Emanga's grandmother was accused of being a witch because she used a certain tree (a tree that came to be called the Magic Shrub) which helped her to increase her farm yields without indulging in shifting cultivation (a practice which was and is still commonplace in their community and which contributes enormously to soil degradation and erosion). While people in that community called her grandmother 'The witch that drew/Fertile soil/From other farmers' farms,' her mother had told her the truth about the shrub her grandmother was using:

> Your daughter told me
> You brought the shrub
> From a village where
> Every farmer planted it
> Around their farms
> To increase their yields, eh?
> So it was truly a lie, eh?
> And does it also mean
> Every farmer in that village
> Was a witch or wizard?
> And from whose farms
> Did they draw fertile soil
> To enrich their farm plots? (62-63)

Now in possession of the truth regarding the so-called Magic Shrub, Ntungwa realises that it could also help in their efforts to stop the impending ecological

catastrophes hanging over their community. "Facing the audience," Ntungwa apologetically declares: "Something tells me/There is a lesson/We've refused to learn/From that woman's story" (63). Such statements suggest a readiness to adopt the tree; they also possibly contribute to the hope-filled ending of the play, when all the characters "[raise their] hands up as a sign of victory" (93). It is worth noting that the mixing of traditional and Christian religious beliefs and practices is common in postcolonial societies where Christianity has remained one of the legacies of colonialism, though Christianity is sometimes blamed for the colonial exploitation and current underdevelopment of these same societies, especially in Africa.

Using the apocalyptic trope to inspire action?

One of the most remarkable strengths of this play is how its author uses the apocalyptic trope not only to convey ecology-friendly messages but also to encourage characters who are initially climate-change-sceptical and nature-destroying to launch a war against the destruction of nature. As Gabriele Dürbeck notes, "In contemporary environmental literature, disasters are often depicted using the dramatizing rhetoric of the Apocalypse which has become a master narrative in this body of texts" (1). The looming catastrophes in the play, already evident in acute water shortages, near extinction of many animal species, rising temperatures, and unpredictability of climatic elements such as rain and sunshine, are mainly perceived and announced by Sangu Ngoe who acts as Seer. Many other characters seem oblivious of this dangerous situation as he says: "So clear are the premonitions,/ Though to them no one pays attention./ But I tell you, simply,/What I see coming/[Is] in leaps and bounds" (51). For Eyambe, there is nothing wrong in asking for the Magic Shrub that was used by Emanga's grandmother, since they now face a "terrible flood of/Life-threatening problems." For Sangu Ngoe, these problems are "A clear sign of global warming,/ A human-induced problem,/With promise of more serious/Life-threatening events" (66-68). He further states that all that he sees is impending and impeding darkness:

> Nothing short of darkness.
> Oh, yes, I see darkness!
> Impenetrable darkness.
> Gradually and systematically
> Engulfing our forest landscape.
> Thick, thick darkness. Alien darkness.
> Blurring the vision of my people. (7)

By likening the situation to "an ugly sore" (15) he creates a sense of fear and urgency, as a sore is a sign of ill health which can burst at any moment. Earlier in the play, he declares that nemesis may soon catch up with them, like it has already done with their neighbours, if they do not stop destroying nature (16). Curiously they seem already caught up by nemesis, judging from the long distances their women and children trek in search of drinking water as well as the unbearable heat they

experience, among other problems. In this way, they are already in the midst of the catastrophe they are trying to avoid. However, the magnitude of the present catastrophe is less than that of the looming one which they will avert through the concerted actions announced at the end of the play. These actions include, among others, their agreement to adopt the Magic Shrub in their farming practices, their prayers to God, their resolve to take a traditional oath to bind them as they combat environmental degradation, and the fleeing of the drummers from stage. By warning of impending peril, extinction or apocalypse, the playwright achieves what Downing Cless, the renowned scholar of eco-theatre, calls an "accumulation of foreboding facts" (Cless 89). This pushes the actors to concerted positive action at the end of the play, the last sign of which is their raising of hands as a sign of victory, thereby situating the play within the category of eco-theatre. In this form of theatre, plays help audience members and readers not only to become aware of problems but also to engage with the problems. Eco-theatrical plays allow 'multiple protagonists,' that is, actors and even audiences, to brainstorm or find solutions to environmental problems in their communities. At the end of such plays, Cless asserts, "acting on behalf of their community and joining with the audience in a forum, these multiple protagonists seek solutions that are both economically and ecologically sound" (Cless 81). Furthermore, the use of the apocalyptic trope not only supports the strong presence of both African and Christian religions in the play, which preach the apocalypse as a punitive end, but equally provides some form of mediation between the often conflicting fields of tradition and science. Scientific knowledge and facts about climate are mainly conveyed in the play through Sangu Ngoe, the Seer. His prophetic apprehensions of environmental calamities corroborate scientific knowledge about Sub-Saharan Africa, where Cameroon, the setting of the play, belongs:

> A recent report of the UN's Global Humanitarian Forum, for example, calculates that global climate disruption causes 300,000 deaths a year due to increased drought, flooding, and other environmental consequences, a figure that will dramatically increase if mitigation against climate change is not pursued. Ninety-eight percent of all such deaths are occurring in postcolonial nations; in stark contrast, only one of the twelve least vulnerable nations is a developing country. Sub-Saharan Africa, the Middle East, South Asia, and the island states of the Pacific and Indian Oceans have been specifically identified as the most at risk. (DeLoughrey and Handley 27)

Instead of creating a character who works, maybe, for Wildlife Fund for Nature (WWF) (like the playwright), to convey such scientific information to the people in the play, Inyang has invested this knowledge in the traditional African seer, thereby deconstructing neocolonial epistemological hierarchies that privilege Western-originated science over indigenous knowledge and practices. Far from just deconstructing, he shatters boundaries between these two forms of knowledge, consequently suggesting that a combination of both can be useful in solving real-life human challenges such as the environmental crises in the play.

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Conclusion

The hybrid approach combining ecocriticism with postcolonial criticism has proved fruitful, not only allowing for the exploration of postcolonial issues such as agency, the subaltern, cultural clashes, power abuse, and neo-colonial capitalism, but also helping to illuminate the intricate connections between capitalism-driven human practices and actions in postcolonial Cameroon and their resultant menaces to ecological balance, menaces which cannot even spare their human-inducing agents. Both the play under study and the arguments herein advanced place humans and nonhumans at the fore, shattering the boundaries between them, revealing how some humans wreak havoc on the earth while some others sympathise with her and consequently speak up and initiate actions to safeguard her. Cultural products such as religion often addressed in postcolonial studies have been interpreted here as being capable, to some extent, of contributing to environmental sustainability.

Thanks, particularly, to the apocalyptic trope, not only the characters on stage, but also the reader, by extension, are moved to take positive action to save and sustain the bleeding and nearly collapsing ecological system of which we humans form a part. By emphasising that "No forest" means "no water", and "no animals" (42, 37), Inyang shows how irresponsible human actions on nature deprive humans of the most basic of their needs: water and food. In the absence of these two things human life is bound to discontinue. This corroborates the assertion that "Man's constant abuse of nature is capable of leading to man's destruction" (Asika and Madu 41). Following Patrick Murphy's "distinction between nature-oriented literature, and environmental literature" (qtd. in Naidu 60), this equally locates Inyang's play within the category of environmental literature. He is committed to fighting environmental damage in many ways, particularly through creative writing. In the face of wanton environmental degradation in Cameroon, especially deforestation in and around the Southwest region, and almost acting like Ken Saro Wiwa, the Nigerian Niger Delta-based environmental and human rights activist,[2] Ekpe Inyang lashes out at such manipulative and exploitative collaborations of native Africans with multinational concerns. Inyang can be said to be "unrelenting in his [rather subtle] attacks on the self-consuming body of the African state, 'conceived in the European colonialist interest for imperial or commercial purposes'" (Huggan and Tiffin 38).

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[2] Ken Saro Wiwa was executed in 1995 under the military dictator General Sani Abacha who ruled Nigeria from 1993-1998.

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Land "under the Ditch": Channeling Water through Owen Wister's *The Virginian*

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Abstract

This paper combines envirotech history with elemental ecocriticism to examine the lively presence of water infrastructure in Owen Wister's *The Virginian* (1902). In Wister's novel, humans and animals assemble around channels of water, and the fight to divert and control water systems initiates both violence and new alliances. Instead of relegating water infrastructures to the inconsequential background, this paper asks what ditches, water storage containers, and reservoirs can contribute to our understanding of gender and human-environmental relations at the turn of the twentieth century. It argues that Progressive Era water development places "manliness" at risk at the same time that it defines it. Since thirst, aridity, and mobility contribute to the making of hard, manly men in Wister's view, irrigation emerges as a potent challenge to the novel's *hard logic*.

Keywords: Ecocriticism, infrastructure studies, Owen Wister, nineteenth- and twentieth-century American literature, new materialism.

Resumen

Este trabajo combina perspectivas del campo de historia de la tecnología medioambiental con la ecocrítica elemental para examinar la vida asociada a la infraestructura hidráulica en *The Virginian* (1902) de Owen Wister. En esta obra de Wister, tanto seres humanos como animales se reúnen alrededor de canales de agua, en los que la lucha para desviar y controlar los sistemas hidráulicos desencadenan episodios de violencia y nuevas alianzas. En lugar de relegar estas infraestructuras a un papel carente de significado, este texto cuestiona cómo han podido contribuir las acequias, los las balsas de agua, y los depósitos a nuestra concepción del género y de las relaciones entre los seres humanos y medioambiente durante los inicios del siglo veinte. Por último, este trabajo pretende establecer que el desarollo hidráulico durante la "época progresista" en los Estados Unidos ha definido "la masculinidad" y, al mismo tiempo, la ha puesto en riesgo. Puesto que, como sugiere la novela, la sed, la aridez, y la mobilidad contribuyen a la formación de hombres duros y masculinos, el sistema de regadío se configura como un desafío potente a las lógicas racionalistas de la novela.

Palabras clave: Ecocrítica, estudios de infraestructura, Owen Wister, literatura norteamericana del siglo diecinueve y veinte, nuevo materialismo.

> But no matter how rationalized the river became, how closely linked with human labor and its products, it remained a natural system with a logic of its own.
> -Richard White, *The Organic Machine* (1995)

> Water is not a singular object of epistemology for which abstract knowledge can be produced and circulated in all times and places without interruption. Rather, water reveals its complex, multi-layered biophysical identities for particular enactments.

-Jessica Barnes and Samer Alatout, "Water Worlds: Introduction to the Special Issue of *Social Studies of Science*" (2012)

Tracing Edenic Flows in Wister's West

Water management, as both a material practice and an ideal, fueled the Progressive Era dream of large-scale environmental management. At the same time, however, it threatened the notion that the West existed as a "country for men" (Wister 62). For ditches and dams, which enabled development, inevitably led to an exodus of land-seeking, westward-moving settler families—including women and children—at the turn of the twentieth century. Nowhere is this relationship between the commodification of water as resource and the modernization of the West more apparent than in Owen Wister's 1902 work, *The Virginian*. The action in this bestselling novel, regarded as one of the first Westerns, takes place on the eve of Wyoming's infamous cattle wars in the late 1880s, and Wister's Progressive fascination with the control of water is apparent throughout. Despite *The Virginian*'s preoccupation with water-as-resource, the theme of water development has gone unexamined in the novel, especially as it relates to shifting gender roles at the turn of the twentieth century.

To counter what were perceived as the feminizing forces of modernity, Wister's narrator frequently *naturalizes* manmade waterways—or defines and experiences them as uncultivated elements of an untouched, edenic landscape—via a method of *narrative rewilding*.[1] Narrative rewilding absorbs human-engineered landscape features, such as irrigation ditches and reservoirs, almost wholly into the category of "the natural," making faint, if not altogether invisible, the traces of human impacts on the environment. For example, as a narrative device, rewilding may encourage readers to see a megadam as part of a mountain, or a canal as a naturally-occurring stream, thus insisting on a mythical vision of the West as rugged and untouched. When Wister's narrator subverts the manmade nature of modern water infrastructure and hides water labor from view, he is attempting to preserve the West's reputation as an eminently *manly* realm, and the sense of a soldierly purpose in the Anglo men who identify as tamers of the land.[2] In contrast to the flowing, diverted streams that course in and out of the narrator's frame of vision, still water, such as the water contained by the tank in Wister's depiction of Medicine Bow, Wyoming, fails to be rewilded and remains utterly unnatural; its presence, as the narrator describes it, threatens to contaminate the region with a toxic eastern

[1] As a popular land management and conservation practice, "rewilding" is "the scientific argument for restoring big wilderness based on the regulatory roles of large predators" (Noss and Soulé 5). In this essay, however, the term is used to denote Wister's narrative strategy of naturalizing mechanical and manmade systems.

[2] According to Ashley Carse, "Infrastructure implies artifice; nature traditionally signifies its absence" (540).

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ethos. By shifting our attention to the artifacts of water development in *The Virginian*, we gain a unique way of understanding how Progressive Era engineering undergirds a white masculinist vision of both regional and national belonging in the United States. In the arid and semiarid environments that dominate Wyoming, thirst for water unsettles communities and social relations, burgeoning industries, and, as the narrator quickly discovers, human bodies. Wister seems fixated on both the economic and social potentialities of irrigation in the West, as were many at the time.

Water's potential to *reform* the semiarid, "unproductive" high plains region of Wyoming is alive and well in the mind of *The Virginian*'s narrator, known only as "the tenderfoot." When this wet-behind-the-ears visitor from the northeast reminisces on his days spent visiting Wyoming's cattle country, his mind frequently turns to water. This is not surprising given the necessity of having access to water in the arid and semiarid American West, particularly if one's livelihood depends on the cattle industry. "In the afternoon on many days of the summer which I spent at the Sunk Creek Ranch," he says,

> I would go shooting, or ride up toward the entrance of the cañon and watch the men working on the irrigation ditches. Pleasant systems of water running in channels were being led through the soil, and there was a sound of rippling here and there among the yellow grain; the green thick alfalfa grass waved almost, it seemed, of its own accord, for the wind never blew. (44)

Water, in this serene moment of reflection, at once nominalizes place (Sunk Creek Ranch), stimulates the growth of agriculture with seeming effortlessness, and calms the narrator with its tranquil "sound of rippling." The "pleasant system" of this manmade waterway is a thing of both natural and economic wonder for the narrator, as he remarks on the channel's supreme ability to animate the grain and alfalfa that keep the cattle—and, in turn, the cattle industry—alive. Diverted water imbues this plant-life with a strange kind of liveliness, as the narrator tells us the grass "waved almost…of its own accord." What is perhaps most interesting about this reflection, however, is that the narrator calls forth an image of the men who dig the irrigation ditches. Their labor, though not described in high resolution, manufactures this seemingly "natural," verdant setting the narrator so enjoys. Soon after the workers' bodies are referenced, they disappear once again into background, granting both water and plant-life the appearance of agentive movement.

Water infrastructure, as this scene reveals, elicits a series of powerful social, ecological, and economic *presences* in Wister's work, making *The Virginian* an ideal novel for *thinking with (flowing, diverted) water* as a critical undertaking.[3] Even when the narrator does not directly conjure water, its potent animacy can be

[3] Here I am gesturing towards the recent emergence of a materially-oriented ecocriticism described by Jeffrey Jerome Cohen and Lowell Duckert as "elemental ecocriticism." In their collection of essays *Elemental Ecocriticism: Thinking with Earth, Air, Water, and Fire* (2015), Cohen and Duckert suggest that elements emerge as vibrant cultural actants in their own right.

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registered in nearly every scene. From the pastoral descriptions of the "plentiful and tall" grass around Sunk Creek Ranch (43), to depictions of the "wretched husk of squalor" that is human settlement in Medicine Bow (10), water keeps humans, plants, animals, towns, entire industries, and the relations between these entities alive in the novel. Wister occasionally offers readers brief but charged glimpses of irrigation ditches, diverted streams, water storage containers, and other artifacts of civil engineering that, when combined, deliver water from distant, unseen sources into lives, bodies, and economies. Even though Indigenous and migrant laborers worked to construct many of the water projects Americans so admire, Wister obscures the labor involved in ditch-digging and, instead, celebrates ditch technology as "natural" symbols of national, masculine progress.[4] If we are willing to wade into Wister's natural-but-manmade ditches and streams, we might discover to what extent the thesis that water drives national, economic, and social narratives in the United States is valid.[5]

Manmade Natures: Conjuring Rain, Channeling Water

Prior to the popularization of large-scale irrigation in the late 1890s and the explosion of federal waterworks projects under the direction of the newly formed U. S. Reclamation Service in 1902, individual farmers, communities, and local and state governments in the arid and semiarid West often hired pluviculturalists, or so-called "rainmakers," who, many believed, could induce rainfall via a variety of "scientific" methods. Rainmaking practices were diverse and ranged from releasing clouds of chemical gases into the air from metal funnels positioned on the ground, to directing "heavy discharges" (Powers 6) of canon fire in the direction of moisture-laden clouds. As a science that gained much popularity in the 1890s, pluviculture was rooted in the belief that "the agency of man" could—and, moreover, should—harness and redirect atmospheric energies for "useful," economic ends (Powers 6). To not make use of the moisture reserved in the clouds would be deemed wasteful. According to the ethos of rainmaking, one no longer had to depend on the

[4] In addition to documenting Paiute relations with water that existed before "the best land [was] taken from them," Winnemucca's *Life among the Piutes: Their Wrongs and Claims* also shines a light on indigenous laborers who engaged in ditch and dam work for various water projects in the West, both on and off reservation land (122).

[5] Since the 1990s, many literary scholars have engaged with turn-of-the-century representations of water and water development. See Cassuto and Formisano for analyses of water development in the West, specifically California. See also *Words on Water: Literary and Cultural Representations* (2008), which looks at the symbolic and material significance of water from a global perspective. Edited by Maureen Devine and Christa Grewe-Volpp, the collection of critical essays "entail[s] looking at water in its various forms as a part of our cultural identity and heritage, understanding historical perceptions of water including political and economic aspects, as well as religious and spiritual perceptions of water past and present" (3). For a study on representations of water in Western films, see "Haunted by Waters: The River in American Films of the West" by Mary Pinard.

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unpredictability of rain or snowfall for agricultural survival; instead, humans would be liberated from aridity, freed from the bonds of drought. A key proponent of pluvicultural theory, Edward Powers, rejected comparisons between Native American rain dancing and what he termed "scientific rainmaking," condescendingly insisting that good science trumps so-called "superstition" any day. In his 1890 treatise on scientific rainmaking, titled *War and the Weather*, Powers says, "Aside from its connection with the superstitions of certain savage tribes,…[scientific rainmaking] is confined principally to those who are accustomed to draw conclusions only from adequate premises" (5). For Powers, as for other rainmaking advocates of the day, to pray or dance for rain was to admit man's subordination to weather's will. Rainmakers would not wait for the weather to change in their favor: they would engineer it into existence. When natural forces "fail to act" (Powers 11), or where rainfall was deemed "insufficient" (Cowan 435), science offered a solution, adherents to pluviculture believed. For farmers and ranchers hoping to make a living upon the public domain lands of the American West, lands that comprised over one-third of the entire area of the United States near the end of the nineteenth century, scientific rainmaking seemed a less labor-intensive, more economic enterprise than, say, digging irrigation ditches.[6]

By the end of the 1890s, however, innovations in irrigation technology in the arid and semiarid West led to the gradual phasing out of scientific rainmaking. Despite its early appeal, pluviculture came to be viewed as an unreliable weather modification method, and enthusiasm for irrigation as a more practicable solution to aridity spread quickly amongst farmers and ranchers alike. For all its difference in both structure and method, irrigation was fueled by a similar faith in "human agency" as the scientific rainmaking that preceded it. Federal investment in the development of dams, reservoirs, and ditches via the Newlands Reclamation Act, which culminated in the development of the U.S. Reclamation Service, worked to expand, standardize, and provide administrative guidance over these more intensive water diversion projects in the West. As cultural critic Mark Seltzer notes in *Bodies and Machines*, the Progressive Era witnessed the rise of the civil engineer as a cultural hero, and a deep interest developed around the "culture-work of channeling, bridge-building, and canalization" (164).[7] Both pluviculture and irrigation, as well as twentieth-century innovations in dam-building and hydroelectric power systems, depended on the idea that rational management

[6] In John L. Cowan's 1906 article "Dry Farming—The Hope of the West," published in 1906, he states that "Nearly one third of the entire area of the United States, exclusive of Alaska and our insular possessions, consists of vacant public lands regarded as naturally unsuited to cultivation on account of insufficient rainfall" (435).

[7] It should be noted that engineers, land managers, and administrators of various types figure prominently in turn-of-the-century American literature, including Edith Wharton's *Ethan Frome* (1911), Edward Mandell House's *Philip Dru: Administrator: A Story of Tomorrow, 1920-1935* (1912), and Ednah Aiken's *The River* (1914).

tactics could effectively redirect environmental elements to human/economic ends and thereby eliminate, or at least reduce, "wasted," unused energies. Historians of the American West have held varying points of view regarding the success of the "businesslike approach" to water resource management that originated in the Progressive Era (Hays 30). Through critiques of rational management (Samuel Hays), capitalism and power (Donald Worster), the human-nature divide (Richard White), regional exceptionalism (Donald Pisani), indigenous water rights (Daniel McCool), and top-down policy narratives (Patricia Limerick)—to name just a few grounds of the Western water history debate—historians from the 1950s to the first decades of the twenty-first century have demonstrated that as water flows through American history and channels through its diverse geographies, its meaning and value continues to change.[8]

Published the same year as the passing of the Reclamation Act, *The Virginian* expresses various infrastructural impulses that seem to anticipate the large-scale water development projects of the 1900s. For example, even though we never see his body engaged in water labor, we are told that the Virginian makes his living in the summer months digging ditches. What is more, penetrating human drama, including violence and romantic love, materializes from the region's waterways in *The Virginian*, demonstrating both the economic *and* social potentialities of water-as-resource for Anglo Americans. More generally, characters frequently converge around water and water infrastructure throughout the novel, highlighting the fact that dams and ditches hold the prospect of uniting entire communities—and, perhaps, even a sprawling nation—into a single, connected network. Since Wister makes invisible the lives and communities of Native Americans in his novel, however, and instead chooses to focus on Anglo futurities in the West, the novel contributes to a vision of the region as a "sparsely-peopled wilderness," to use the language of William E. Smythe, a popular irrigation enthusiast of the day (xvii). By and large, property rights did not extend to the *prior* inhabitants of the West, those who "were living there and fishing, as they had always done" (Winnemucca 77). The absence of Indigenous voices in the novel is troublesome, highlighting the

[8] The various approaches to Western water history noted in this passage can be attributed to environmental historians Samuel P. Hays, Philip Fradkin, Donald Worster, Marc Reisner, Richard White, Donald J. Pisani, Daniel C. McCool, and Patricia Nelson Limerick. See Hays, *Conservation and the Gospel*; Fradkin. *A River No More: The Colorado River and the West*. Oakland: University of California Press, 1981; Worster. *Rivers of Empire: Water, Aridity, and the Growth of the American West*. New York: Oxford UP, 1985; Reisner. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin, 1993; White. *The Organic Machine*; Pisani. "Beyond the Hundredth Meridian: Nationalizing the History of Water in the United States." *Environmental History* (5.4) 2000: 466-482; McCool. *Native Waters: Contemporary Indian Water Settlements and the Second Treaty Era*. Tucson: University of Arizona Press, 2006; and Limerick. *A Ditch in Time: The City, the West, and Water*. Golden, CO: Fulcrum Publishing, 2012.

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racial/ethnic subjugation that often results from American expansionism in general and water policy more specifically.[9]

Dry Realities and Wet Dreams

Throughout *The Virginian*, the narrator perceives Wyoming's arid landscape as both a thrilling spectacle and a problem that only water can cure. Just as Powers deploys the rhetoric of viciousness ("destructive drought") and deficiency to promulgate his precipitation agenda, so, too, does Wister align Wyoming's "unending gulf of space" with overwhelming lack (7). Water may appear in the names of towns—Bear Creek, Sunk Creek, Westfalls, Willo' Creek, Stinkin' Water, etc.—but it rarely materializes in the region's vast rangelands. Oddly, the most turbulent waterway in the novel cuts through the town of Drybone, a name that announces the nonexistence of water. The overwhelming presence of water in Drybone underscores the often unpredictable and contradictory nature of water in the region. The narrator comments on the absence of Wyoming water as soon as he steps off the train. "Where in this unfeatured wilderness is Sunk Creek? No creek or any water at all flowed here that I could perceive" (7). Absence emerges in various forms in this passage, from the prefix of "unfeatured," to the tenderfoot's claim that "no creek or any water" exists. References to resource shortage and environmental desiccation such as these predominate the tenderfoot's observations of the novel's arid spaces, and he seems to find refuge only when near flowing bodies of water. Wyoming immediately emerges as a vexing problem, causing the narrator to define its environment not by what it contains, but by what it fails to provide. Cultural theorist and historian Daniel Belgrad views humans' concerns with ecological uncertainty as a way of reading agency in the environment, an agency that instigates a variety of responses in the bodies of individuals who interact with it. "[U]ncertainty about rainfall and its effects on the condition of the range could generate anxiety among ranchers," he states, "contributing to the tensions over range use that erupted into violence" (168). In addition to the anxiety that unpredictable nature-spaces provoke in bodies, Belgrad imbues water—or *waterlessness*—with the power to engender violence. For Belgrad, lively, arid absences stimulate movement and, in general, force bodies to respond, sometimes in terrifying ways. However, in addition to inciting unease and civil unrest, waterlessness also propels humans to develop various methods of conjuring water, or of managing it into existence.

Both Wister and other turn-of-the-century Western writers depend on rhetorical negation to spur excitement about development in the region. For example, in John Cowan's 1906 article on arid agricultural methods, he describes the "absolute desert" as "unimproved," "uncultivated," "unoccupied," "inhospitable,"

[9] See Jennifer Tuttle and Louis Owens.

"worthless," and other terms denoting ecological insufficiency (436-437). For Cowan, as for Wister's tenderfoot, calling attention to everything the desert was not was meant to stimulate interest in the "problematic" region and prompt men into action. The concept of dry farming—of producing yields out of "waste"—energizes Cowan, and he cannot help but imagine hundreds of farmers tilling "every acre of arable land…to the utmost limit of its productiveness" (445). Similarly, the tenderfoot's energized response to "the alkali of No Man's Land" (194) causes him to perpetually scan its topography and "[take] its dimensions" (10) into his body for future contemplation. Though neither man is a water engineer—Cowan even openly admits his disdain for irrigation's "inefficiencies"—their fascination with aridity as an unresolved problem underscores Progressivism's engineering ethos. Both exhibit a deep, almost ecstatic desire to conjure flowing water where it is in short supply. In several scenes, the tenderfoot almost imagines water into being, allowing the idea of it to well up in his mind when it fails to appear in reality. "All things merged in my thoughts in a huge, delicious indifference. It was like swimming slowly at random in an ocean that was smooth, and neither too cool nor too warm" (32). His watery imaginings—or *wet dreams*—are then interrupted by the arrival of a train, "coming as if from shores forgotten" (32). The tenderfoot's water-thoughts express the regulatory logic of water development, in that he tames the waves ("an ocean that was smooth") and controls the temperature ("neither too cool nor too warm") at will. What is more, the wild body of the ocean transforms into a recreational space for this dreamer, as he imagines himself "swimming slowly" without a care. The Progressive dream of regulated flows—the same dream that culminated in megadams and transregional and transnational irrigation networks—is alive and well in the mind of the narrator, even though he does not have the expertise to realize his vision on the ground.

Beyond the narrator's dreams of a perfectly regulated water world, *real* water seems to disappear at will in the novel, imbuing the element with a power over men who depend on its constancy. When a "young cowboy" purchases two cans of tomatoes so that he can drink the juice, the proprietor of the dry goods shop asks, "Meadow Creek dry already?" The boy responds, "Been dry ten days" (30). The narrator then offers readers additional information about the state of the waterless creek, noting that "water would not be reached until sundown, because this Meadow Creek had ceased to run" (30). The proprietor's shock that the creek was "already" dry calls attention to the unpredictable, seemingly defiant, nature of water in the region. Flows of water, if left unmanaged, might simply refuse or "cease" to run, as if by their own will, leaving men to quench their thirst (and deplete their wallets) with juice from a can. At the other extreme, when flows of water build, rush, and exceed infrastructural capacity, bodies and machines risk losing control, as when the river "came sucking through the upper spokes" of Molly's carriage, taking it under—and nearly taking her down with it. The potent animacy of flowing water, from its absence to its hyper-abundance, reveals just how permeable the boundary

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is between humans and ecologies. Geographer Karen Bakker reflects on this idea when she says: "water is a resource upon whose constancy (of both quality and quantity) we depend; and yet, water engenders attempts to regulate its inherent variability in time and space—which are in turn frustrated by ecological, technological, and economic barriers to human control" (617).

Environments where water is in short supply, as these scenes demonstrate, represent complex locations of possibility for characters in *The Virginian*. Despite the attempts made by Powers, Cowan, and Wister's narrator to refuse human-environmental enmeshment by positioning the elements on the other side of the skirmish line, their inability to wholly manage water reveals that intimacy with the elements is unavoidable. Their attempts to manage water, to both channel it and imagine it into existence, demonstrate a liveliness, an unending responsiveness, in the element they wish to control. While environmental historian Donald Worster conceives of American imperial power as a coercive net that covers everything, resulting in what he calls "a hydraulic society" that began in the West, the rebelliousness of managed matter pervades water history and literature. So long as the men are merely managing, even if their management materializes into vast architecture that delivers water hundreds of miles from its source, the "vibrant matter" that is flowing water keeps their bodies always on the alert.

The Hard Logic of Thirst in the Western

Even though the novel equates the presence of irrigation technologies with white masculine ascendance in the semiarid West, Wister, almost paradoxically, views the (male) body's ability to withstand thirst as an emblem of masculine endurance. In other words, the less water one's body requires, the more likely one will emerge as a true man of the West. To be a man meant to inhabit an efficient, resilient body. As soon as the narrator sets foot in Wyoming, thirst begins to overtake his body, which calls attention to the dryness and harshness of the Territory. Water, much to the tenderfoot's dismay, is in short supply in this "planet of treeless dust" (17), and surviving in such an environment will require self-discipline and a roughening of both form and spirit. This acknowledgement of human-environmental relationality in the arid West represents the hard logic of the novel, the drive to make tough and resilient the bodies of men. Many men who wrote about Western farming techniques at the turn of the twentieth century, such as Cowan, arrived at these same conclusions about the ideal body. As a practitioner of "dry farming," or what was also called "scientific soil culture," Cowan argues that only a *certain* kind of modern, male body will be able to prosper in the arid and semiarid West. Unlike the eastern farmer who has the luxury of consistent rainfall, the dry farmer, Cowan says, "knows no season of rest or idleness. He knows that eternal diligence is the price he must pay for good crops" (440). For Cowan, land management in arid environments requires industry, a dedication to efficiency, and "eternal" attentiveness; without these necessary inputs, the farmer will be left with

"lands that are now waste," or property without economic purpose (442). Instead of succumbing to arid "waste" and admitting defeat, Cowan urges newly-arrived farmers in the West to experiment with hardy, drought-resistant crop varieties and "natural" tilling methods that would reserve water in the under-soil. The Western farmer could convert desert waste into wealth if, and only if, he could resist the temptation of merely transplanting the familiar farming practices from "humid America" to the dry regions of the West (441). Cowan believed that irrigation was a lame (and costly) attempt at mimicking eastern environmental conditions. He therefore encouraged Western farmers to get out from "under the ditch" and adapt to aridity. As both Cowan and the Virginian contend, men had to learn to live with the Western climate—to become as resistant to drought as the durum wheat that thrived there.[10]

Dryness in *The Virginian* calls upon male bodies to become more physically efficient, and the rustlers seem proud of their ability to withstand a world where water is in short supply.[11] For example, while waiting for the narrator's lost luggage to arrive, Steve and the Virginian emphasize Wyoming's extreme climate to great effect. Both men claim that an ability to stave off thirst in the region's alkali expanse is central to being a man. Wyoming "makes a man thirsty," says Steve to the tenderfoot. The Virginian adds, "Yes,…thirsty while a man's soft yet. You'll harden" (17). The process of "hardening" in this social and ecological context is as physical as it is psychological. In other words, to become a *true* man of the West, one must not only learn to live with little water but also train away any *thought* of thirst. "And if yu' keep a-thinkin' about it," says the Virginian, "it'll seem like days and days" (17). To desire a remedy for thirst when no remedy exists exhibits a lack of restraint, according to the Virginian; he claims that one wastes both time and energy if the desire lingers for too long. *Wasted* thoughts do not align with the Progressive values of efficiency and self-control.

Steve and the Virginian continue to build on each other's claims of climatic intensity. As their talk continues, the land becomes so startling dry—and, in consequence, their bodies so resilient to its harshness—that even a "drop of wetness" in their depiction of Wyoming would seem out of place (17). Their speech, like the wringing out of an already-dry cloth, stands as testament to their ability to withstand a landscape that makes human survival difficult. At the end of the scene, the narrator draws an interesting comparison between the men's speech and telecommunications infrastructure, infrastructure that fosters a mode of

[10] Cowan notes that due to its "hardness," durum wheat prospered in the arid West (441). "It will not thrive in humid environments, requiring for its most perfect development a dry climate and a semiarid land" (441). In Latin, "durum" means "hard."

[11] This physical hardening resonates with Stacey Alaimo's transcorporeal theory, wherein bodies and natures flow into and through one another, materially altering both. In this sense, the men's dry, thirsty bodies physically *become* men via their intimate interactions with Wyoming's semiarid ecology.

interconnection similar to that of irrigation: "They dropped into direct talk from that speech of the fourth dimension where they had been using me for their telephone" (17). As a telephone, the narrator operates as a conduit for the men's commentary on aridity, revealing what Benson refers to as "the relational nature of infrastructure" (114). Power flows through him and connects him to both Steve and the Virginian, both of whom vie for communicative power. However, the tenderfoot fails to generate power on his own. Similarly to water diversion systems, wherein a complex plexus of irrigation ditches enables the delivery of water-as-resource, the telephonic narrator mediates but never produces power in any direct sense. These constant *flows* of communication that filter through the narrator's porous, receptive body reflect Bakker's new materialist renderings of how the hydrological cycle engenders a mesh of interconnected bodies: "water links individual bodies to one another through the cycling of waters and water-borne effluents between water bodies and organisms—both human and non-human" (616). "Water," she continues, "is thus intensely political in a conventional sense: implicated in contested relationships of power and authority" (616).

In spite of the tenderfoot's early claims that much of Wyoming was an arid "No Man's Land," water-rich environments frequently emerge in the novel, startling both characters and readers alike with their unlikely presences. Many of these watery environments seem to impede mobility and, thus, interfere with white masculine ascendance. Periodic glimpses of soft, watery landscapes—such as quicksand, crumbling banks, and standing pools—bubble forth as problematic ecologies, and a man must learn to bypass such terrain without losing his footing. Softscapes evoke the textural give of swamps and bogs, and, according to Wister's *hard logic*, too *much* give could result in both unproductive landscapes and sluggish, unmanly bodies.[12] Soft, liquid environments suction bodies in place and threaten to *waste them away*. As an example, the narrator, whose newly arrived eastern body seems incompatible with the range's extreme climate, falls into and/or misidentifies wet environmental substances throughout the novel. He stumbles and drops his luggage in the river, mistakes quicksand for a ford, and emerges from a pond as a "spectacle of mud" (46). The "slippery," "weltering heap" (46) that is the tender body of the tenderfoot demands regulation and a harder, more resilient corporeal architecture in order to direct and contain what seems an endless seepage. Thus, the project of hardening the bodies of men and building water infrastructure reach towards a common goal: "a channeling of natural floods into orderly movements" (Seltzer 164). As a "spectacle of mud," distinct environmental elements—mud and water—become muddled on the tenderfoot's body. Irrigation ditches, which

[12] In landscape management, "softscapes" are the organic materials (plants, soils, flowers, pools, etc.) used to create landscapes. "Hardscapes," on the other hand, exist as the foundational materials (rock, metal, wood) that structure landscape design. At the 2016 C19 Conference, David Phillips and Judith Madera used the term "softspace" to denote watery ecotones such as swamps and marshes, a fitting contrast to the hard bodies and environments that populate *The Virginian*.

transport water from a source to a destination via channels carved out of the earth, hold separate, at least ideally, the liquid energy from the earthy conduit. When he falls into the mud and emerges with the substance sticking to his body, the narrator gets presented as a management problem. He is unable to separate the liquid from the solid, the vital energy from its infrastructure. Frequently wet, Wister's tenderfoot is never fully a man.

While *The Virginian's* tenderfoot frequently perceives aridity as a problematic agent that assaults bodies and renders environments sterile, water development may pose even greater threats in the novel. For one, water infrastructure facilitates the arrival of women and children in what was formerly considered an all-male space. What is more, land deemed arable via irrigation was, at the time, referred to as "under the ditch," a phrase that places man under the agency and weight of water infrastructure—and, subsequently, under the hand of civilizing and feminizing forces. Land "under the ditch" is land that is ostensibly reclaimed, regulated, and "brought to a high state of productiveness," to use Cowan's optimistic language (436). If the novel idealizes hard (male) bodies and landscapes, and outlines steps for how masculine toughness may be achieved, it also suggests that the reform-oriented, regulatory practices of Progressivism might interrupt the hardening processes in the West. For example, Wister's depiction of the sickly "engineer's woman" in Medicine Bow offers a troubling vision of the potential effects of the region's water infrastructure. Readers are told that "there was a woman—an engineer's woman down by the water-tank—very sick" (28). Here, the narrator aligns the water-tank, a structure that facilitates the settlement of Medicine Bow, with the image of a failing, unproductive woman's body. The storage tank is the first example of water infrastructure we witness in the novel, and it is worth considering how Wister distinguishes between tanks, ditches, and "natural" waterways. For example, structures meant to contain and reserve water for future use, such as the sickly woman's water tank, fail to receive the same kind of admiration as irrigation ditches and other "flow technologies" (Seltzer 164). The fact that this woman is "the engineer's woman" points to the possible pitfalls of water development in the region: while channeling the flow of water requires hard bodies, the eventual containment of water would seem to domesticate and, in effect, sicken them. The woman's *stilled* body has a taming effect on the town, one that seems to contaminate it with a disquieting, unmanly calm. The narrator tells us, "she brought a hush over Medicine Bow's rioting" (31). Even though we never see the woman, her presence hangs heavy "over" the town, drowning it with a feminizing "hush." A town that exists "under the ditch" seems to be under the woman as well, in other words. Unable to energize the stagnation of his wife's body, the engineer's work stalls, leaving the town in a state of veritable inertia.

Life becomes pastoral—it settles, slows, softens, and loses its generative impulse—around manmade waterways, as evidenced by both the human and animal communities that converge around them. Just as Medicine Bow "hush[es]" at

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the arrival of the engineer's wife (and her representative tank), so, too, do Wyoming's ranching communities mellow out along the muddy banks of streams and ditches. Though these moving bodies of water are not deemed as threatening as the still waters of Medicine Bow, the lush landscapes they engender pose significant risks to (re)production. "The placid regiments of cattle lay in the cool of the cotton-woods by the water" (43), we are told, and the narrator, a man capable of performing labor, spends many leisurely afternoons lounging at their side. Likewise, Emily, a chicken driven mad by her inability to reproduce, tends to her "changelings" near the edges of an irrigation ditch (50). During one of her more intense episodes, she "cross[es] the ditch" (50) to join a flock of wild turkeys, an act that marks the dry ditch with a trace of the unnatural. More than anything, the novel depicts irrigation as a question, one that, despite its economic promises, threatens the health and vitality of bodies. Molly's interest in irrigation delights the Virginian, and it is worth examining what it means when women take an interest in water management. After all, we are told that Molly's "mind was alive to Western questions: irrigation, the Indians, the forests" (322). Unlike the mired body of the engineer's wife, Molly's reform-minded, analytical outlook on the West—much like that of Irene, a woman with managerial interests in Ednah Aiken's journalistic novel *The River* (1914)—allows her to maintain a critical distance from the muddying effects of *too much water*. The engineering ethos stimulates Molly's curiosity, thus opening the masculinist project of water development to women—or at least to the women who "have always wanted to be a man" (Wister 85).

Mark Seltzer's insightful examination of the rise of civil engineering and the dream of the "directed nonstop flow of water" in Progressive-Era American culture points to the gendered nature of water development in the arid West. Seltzer's alignment of water management with a "transcendence of female/nature" (164) is compelling, especially when we pair nineteenth-century water diversion projects in Wyoming and other regions of the arid and semiarid American West with the concurrent drainage of swamps and wetlands in the South and Midwest (Pisani). What Seltzer overlooks in his focus on masculine "transcendence" in the context of water development is how drainage, storage, and diversion efforts resulted in domesticated landscapes, landscapes that enabled settlement and assisted the so-called civilizing project. In other words, nineteenth-century civil engineering defines "manliness" at the same time that it places that category at risk. While the labor involved in controlling/channeling the flow of water might, at first, seem like "man's work," the result, as *The Virginian* seems to argue, facilitates the migration and settlement of women, children, and families, thus disrupting "the playground of young men" celebrated by Wister (44). To mitigate these effects in the novel, and to preserve the West as a zone for men, Wister rewilds manmade waterways, or blurs the lines between "natural" and "artificial." Just as it is often difficult to discern "natural" from the "manmade" waterways in our daily lives, the novel frequently fails to tell readers whether a watercourse is naturally-occurring or engineered by

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human labor. Terms like "natural" and "manmade" begin to lose their distinct meanings in the context of damming and irrigation. After all, is a manmade reservoir altogether unnatural? Do such distinctions matter to the algae that develops there, the fish that populate it, or the humans who fish from its shores? At times, however, Wister does go out of his way to identify wild, "virgin" bodies of water, such as rivers, springs, and brooks. These references to "natural" bodies of water, such as Yellowstone's "swift ripples" (112), the "heavy-eddied Missouri" (99), and the edenic pool in the Virginian's private "virgin wilderness" (295) exist off the grid. The novel assures us that despite the encroachment of "new-scraped water ditches" and fences, the West is still large enough to harbor wild bodies (of water).

Charting a "Fuller Range" of Regionalism in the Western

Due to the large-scale nature of water development in the West, maps were integral tools for surveyors and engineers. For irrigation companies and speculators, project-planning maps also came to represent topographies of wealth and possibility. In "A Map of Wyoming with Special Reference to Shoshone Irrigation Company's Lands and the City of Cody (1900)," political boundaries, such as state and county lines, intersect with the blue lines of proposed ditches and canals, revealing, in visual form, the complex relations that water engenders between governments, individuals, and private enterprises. The Big Horn Basin, from which all irrigation lines on the map originate, dominates the map. The blue ink that represents the basin shades the names of towns and leaks over the borders of counties and reservations. The Shoshone Irrigation map informs us that the Big Horn Basin is a landscape feature of great significance; after all, geysers, mountains, hot springs, rivers, and other landforms are represented as faint black outlines, and unless we examine the map closely, these muted features easily fade into background. Wealth is water, the map tells us, and as the irrigation lines thread outward from the sky-blue source, the social and economic potentialities multiply—as do the risks.

Similarly to the Shoshone Company's cartographical rendering of Wyoming, *The Virginian* frequently renders the Territory in map-like terms, thus allowing readers to see the West through the eyes of an engineer. When the Virginian and Molly journey across the seemingly illimitable expanse near the end of the novel, the narrator notes, "All beneath them was like a map; neither man nor beast distinguishable, but the veined and tinted image of a country, knobs and flats set out in order clearly, shining extensively and motionless in the sun" (287). What may seem unruly and incomprehensible on the ground becomes legible via this narrative blueprint. Messy lifeforms dissolve, and landforms "set out in order clearly." The lively environment stills and stabilizes when filtered through the map, granting characters the ability to ascertain coordinates and chart their course with more ease. Aerial perspectives, panoramic vistas, and frequent comparisons of environments to gridded maps transform the region into a manageable space. These

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moments of cartographical clarity do not last long, however. There is always more to manage, always *more* the map cannot contain.

The narrator frequently identifies natural sources of water as a way of framing the dimensions of this region. Small towns, he says, "littered the frontier from the Columbia to the Rio Grande, from the Missouri to the Sierras" (10). By framing the West with two major rivers—rivers on which much human labor has been expended and from which much energy has been extracted—the narrator encourages readers to observe the turn-of-the-century West as a field of productive possibilities. As we linger over *The Virginian*'s narrative maps, we might wonder how wild waters from rivers and mountaintops could be dammed, diverted, and then put to use hundreds of miles from the source—say, in a cattle ranch in northern Wyoming. These brief moments of cartographical pause in the narrative invite readers to admire the productive possibilities of water infrastructure. This impulse to map and survey, to imagine the "higher-order" (Bakker 618) possibilities of water development, converts the rush and movement of water into "instrumentalized matter" (Bennett ix). "[T]he image of dead or thoroughly instrumentalized matter," Jane Bennett says, "feeds human hubris and our earth-destroying fantasies of conquest and consumption. It does so by preventing us from detecting (seeing, hearing, smelling, tasting, feeling) a fuller range of the nonhuman powers circulating around and within human bodies" (ix). When the narrator observes the town of Medicine Bow in order to "take its dimensions," for example, distance both grants him a wide planar perspective and erases particularity.

It might seem odd to pay so much attention to the supposed "non-place" of water infrastructure in literary studies, especially since we so often fail to *see* the various human-and-mechanical apparatuses that divert, sanitize, store, and then deliver water to us in our daily lives. Even more invisible, perhaps, are the mechanisms that allow us to drain and flush "used" water from our homes into an unthinkable *out there*. Envirotech historian Etienne Benson argues that this failure to hold infrastructure in both sight and mind happens in spite of the hypervisibility and ubiquitous nature of these structures. Benson states, "Infrastructural inversion—the analytic practice of bringing the background into the foreground—requires a kind of focus that often escapes me" (121). The presence of manmade water systems and the modes of ecological and social relations they organize in *The Virginian* make visible and tactile an elemental/material drama, one that dramatically impacts the lives of those who believe they are separate from and/or managing over controllable flows. This essay's analysis of water management in Wister's novel attempts to challenge the human-centered rhetoric of Progressive Era resource management to uncover the animated life of the element. Additionally, it asks what kind of contemporary environmental ethics, if any, can be born from directing our focus to the frequently overlooked water projects upon which so many human and nonhuman lives depend.

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A focus on the affective presences of water infrastructure in this and other writings set in the American West brings the materiality of water, aridity, and human relations with place into sharper relief. From sites of labor and national myth, to locations of failure and repositories of grief, water infrastructure calls on us to reconsider terms like place, management, and cultural memory. Considering the ongoing crises of water in the American West and elsewhere, a focus on water infrastructure and water-as-resource is of paramount importance in the environmental humanities.[13] From water shortages and toxic wastewater spills, to oil pipelines that threaten to contaminate aquifers and deteriorating dams, water and other elements emerge as agential presences in our present political and ecological moment. As Stephanie LeMenager notes, "the ecological histories of modernity [are] evolving beneath my feet, in my house, my water," and she calls on humanists to "to make material or represent" these elements via acts of narrative conjuring (185). A critical focus on water-as-resource in nineteenth- and twentieth-century American literature could contribute much to the way we understand, respond to, and attempt to remediate today's environmental crises. In more ways than we can count, water and water infrastructure intersect with pressing ecological, social, cultural, and biological concerns. In our efforts to map and manage water, we must admit that our fate precariously flows in its currents.

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Editorial

Creative Writing and Art
Population, Ecology, and the Malthusian Imagination

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This is not the first time that I begin an editorial with Italo Calvino. I did so for the special issue on "Urban Ecologies," and I do so again now, since the topic, "Population, Ecology, and the Malthusian Imagination" resonates convincingly with the creative algorithms of my favorite writer. In his *Invisible Cities*, in fact, Calvino provides us with a perfect example of how "Malthusian imagination" works. "Each year," Marco Polo says to the Khan, "I stop at Procopia and take lodging in the same room in the same inn." Regularly, from the same window of that same room, Marco lingers to look outside. The first year, what he sees is a typical countryside landscape: "a ditch, a bridge, a little wall, a medlar, a field of corn, a bramble patch with blackberries, a chicken yard, the yellow hump of a hill, a white cloud, a stretch of blue sky shaped like a trapeze" (131). This landscape is also distinctive, at first glance, for the total absence of inhabitants. Year after year, however, things change. Little by little, strange people appear. Silent, round-faced characters now dwell in the fields, in the ditch, in the chicken coop, on the trees... Gnawing an ear of corn or chewing a leaf, they look polite, even friendly—only a bit odd. Still, they are there, and they are many: sixteen, twenty-nine, forty-seven… and the more you count, the more they multiply. By the end of the tale, these bizarre figures have become *really* many. So many, that they even cover the sky. And they are not only outside the window. Closing his story, Marco adds: "There are twenty-six of us lodged in my room: to shift my feet I have to disturb those crouching on the floor. I force my way among the knees of those seated on the chest of drawers and the elbows of those taking turns on the bed: all very polite people, luckily" (132). Even though Calvino's invisible cities are unreal by definition, few accounts of what overpopulation looks like could be more realistic than the story of Procopia. Here, you can find the math of the Malthusian mind: within a determined timescale, space, resources, and population result in ever-growing disproportion. The only non-realistic element of this fictional episode, perhaps, is the kindness of these round-faced figures smiling with freckles on their cheeks and their lips tinged with blackberries.

Overpopulation is one of the triggering themes of the environmental debate. It was 1968 when Paul and Anne Ehrlich wrote *The Population Bomb*, and another path-breaking and highly debated volume, *Limits to Growth*, appeared in 1972—the

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same year as *The Invisible Cities*. Responding to an inquiry from Aurelio Peccei and the Club of Rome, in that report a group of MIT scientists made a genuinely Malthusian forecast: given a "business as usual" scenario, by 2072 the combination of unlimited growth in population, resource extraction, production and consumption of material goods, would in the long run result in a crash of the planet's systems. Today this predicted picture, based on statistical data and computer simulations, has been updated and in some respects disproved. But the problem remains, and "Anthropocene" is the name we are giving to the confluence of these factors with the dynamics of planetary cycles. As the essays included in the scholarly section brilliantly edited by Margarita Carretero González and Hannes Bergthaller demonstrate, science and statistics are not the only terrain where the Malthusian imagination is cultivated. Literature, film, and art are privileged grounds where it grows and flourishes. In our section, we will explore this topic relying in particular, although not exclusively, on the contribution of visual art.

The first of our artists—and also author of the cover of this *Ecozon@* issue—is cinematographer, photographer, and digital developer Mario Amura. A native of Naples, but internationally active and renowned, Amura's work has always demonstrated his triple vocation: that of a photo-reporter, an *engagé* documentarist, and an aesthetically visionary artist. The images selected for our art section emphasize this last vocation, showing, however, how all three are seamlessly interwoven with one another. They come from *Napoli Explosion* (2007-2017), a live-performance photographic project consisting of the dynamic combination of pictures and music, based on a technique called *StopEmotion*©.[1] The setting is the spectacular view of New Year's Eve fireworks on Mt. Vesuvius. Spectacular, but simultaneously grim: Mt. Vesuvius, as we all know, is an active volcano. Its radial extension is home to nearly 3,000,000 people, 800,000 of whom live under direct threat of an eruption in the so-called "red zone."[2] Shot by Amura and his troupe over eleven years, *Napoli Explosion* reproduces the literally detonating combination of our overwhelming human presence and the hidden power of a seemingly dormant nature.[3]

Implicitly evoking the famous "Plinian" eruption of 79 AD, so named after the description recorded by Pliny the Elder, these fireworks act like a gigantic

[1] *StopEmotion* is now developed by Emoticron s.r.l. as Phlay, a digital application for live-editing real-time videos from sequences of pictures played on music, internationally patented by Amura. *Napoli Explosion* is one of many experimental projects of the artist's based on this technique.

[2] See https://it.wikipedia.org/wiki/Zona_rossa_del_Vesuvio. On Vesuvius as "Europe's ticking time bomb," see Katherine Barnes's article in *Nature*, which is preceded by the following editorial caption: "Vesuvius is one of the most dangerous volcanoes in the world—but scientists and the civil authorities can't agree on how to prepare for a future eruption" (140).

[3] From 2007 to 2015 the photos for *Napoli Explosion* were shot solo by Amura. Since 2016, a "polyphonic" photo-ensemble was formed, which includes Christian Arpaia, Claudia Ascione, Eleonora Grieco, Raffaele Losco, Marco Rambaldi, Marco Ricci, Armando Serrano, and Maurizio Valsania. Original music by Louis Siciliano. See https://mario-amura.com/stopemotion/.

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synchronized exorcism of the "violently inhumane" forces (Cohen 271) coming from the underground. Dancing with this exorcism every year in a different way, *Napoli Explosion* reveals a number of stories: stories of people, of animals, of chemical violence. To my eye, these pictures also document how high real estate speculation has climbed on the slopes of Vesuvius: as it appears distinctly from these images, houses almost verge on the crater. Black and silent behind the blasting colors, the volcano is the unspoken referent of all this, a very concrete threat dysfunctionally but inseparably tied to the "Malthusian imagination" of this place. John Berger has written: "What makes photography a strange invention—with unforeseeable consequences—is that its primary raw materials are light and time" (85). In this project, unpredictability is not only due to the intersection of light and time. It is due to the fact that what would seem to be a repetitive experience actually changes every year. In conversations, Amura has told me that *Napoli Explosion* is not simply about an aesthetic experience, but also intrinsically an anthropological and psychological project. It is so, because it investigates how the volcano constantly, but in always-different ways, enters the fears, the hopes, and the convulsive emotional dimension of generations of people caught between the land and the sea as if between a womb and a trap. Beyond folkloristic discourse, these fires express periods of crisis, the desire to forget or to rebuild, and, paradoxically, the need to resist—while at the same time remaining part of a place whose mind is and can be "violently inhumane." Standing with his team on a cold mountaintop facing the volcano, Amura is like Pliny the Elder. And the story he tells has two faces: the face of a dark nature that might swallow our human presence, and the face of this incontrollable humanity, whose unspoken desire is, perhaps, just to be swallowed by this landscape of inhuman forces.

The second selection of artworks, titled *Climate Art Projects*, also comes from Italy. Its author, Andreco, is the protagonist of a large number of exhibits and performances across various continents. A native of Rome, Andreco has a "Leonardesque" feature: besides being an artist, he is also a scientist. The holder of a PhD in environmental engineering, he specialized in sustainability and green technologies, with collaborations that involve Columbia University, Bologna University, and NASA. Inspired by American Land Art, his works lie at the intersection of scientific research and artistic expression (see Andreco, *Climate Art* 83). This explains the ideal subtitle that, in our e-mail exchange, he suggested for his contribution: *Art, Science and Ecology at the Time of Climate Change.* Natureculture is at the core of Andreco's works. At center stage in his eco-artistic and scientific research we find the human impact on natural systems, the sustainability of our footprint given the planet's limited carrying capacity, the way we shape the environment, and a host of symbols representing our relationship with the more-than-human world. These topics are explored with various techniques, which include public installations, videos, wall paintings, and drawings. The connection with the ecology of overpopulation is the distinctive feature of his creations: as curator Andrea Lerda notes, Andreco's art clearly stresses the fact that "anthropic

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interference is the primary cause of environmental harm: from the constant rise of CO_2 in the atmosphere, the pollution of land and sea, climate change, and cementification." His works, however, never take the form of "propaganda," but rather "offer reflections on alarming subjects that the viewer can discover and analyze" (232). Programmatically site-specific, the works displayed here situate themselves perfectly along these lines. Pictures 1 to 3 are wall paintings, respectively displayed in Paris (*Climate 01 – Climate Change – Causes and Consequences – Paris*) and Venice (*Climate 04 – Sea Level Rise – Venice*). They are part of a tetralogy on climate that also includes *Climate 02 – Emissions – Bologna* and *Climate 03 – Desertification – Apulia*, all of which are conceived to be in direct conversation with the places where they are installed. In our particular case, Paris and Venice perfectly represent the political and material aspects of climate change with its connection to overpopulation: *Climate 01*, in fact, was painted in the French capital on the occasion of the Paris Climate Agreements in 2015, whereas *Climate 04*, exhibited in the Venice Art Biennale, bear witness to the alarming situation in the Lagoon's ecosystems: a paradigmatically endangered ecosystem threatened by global warming, political mismanagement, and the overwhelming influx of tourists who daily invade Venice, often on board gigantic cruise ships. Picture 4, *The End – Anthropocene Parade* testifies to a collective action performed in 2017 at the Centro Pecci for Contemporary Art in Prato. A group of actors carrying black flags with graphic illustrations of CO_2 particles enacts a funeral cortège, which is at the same time an admission of guilt toward the Earth and an exorcism against its death. Inspired by Déborah Danowski and Eduardo Viveiros de Castro's *The Ends of the World*, *The End – Anthropocene Parade* also stages the end of the Holocene and the arrival of this new geological epoch dominated by the footprint of our species. The last three pictures, a painting from *Back to the Land*, *Rockslide*, and *Total Black* (both 2016) embody Andreco's Anthropocenic narrative and "mineral aesthetics," representing the apparently abstract geometry of elements that enter the very core of our materiality (See Andreco, *Climate Art Project*).

This creative section has concentrated on visual art for its explicit bond with the special focus topic of this issue of *Ecozon@*. Interestingly, however, its literary component explores other populations: nonhuman or more-than-human beings that live alongside us. Their stories come from two poems. The first one is "Costume Shop" by Canadian author Terry Trowbridge. This "meditation about distributive justice, belonging" and habitats materializes in the author's own backyard, where human food scraps are interlaced with co-evolutionary companionships and animal creativity. With the force of its ironical humbleness, a "subversive" human-nonhuman complicity takes the shape of an open vision of the future: "I leave the compost open / because birds can sew. / I eat lemons so to seed / a subversive justice." In perfect conversation with "Costume Shop" and, remarkably, with the visual art selection is the second poem, "After the Cyclone" by Australian author Louise Boscacci. Concerned to explore "affect and atmosphere in the more-than-human Anthropocene," Boscacci's verses portray the strange but ordinary

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interlacements of the Anthropocene, where extreme climatic phenomena, "formalin-fixed" insect specimens, and the solitude of a scientist in her lab virtually communicate with the biosemiotic stubbornness of newborn birds. Here, like in a multiple blast ("atom bomb / carbon bomb / bomb cyclone"), poetry emerges from the confluence of human words and more-than-human voices that articulate the resilience of the world.

All these contributions have, I think, something in common, namely, the sense that reality, whether in human or more-than-human forms, has a "Malthusian imagination." This is the ever-growing imagination of matter that expresses itself in the chemistry of volcano eruptions and fireworks, in carbon particles and rising seas, in human food for bird seeding, in verses and magpie voices rising "after the cyclone"—and, also, in the odd round-faced characters that add silent kindness to the landscape of Calvino's Procopia.

I would like to conclude these few pages on a personal note. This is my last editorial. To serve as *Ecozon@*'s Creative Writing and Art Section editor has been one of the most inspiring experiences for me. In the last four years I have had the opportunity to approach artists and writers from whom I received stimuli and ideas that enlarged my horizon as a critic. My profound gratitude to all of them. This exciting experience would never have been possible without the exceptional editorial team of *Ecozon@*, and in particular Carmen Flys Junquera and Axel Goodbody: thank you for providing me with a "pass" to approach these amazing people who give a creative form to our theories and struggles. And, even more, thanks to all our *Ecozon@* readers. These undisciplined conversations continue. Keep following!

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Napoli Explosion

Mario Amura

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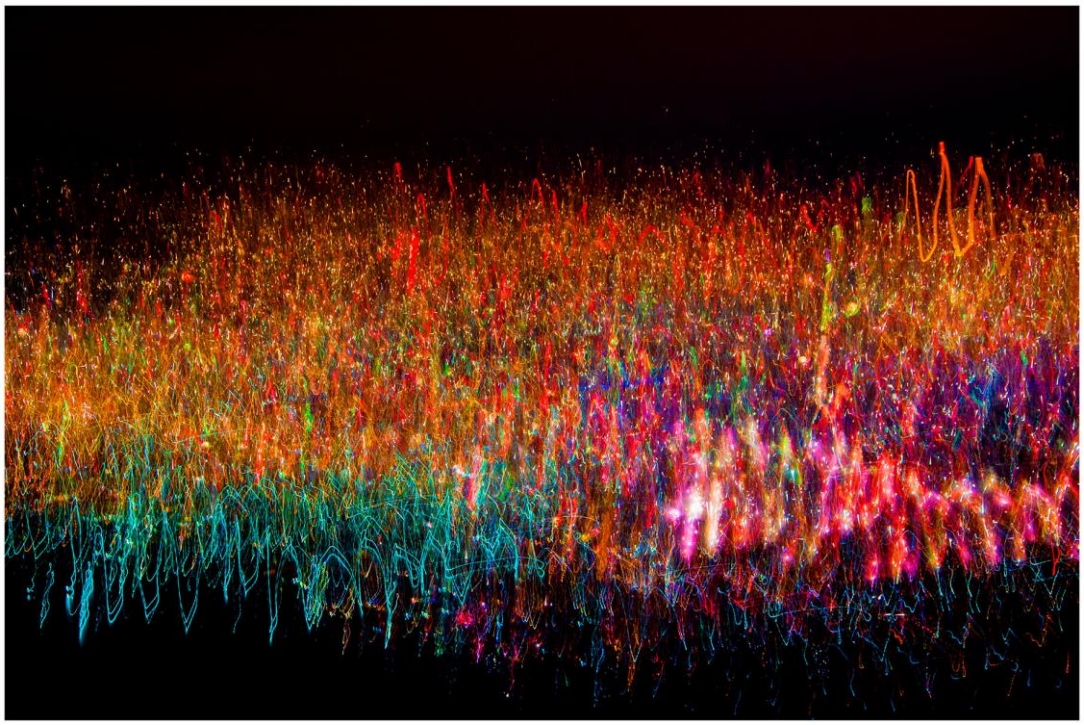

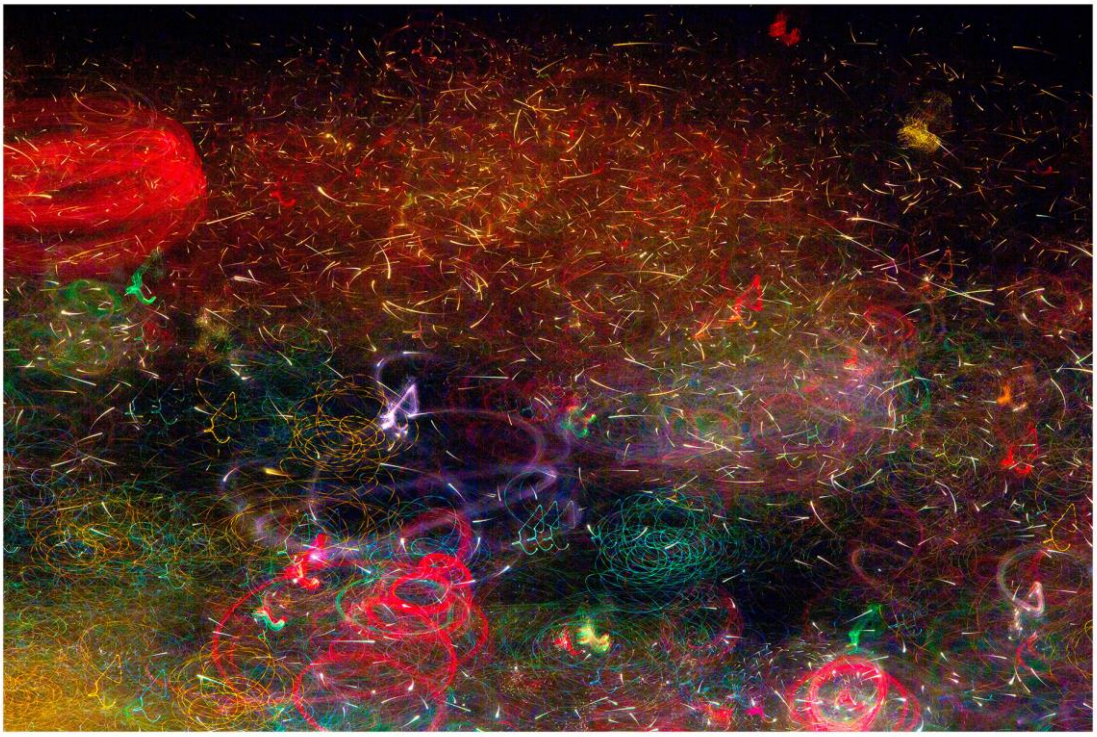

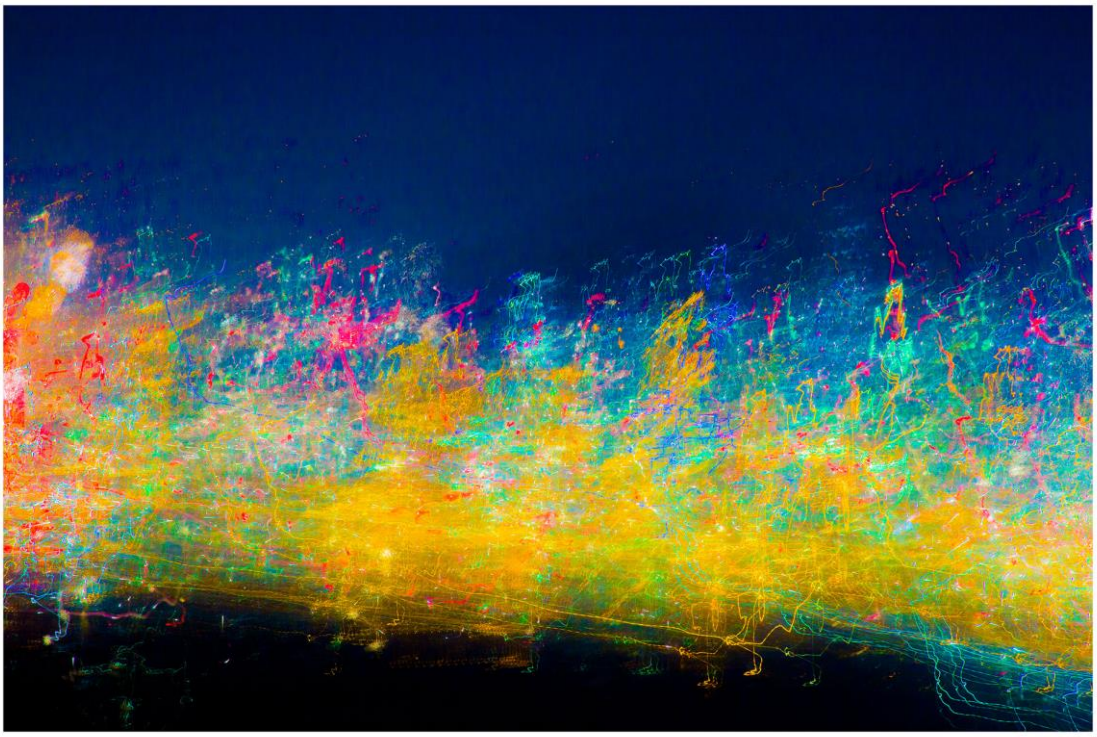

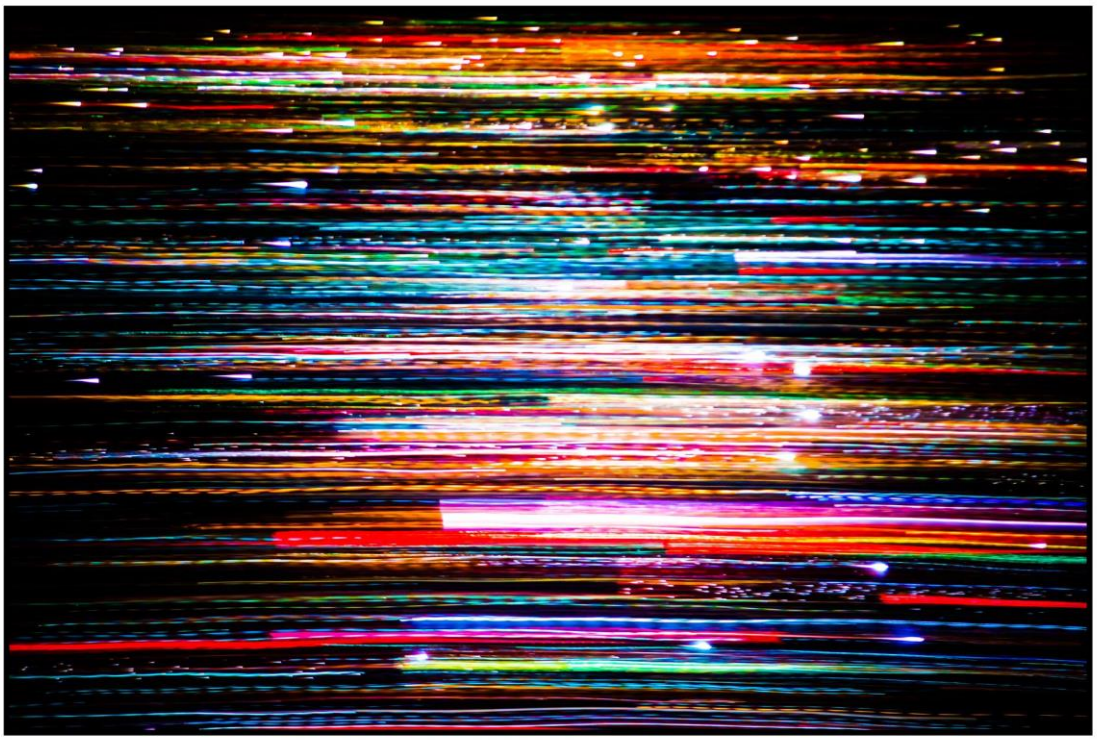

Climate Art Project

Andreco

1 Andreco, *Climate 01*. Wall Painting. Paris, 2015
(Production: GFR and Pigment Workroom)

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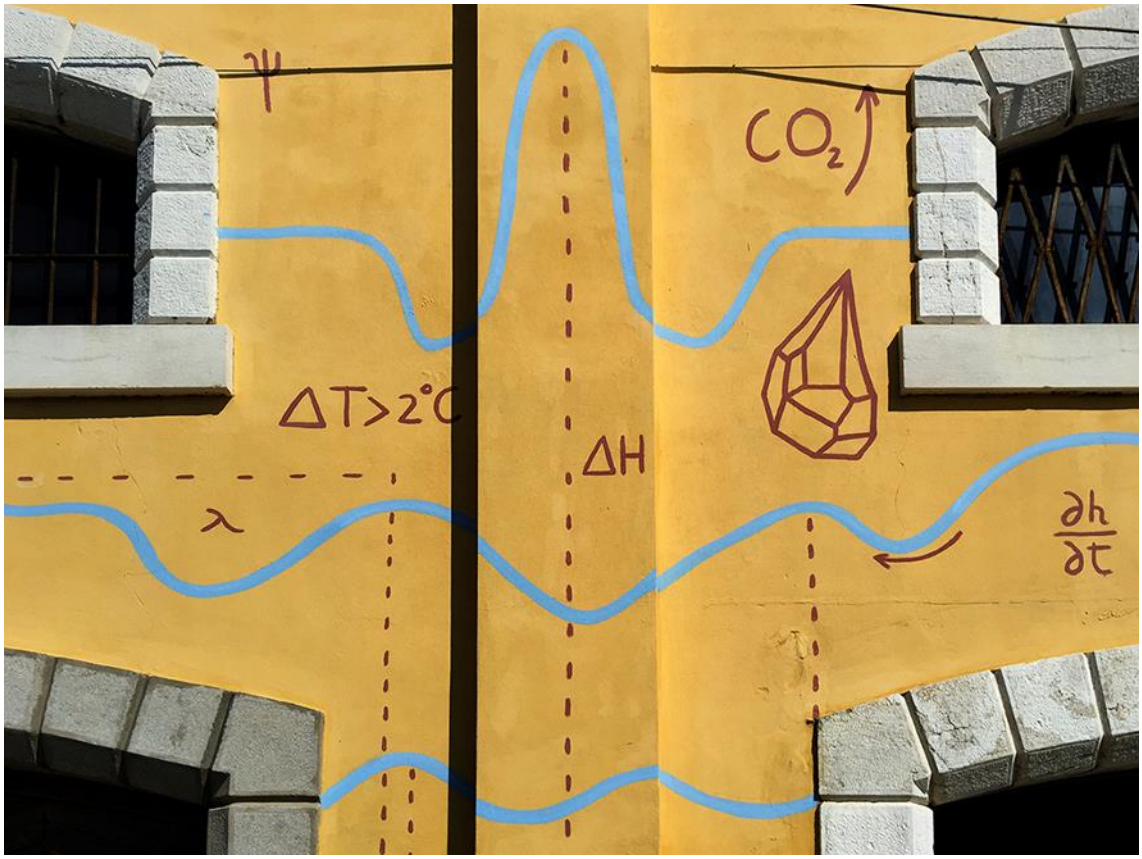
2 Andreco, *Climate 04 – Sea Level Rise*. Wall Painting. Venice, 2017 (Photo: Like Agency)



3. Andreco, *Climate 04 – Sea Level Rise*. Wall painting. Venice, 2017 (Photo: Like Agency)

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4 Andreco, *The End – Anthropocene Parade*.
Centro per l'Arte Contemporanea Luigi Pecci, Prato, 2017

5 Andreco, Installation for the show *Back to the Land* (curated by Andrea Lerda).
Courtesy Studio La Città, Verona, 2016 (Photo Michele Sereni, Pelicula snc.)

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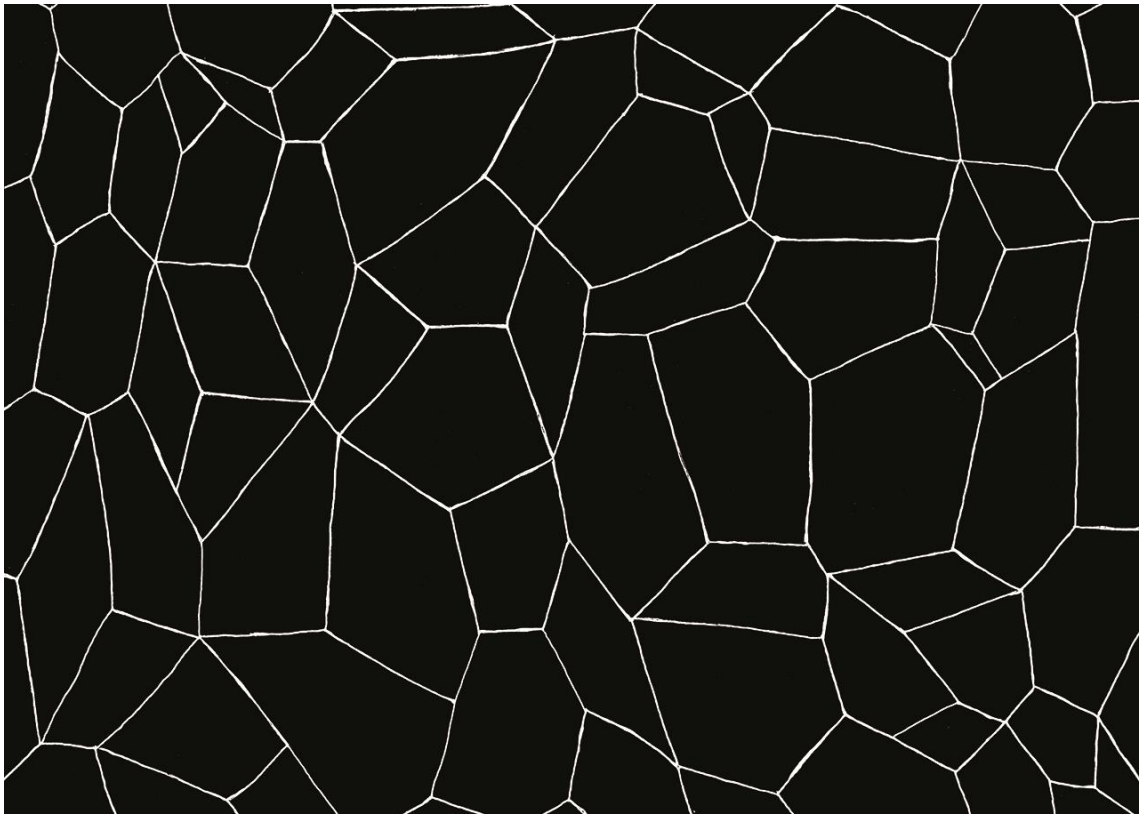
6. Andreco, *Rockslide*. Acrylic on Paper, 2016



7. Andreco, *Total Black*. Bitumen on Paper, 2016

Costume Shop

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An enterprising sparrow
could pull this lemon peel
out of my compost;
with a few alterations
disguise herself as a finch
and flock with the finches
under the bird feeders
that the humans on my street
refill most often.

I leave the compost open
because birds can sew.

I eat lemons so to seed
a subversive justice.

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POEM

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After the Cyclone

I sat
in the posthumous research laboratory
writing poems
in between the fish larvae formalin-fixed
for microscope eyes

I was diligent
observed, noted, discriminated
identified and questioned

I looked
as much as I now listen
to the magpie geese influx
on my eye tunes app
from where I stood last September
for an hour and
could not leave could not
move
as undead life
undid me

But no silent spring this one
cicadas and channel-bills are in the messmate trees
yesterday the new contact zone was 47.3 degrees
Celsius scaled incremental change
as do lexical degrees of
atom bomb
carbon bomb
bomb cyclone

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Outside at first light
a downy magpie is learning
to sing back to a patient parent
in the cool after-storm

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Book Review: Andreas Malm, *The Progress of this Storm: Nature and Society in a Warming World* (London: Verso, 2018), 248 pp.

After the linguistic turn lost its glamour two decades ago, when the cheering fans of the anti-theory camp eagerly expected conventional realism to return to academia, the material turn came instead. The new materialism sought to bridge the gap between ontology and epistemology so as to overthrow dualisms of all kinds that have informed Western thought for centuries. Integrating the material and the discursive, the material turn radically reconfigured the conceptualizations of materiality, claiming that matter in every form is agentic and capable of producing meanings. Andreas Malm's *The Progress of this Storm: Nature and Society in a Warming World* is a full-frontal attack not only on this school of thought, but on the entire spectrum of theoretical approaches that have emerged in recent decades to tackle the complexities of the current ecological condition. Taking their basic premises to the extreme, Malm polemically challenges postmodernism, new materialism, posthumanism, actor-network theory, and hybridism, arguing that they lack intellectual rigor and coherence, and ultimately fail to provide practical guidance in our current ecological predicament.

Malm subverts the conceptual labyrinths of contemporary thought through a series of intellectual maneuvers. In a compelling argument about super storms and typhoons (such as Sandy, which hit New York city in October 2012, and Haiyan, which struck the Philippines in November 2013) becoming the new normal, Malm claims that "the planet is already doomed" (9). A close look at the current CO_2 levels is sufficient to forecast this impending fate. "Now more than ever," he reminds us in his introduction, "we inhabit the diachronic, the discordant, the inchoate" (11). If our "daily life, our psychic experience, our cultural responses, even our politics show signs of being sucked back by planetary forces into the hole of time" (11), he continues, how then are we going to respond and find sustainable solutions? How are we going to come to grips with the alarming scientific data presented on climate change? Although Malm dismisses them, the new materialists do have a convincing answer: if the social interpenetrates the natural so profoundly, our environmental problems cannot be disentangled from cultural, social, economic, and political practices, and if we understand how discursive practices and material phenomena are mutually constitutive in the entwined zones of natural processes and social systems, it is possible to free knowledge structures from anthropocentric moorings, to rethink our being-in-the-world and our relations to other species in more

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ecologically responsible ways. But Malm is not convinced, asking instead if any of these theories have been able to generate effective resistance against the "fossil fuel economy" which continues to exacerbate cataclysmic climate change. Did they provoke any practical change, demolish human hubris, or offer any point of reference for action? No, argues Malm; they remained locked within complex conceptualizations. He presents a different perspective, not a new "cultural logic" in Jameson's sense, but a thoroughly activist agenda that would build collective resistance and contribute palpable solutions to the new normal, which is quite disheartening: the rise in the Earth's average temperature since pre-industrial times reached the landmark of 1.5°C in 2016; the increasing possibility of the West Antarctic ice sheet sliding into the oceans during our lifetime, raising sea levels by several meters; and, more generally, the possibility of our daily lives being upended by planetary forces. "Postmodernity," he says, "seems to be visited by its antithesis: a condition of time and nature conquering ever more space" which he calls "*the warming condition*" (11). He claims that "climate change is overshadowed" (12) by a new postmodern condition in our digital age that mentally alienates people from grasping the truth of the physical and thus helps anchor the discourse of denial. In Malm's understanding, prioritizing virtual reality as a substitute for the real world removes the ecological urgencies from the purview of human concern. The postmodern condition today, he proclaims, is in fact "locked in struggle with a formidable enemy" (13): climate change and the biogeochemical forces of nature.

Andreas Malm's main point is that while global warming and other environmental catastrophes escalate, contemporary theory is strangely absorbed in "interpreting" what constitutes nature, how it is entangled with culture, and who the agents of biocide are (forces of matter or humanity, or a mix of both). Constructionism, new materialisms, post-humanism, actor-network theory, hybridism, and other theoretical schools predicated on similar conceptualizations, are wrestling with "the imbroglio between the social and the natural" (16). If these theories are of no use in making any change, Malm contends, then they are part of the problem. In his view, the main task of theory for the warming condition should be "to clear up space for action and resistance" (18). The book's seven chapters engage this idea from a fundamentally critical vista: contemporary theories have all failed in dismantling the "fossil fuel economy," the main culprit of environmental transformations. The three chapters that follow the introduction are each written sharply "against" one of these theories: "Against Constructivism," "Against Hybridism," and "Against New Materialism." Chapter four, however, is titled "For Climate Realism," and the remaining four chapters reiterate and expand on previous contentions. Since it is the opening chapters which pack most of the polemical punch, it is on these that I will focus in the following.

The major argument of chapter one, "Against Constructivism," is that, being deeply preoccupied with cultural constructions of nature, postmodernism refused to recognize extra-discursive reality. Malm blames postmodernism for its interest in

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the textual, the self-referential, the metaphorical, and the invented. As his representative example, he chooses Noel Castree's *Making Sense of Nature: Representation, Politics and Democracy* (2013), which recommends a kind of postmodernism that sees nature (and, for that matter, all that is physical) to be nothing but a discursive construct. Castree's statements that nature "doesn't 'exist' out there" and "global warming is an *idea*" (24) are juxtaposed with Donna Haraway's pronouncement in 1992 that nature is "a powerful discursive construction" (25). All of these passages are cherry-picked to support Malm's critique, as if they represented the predominant form of postmodernism.

Attacking postmodernism by such carefully selected quotes is, of course, nothing new, and Malm reiterates some of the evergreens of anti-postmodernist polemics, such as Kate Soper's assertion that "it is not language that has a hole in the ozone layer" (qtd. in Malm 27). Although not quoted by Malm, let me add David Mazel's rhetorical question to the chorus of anti-postmodern voices here: "If 'nature' is 'merely' a text, what about environmental destruction?" But this view of postmodernism—as a meaningless celebration of the play of language which disregards everything external—rests on a fundamental misunderstanding. The absurd assumption that nature is nothing but a verbal construct is a schizophrenic feature of the linguistic turn, not the defining characteristic of postmodernism that Malm wants it to be. Associating postmodernism with extremist forms of constructionism is misguided, because postmodernism does not aim to erase the referent itself. So why all the confusion? By questioning the conviction that there could be an unmediated access to reality, postmodernism challenged the realist notion of representation which presumes a natural link between word and world. Malm confuses this denaturalization of realism's assumed transparency with a reduction of reality to linguistic construction. Even if it has not initiated sufficient political and social resistance against declining ecological conditions, postmodernism hardly deserves to be caricatured in this fashion. After all, were the anthropocentric conceptions which underwrote the destruction of nature not formulated on the basis of realist epistemologies much like those Malm champions? He also criticizes the literal reading of the metaphor of construction with reference to Steven Vogel's work, which basically claims that all landscapes are now built landscapes. Malm objects: when coal formed "some 286-360 million years ago, no humans could possibly have assisted in the process" (36). This is rhetorical point-scoring, not serious engagement with his intellectual opponents.

In the second chapter, "Against Hybridism," Malm moves his critical lens to hybridism, defining it in terms of a reality "made up of hybrids of the social and the natural" (46). Hybridism, he also argues in chapter four, comes in two flavors: "constructionism and new materialism. If the former collapses nature into society, the latter does the reverse" (149). According to Malm, the blurring of the nature/culture divide is the "cardinal principle of hybridism" (46). Here, too, his tone is playfully ironic, especially when he draws attention to the political

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consequences of hybridism. If the ways in which the social and the natural are interwoven renders the categorical distinction between them moot, Trotsky should also have concluded that "capitalism" was essentially the same as "Tsarism" (49); likewise, Platonism and Shiism, air and cigarette smoke, Zionists and Palestinians (49), and oil and water (61) would all have to be considered as identical! Can such a rhetorical admixture of categorically incompatible things be considered as hybridism to prove the point that nature and society are not "self-contained galaxies" (50)? Of course not, because rather than promoting the absurd idea that "society was made of the same substance as nature" (53), as Malm claims it does, hybridism basically indicates the mutual permeability of nature and culture. Examples for how the social interpenetrates the natural abound – one may think of plastic pollution in the oceans, toxic chemicals released into the soil and air, or mineral extraction, and of their drastic effects on ecosystems and biotic communities. Surely Malm agrees when he quotes Alfred Hornung that the vital theoretical task should be "to tease out how the properties of society intermingle with those of nature" (61). His emphasis on fossil fuel economy as the driver of climate change (76) attests to this.

In the third chapter, "Against New Materialism," Malm challenges the new materialist theorists who "aim to sober up theory" (78). Having provided a very detailed outline of the new materialist thought with references to Karen Barad, Jane Bennett, Samantha Frost, Diana Coole, and others, Malm proceeds to criticize them for "erasing the boundaries between the human and nonhuman, animate and inanimate matter" (88). He disapproves of their reconceptualization of agency which, he claims, eviscerates the concept of meaning. In Malm's view, agency cannot be separated from human intentionality: it is, he argues, implausible to ascribe *goals* to nonhuman entities, such as rivers and mountains. In making this argument, however, Malm mischaracterizes the views of the those he critiques. For the new materialists, that nonhumans have agency need not imply that they have goals. To claim, as Malm does, that attributing agency to nonhumans means downplaying human responsibility for climate change (93) is a downright distortion of new materialist thought. Much like in the preceding chapters, Malm's preferred mode of argument is the *reductio ad absurdum*: for him the new materialist thinking implies that "coal *itself* bears responsibility" for climate change (93); in chapter six, he approvingly quotes Rebecca Clausen and Brett Clark's statement that "the oceans are not polluting themselves; humans are doing it" (178). If such a nonsensical line of reasoning were taken seriously, climate talks would indeed be stalled: "It was not us who initiated coal consumption or emitted the CO_2; it was the swarm of actants that caught us in their whirlwind" (111). Never mind that no serious new materialist ever questioned the fact that humans are the primary agents of ecological destruction. Malm's conclusion—that the "only sensible thing to do now is to put a stop to the extension of agency" (112)—is premised on a misunderstanding of the

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new materialists' central claims, and he ends up reinscribing the anthropocentric logic they have worked so hard to dismantle.

The following chapters reiterate his critique of constructionism and new materialisms, but they also offer compelling arguments about the twists of climate change, how we are to deal with its consequences and find meaningful ways to resist the exploitative systems which produced it. In chapter five, Malm argues in favor of historical materialism as an alternative to the theoretical frameworks he rejected in the preceding chapters; chapter six elaborates on metabolic rift theory, chapter seven on ecological autonomism. These approaches, Malm contends, allow for the kind of concrete analysis that would "feed into resistance or, preferably, revolutionary ecological practice" (174). He observes that "climate activists have so far been indifferent to constructionism, Latourianism, new materialism, posthumanism and the rest of it" (175). Yet, while all these theories at least brought about a paradigm change in the social sciences and humanities, were the activists able to effect any tangible change in the world to put an end to the fossil fuel economy? One wonders if climate activists will instead embrace Malm's alternative theories to initiate a change of mindset. Will subscribing to Malm's counsel—"Negativity is our only chance" (223) to avert the worst—bring us closer to an actual solution? Malm concludes with the idea that theory "can only play a very limited part in this project" (231). That the question whether negativity can bring about positive change is itself one which only theory can tackle, is an irony which seems to escape him.

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"Wir leben vom Nichterklärten": Wilhelm Lehmanns *Bukolisches Tagebuch* erscheint in einer bibliophilen Neuausgabe

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Wilhelm Lehmann: *Bukolisches Tagebuch und weitere Schriften zur Natur* (Berlin: Matthes & Seitz, 2017), 292pp.

In den letzten Jahren ertappe ich mich immer wieder dabei, dass ich meine Stammbuchhandlung Dombrowsky in Regensburg mit einem Buch unterm Arm verlasse, das ich eigentlich schon besitze. Band für Band habe ich die zerfledderten Originalausgaben meiner englischsprachigen Klassiker des *nature writing* mit deutschsprachigen Übersetzungen ergänzt, in denen ich zwar genussvoll blättere, die ich aber nie durchlese. Der einzige Grund für meine Doubletten-Sammelwut ist die Schönheit und sorgfältige Machart der Reihe "Naturkunden", die der Berliner Verlag Matthes & Seitz seit 2013 unter der Federführung der Schriftstellerin und Buchgestalterin Judith Schalansky herausgibt. Jeder Band in dieser Reihe, die ein deutschsprachiges Publikum mit Namen wie John Muir, Edward Abbey, Nan Shepherd, Annie Dillard und Robert Macfarlane bekannt gemacht hat, ist von auserlesener Qualität. Nun hat Schalansky eine neue Ausgabe von Wilhelm Lehmanns *Bukolischem Tagebuch* herausgebracht: ein Kleinod der klassischen Moderne und ein Text, der gerade in seiner ästhetischen Eigensinnigkeit mit besonderer Dringlichkeit zu uns heute spricht.

Es gibt wenige Texte in der deutschsprachigen Literatur seit Goethe, die auf solch radikale Weise "anschaulich" sind. Für viele Leser heute aber ist es eine beinahe schmerzliche Anschaulichkeit, die viele seiner Einträge in diesem zwischen Herbst 1927 und Sommer 1932 geführten naturkundlichen Tagebuch auszeichnet. Schmerzlich, weil wir uns unvermeidlich als Nachgeborene einer Kultur empfinden, "in der das Empirische noch das Romantische war – und man im Romantischen sich am Empirischen erfreuen konnte", wie Richard David Precht anlässlich der deutschen Neuausgabe von Jean-Henri Fabres *Souvenirs entomologiques* bemerkte. Schmerzlich auch, weil wir an Lehmanns Beobachtungsreichtum und Sprachkunst ablesen können, wie viel an naturkundlicher Praxis und damit verbundener sprachlicher Ausdrucksfähigkeit uns in der Gegenwartskultur abhandengekommen ist. Wir mögen für, Umweltprobleme' sensibilisiert sein oder gar in einem "ökologischen Zeitalter" leben, wie der Historiker Joachim Radkau betont, doch das Wissen vieler Menschen über die Natur nimmt kontinuierlich ab. In einem Brief an Friedrich von Müller schrieb Goethes 1819: "Man sieht nur, was man weiß." Das *Bukolische Tagebuch* zeigt uns, wie wenig wir in der Natur sehen, weil wir fast nichts mehr von ihr wissen. Es zeigt uns überdies, wie wenig 90 Jahre später noch da ist

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von der Artenvielfalt. Wir schauen von seinen Einträgen auf, und trotz aller Verluste trifft uns nach der Lektüre die Schönheit der Natur mit ungeahnter Wucht. So beruht denn die Unheimlichkeit dieses heimlichen Klassikers der Moderne darauf, dass er uns ästhetisch nahe, aber kulturell fremd ist. Der experimentelle Umgang mit Sprache und die harten lyrischen Fügungen entsprechen einer Sensibilität, die sich als Erbe des Modernismus verfestigt hat. Die Praxis der Naturkunde hingegen, die in der Fähigkeit wurzelt, morphologisch genau zu beobachten, ist uns fast gänzlich abhandengekommen.

Oft scheint es, als habe Lehmann die gesamte Ausdruckspotenz des literarischen Modernismus gepackt und in den von ebendiesem Modernismus weitgehend vernachlässigten "unendlichen Raum" der Naturgewalten gestellt. (12) Alles zeugt von ständiger Metamorphose: Über Nacht haben sich "die gelbflaumigen, zarten Blüten des Igelkolbens […] zu hartzinkigen Morgensternen gewandelt." (11) Und in allem spiegeln sich unendliche Variationen ähnlicher Themen: "So wie der rotgelbe Dotter des Wendehalses durch seine dünne Schale scheint, so leuchtet um halb neun die Sonne durch den weißgrauen Dezemberdunst." (65-6) Den Zusammenklang dieser Formwandlungen setzt Lehmann gegen vulgärdarwinistische Vorstellungen des Lebens als totaler Konkurrenz: "Jedes Tier, das vergeht, jede Art Lebewesen, das ausstirbt, verdünnt das Weltvokabular, bringt uns weiter zurück von der Wahrheit, die nur aus dem Zusammenklang aller Wesen sich heraufarbeitet." (63) Dabei sind bei ihm die beobachteten Tiere und Pflanzen mit Wirkmacht ausgestattet, die den Beobachter immer aufs Neue in Staunen versetzen, wie Axel Goodbody in seinen Studien betont.[1]

Anfangs erfolgen die Einträge recht regelmäßig alle zwei bis drei Wochen, die Leser folgen noch einem kalendarischen Rhythmus,[2] im dritten Jahr wird man aber durch die bewusste Stauchung der Zeit zunehmend in den Sog der Jahreszeiten gezogen und unseres eigenen jahreszeitlichen Unbewussten bewusst. Gegen Ende hin vollziehen sich schließlich immer stärker Momente intensiver sinnlicher und geistiger Gegenwärtigkeit, die in der zeitgenössischen Literatur in ähnlicher Weise nur bei Peter Handke zu finden sind. Das kulminiert im großartigen Schlussbild des schrägstehenden, wilden Apfelbaums, der seine "kleinen, gelben, energischen Früchte" ins dunkle Wasser streut: "Die kleinen, wilden Äpfel […] fallen in den Schlamm, sie geben sich zurück der Stille, die nach dem dumpfen Klang anschwillt. Wachstum löst sich in Duft auf. Das Opfer wird angenommen." (149-50) Die Unfähigkeit, im wörtlichen Sinne ‚Opfer zu bringen' für das Leben, nimmt den

[1] Siehe beispielsweise Axel Goodbody: "Lehmanns *Bukolische Tagebücher*. Der Dichter als, Nature Writer", in: Uwe Pörksen (Hg.): *Wilhelm Lehmann zwischen Naturwissen und Poesie*. Göttingen: Wallstein, 2008: 51-67.

[2] Goodbody verweist in diesem Zusammenhang auf den Einfluss von, Country-Diary'-Kolumnen in englischen Zeitungen, die Lehmann aus seiner Zeit als Kriegsgefangener der Briten kannte. Deren Schwerpunkt liegt auf "der Beobachtung der jahreszeitlich und witterungsmäßig bedingten Änderungen in der Pflanzen- und Tierwelt." (ibid., 63)

Menschen im Anthropozän zunehmend aus dem Zyklus des Lebens heraus. Der Apfelbaum ist ein Gegenbild zum Totalitarismus des ökonomischen Paradigmas und zum menschlichen Selbstoptimierungswahn auf Kosten der eigenen biologischen Lebensgrundlagen. Er verkörpert eine Ethik der Gabe, die Lehmann in der Natur wirken sieht.

Und so sucht denn Lehmann an der Eckernförder Ostseebucht "Herberge […] in der Endlichkeit" (15). Er versteht diese Endlichkeit als Gabe, weil nur sie den Fortbestand des Lebens gewährt. Seine Kunst, sich dem genauen Beobachten hingeben zu können und Halt zu finden im Stirb'und Werde, seine Sprache, mit der er um eine angemessene Haltung der Dankbarkeit gegenüber den Gaben der Natur ringt, fügen sich zu einer Ästhetik der Anerkennung, wie sie für unsere Zeit etwa der nordamerikanische Philosoph Stanley Cavell formuliert hat.[3] Wie bewahren wir uns unter den psychologischen Zwängen, denen wir ausgesetzt sind, die Fähigkeit, zu staunen? Und wie pflegen wir eine Sprache, die offen bleibt für diese Fähigkeit? Für Lehmann sind das während des Aufstiegs des Nationalsozialismus existenzielle Fragen. "Von nichts als vom Gedicht beschützt / Auf allen meinen Wegen", schreibt er im Juni 1933 in "Sonnenwende". "Gedicht" steht für Lehmann hier als das Ineinandergreifen der Metamorphosen in der Natur und des sprachlichen Weiterwebens. Das *Bukolische Tagebuch* ist eine Werkstatt, in der Lehmann in Prosa-Experimenten die Elastizität und Belastbarkeit seiner Sprache für dieses "Gedicht" erprobt. Hier entstehen Augenblicke vollendeter Prosa, die den Keim eines Gedichtes in sich tragen: "Der Dezember läßt sich die Trauer seiner Dunkelheit nicht aus den Händen winden, aber wenn des Mittags eine Weile die Sonne an die Glasklarheit des Heumonats erinnert, dann bleibt der Himmel vor Erstaunen bis in den Spätnachmittag hell." (17) Selten wurden radikale Subjektivität und radikale Objektivität so hart und klar ineinandergefügt.

Das spiegelt sich auch in der Erzählperspektive des *Tagebuchs*, die zwischen der ersten Person, die man natürlich erwartet, und der dritten Person ("der Kantor") changiert. Tendenziell ist der Verfasser mehr beim "ich", wenn er durch die Landschaft streift, und schlüpft in die Rolle des Kantors, wenn er in seiner Rolle als Lehrer, Vater, Bürger in Erscheinung tritt. Aber diese Grenze wird von Lehmann bewusst porös gehalten, und so entsteht ein faszinierendes Experiment der Selbstdistanzierung. Die Selbstcharakterisierung als Kantor ist selbstironisch, denn der aufreibende Lehreralltag, über den Lehmann sich in Briefen oft beklagte, hat sehr wenig mit der liturgisch geordneten Tätigkeit eines Kantors zu tun. Und doch hat diese Rolle auch etwas durchaus Affirmatives: Lehmann wird selbst zu einer der vielen Vogelstimmen, die er beschwört, er wird zum heiligen Franziskus, der mit den Vögeln spricht, oder zum Schöpfer gar, der die Geschöpfe in ein Leben in der Sprache ruft (man denkt unwillkürlich an Meister Bertrams Grabower Altar). Ihm geht es darum, sich in der Sprache den Dingen und Lebewesen wieder zuzuwenden, sie aus

[3] Stanley Cavell: *The Senses of Walden. An Expanded Edition*. Chicago: The University of Chicago Press, 1992.

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dem Korsett der Begriffskonventionen zu befreien und wieder sinnlich erlebbar zu machen. In diesem Anliegen ist er gleichermaßen von der historischen Sprachwissenschaft geprägt wie von der Sprachmystik eines Jacob Böhme.[4] Charles Taylor würde ihn in die Tradition von "HHH" einordnen, die er jüngst gegen die zunehmend verkrustete heutige Sprachphilosophie in Anschlag brachte. Mit den drei Hs beschreibt er die radikale Bereitschaft von Herder, Hamann und (Wilhelm von) Humboldt, Sprache nicht nur als kombinatorisches System, sondern auch aus ihrer sinnlichen und sinnhaften Körperlichkeit heraus zu verstehen.[5]

Der "Kantor" ist allerdings auch eine Kassandra: Prophet im eigenen Land. Denn Lehmann ist sich dessen bewusst, dass seine Stimme der Sorge unter seinen Mitmenschen auf taube Ohren stoßen wird, dass die naturkundlichen Kulturpraktiken verloren gehen werden, schon verloren gegangen sind, nie die ethische Verbindlichkeit erlangt haben, deren es bedürfte. Diese Kantor-Rolle lässt auch das bukolische Element des Titels ambivalent erscheinen. Zwar durchstreift mit dem alten Adamsdotter eine positive pastorale Gestalt die Seiten des Buches, aber er ist bezeichnenderweise kein Hirte, sondern ein Gutsverwalter. Für Lehmann ist er ein Wahlverwandter, vielleicht sogar ein Mystagoge, sicher aber Komplize im Zur-Sprache-Bringen der Dinge: "Er erzählt mir vom Eigensinn der Dinge, und wie im Herbst ein wandernder Starenschwarm plötzlich den schweren Eichbaum spricht, spricht er manches aus, was ohne ihn, den alten Adamsdotter, immer stumm geblieben wäre." (96) Lehmann setzt das Bukolische bewusst als einen schillernden und widersprüchlichen Begriff ein. Durch seine Konzentration auf die Ränder der Agrarlandschaft, auf das Wilde zwischen Land und Meer, wendet er sich vom klassischen Topos der Bukolik ab und unterläuft ihren Hang zur Idyllik. Auch ist seine oben erwähnte Dramaturgie der Zeit denkbar weit entfernt vom einflussreichsten aller Hirtengedichte, Vergils Vierter Ekloge. Dort kündet ein göttlicher Knabe, der bald als Vorläufer des Messias gedeutet werden sollte, von einem Goldenen Zeitalter, in dem sich der Mensch nicht mehr der Mühen der Landwirtschaft unterziehen müsse.

Wie die Bukolik die Spannung zwischen heroischem Versmaß und alltäglicher Szenen sucht, schlägt allerdings auch Lehmanns *Tagebuch* seinen Funken aus einem hohen Ton, der ganz den Dingen in ihrer Endlichkeit verschrieben ist: "unten spritzt das Meer Salz auf die Erde. Von allem Geruch der Welt: der des Brotes; von allem Geschmack der Welt: der des Salzes. An dieser Stelle hört das Dasein auf. So beginnt es an dieser Stelle." (31) Wie viele Intellektuelle der Weimarer Zeit, die sich aus dem Schatten des Ersten Weltkrieges herausarbeiten mussten (Lehmann desertierte zweimal an der Westfront und verarbeitete seine

[4] Lehmann betonte mehrfach die Analogie zwischen etymologischer Forschung und Botanisieren, die beide durch die Suche nach geheimen Verwandtschaften geprägt seine, siehe hierzu Hans Dieter Schäfer: *Wilhelm Lehmann. Studien zu seinem Leben und Werk*. Bonn: Bouvier, 1969, 13-19.

[5] Charles Taylor: *The Language Animal: The Full Shape of the Human Linguistic Capacity*. Cambridge, MA: Harvard UP, 2016.

Erfahrungen im Roman *Der Überläufer*), war er auf der Suche nach Verhaltenssicherheit in einer als völlige unsicher empfundenen psychologischen, gesellschaftlichen und politischen Situation. Helmut Lethen hat herausgearbeitet, wie sich viele brillante Geister der Zeit am Ideal einer "kalten Persona" orientierten – an einer Selbststilisierung als souverän, schockresistent und mitleidslos, die in einer unbeständigen Umgebung die eigene Relevanz durch Anpassungsfähigkeit sicherstellte.[6] Gewiss zeugt auch Lehmanns Spiel mit der Dichterpersona als reinem Medium vom Versuch der Selbstsicherung durch Selbstentäußerung. Gewiss verrät seine naturkundliche Präzision auch eine Nähe zum kalten Blick der Neuen Sachlichkeit. Doch an keiner Stelle übt er die "Verhaltenslehren der Kälte" ein, mit denen sich viele seiner Generation gegen die Gespenster ihrer vergangenen Zukunft zu helfen suchten. Seine Anschauungskunst wird ihm vielmehr zur Lebenskunst. Er erarbeitet sich aus der Anderszeitlichkeit der Natur und aus der Arbeit an der Sprache eine Persona der Offenheit und Zuneigung. Wenn durch seine Texte nicht immer wieder eine steife Brise oder ein eisiger Wind fegten, wäre man sogar versucht, von einer "Verhaltenslehre der Wärme" zu sprechen. Sicher sind es Exerzitien der Zugewandtheit zum Dasein.

Das *Bukolische Tagebuch* erschien ursprünglich als Kolumne in der nicht gerade weltläufigen Berliner Sonntagszeitung *Die grüne Post*. Das hat seine Rezeption in literarischen Kreisen nicht gerade gefördert. Und die Erwartungen des Herausgebers Ehm Welk mag auch für gewisse eskapistische und betuliche Passagen verantwortlich sein, von denen nicht alle Tagebucheinträge frei sind. Erst 1948 erschien unter der Lizenz "US = W = 2013" der Alliierten eine Gesamtausgabe des *Tagebuchs* beim Verlag Parzeller & Co. in Fulda. Klett Cotta brachte es dann 1999 im achten Band einer kritischen Gesamtausgabe. Die bibliophile Neuausgabe vereinigt nun alle Schriften Lehmanns, die im weiteren Zusammenhang des *Bukolischen Tagebuchs* anzusiedeln sind. Diese Zusammenschau ermöglicht einen faszinierenden Einblick in Lehmanns Kunst der Landschaftsschilderung und Selbstreflexion. Dankbar werden die meisten Leser auf das Register von Verena Kobel-Bänninger zurückgreifen, das hervorragende Nachhilfe in feldbiologischen Fragen leistet. Hanns Zischlers Nachwort rückt das *Bukolische Tagebuch* in die unmittelbare Nähe von Lehmanns *Überläufer*. In beiden "bekundet sich ein Reflex der Selbsterhaltung des Individuums und untrennbar damit verwoben ein energischer Wunsch, die bedrohte Schöpfung *in die Sprache* zu retten." (276)

Als Naturforscher, Philologe und Pädagoge vereinigt Lehmann in seinem Schreiben Qualitäten aller drei Rollen und fügt sich nicht in die Muster akademischer oder feuilletonistischer Intellektualität seiner Zeit. Geprägt von der englischen lyrischen Tradition und Autoren wie Henry David Thoreau und Jules Renard, freundschaftlich verbunden mit Dichtern wie Moritz Heimann, Oskar Loerke und Werner Kraft, bleibt er ein Solitär, ein innerer Emigrant. Einer, der sich

[6] Helmuth Lethen: *Verhaltenslehren der Kälte. Lebensversuche zwischen den Kriegen*. Frankfurt am Main: Suhrkamp 1994.

im Schreiben immer wieder seiner Fähigkeit zur Wärme versichern muss; einer, der die Grunderfahrung einer existenziellen Angst immer wieder neu in einem "beredte[n] Schöpfungsjubel" und einem Gegenmythus zum, Mythus des 20. Jahrhunderts' kontextualisieren und dadurch beruhigen muss, nicht immer frei von thematischen und bildlichen Wiederholungszwängen.[7] Alfred Döblin verlieh ihm, gemeinsam mit Robert Musil, 1923 weitsichtig den Kleistpreis. Bis heute ist das ästhetische Establishment dieser Weitsicht noch nicht gerecht geworden. Das ist vielleicht gut so, "denn wir leben vom Nichterklärten." (105) Und das kann schließlich nur dort überleben – wo es nicht erklärt wird.

[7] Heinrich Detering: "Der Regen wärmt wie Drachenblut. Zu Wilhelm Lehmanns Lyrik", in: Uwe Pörksen (Hg.): *Wiederbegegnungen. Wilhelm Lehmanns poetisches Spektum*. Göttingen: Wallstein, 2006: 51-59, hier: 57.

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Paul Lindholdt, *Explorations in Ecocriticism: Advocacy, Bioregionalism, and Visual Design* (London: Lexington Books, 2015), 237 pp.

In *Explorations in Ecocriticism*, Paul Lindholt opts for a cross-fertilizing approach of ecocriticism, interweaving literary and scientific studies of early to contemporary travel and nature writing, anthropology, environmental history and politics, visual arts, ecopoetry, narrative scholarship, and pedagogy. This cross-disciplinary approach benefits from looking at fine arts and technological issues through original lenses such as imperialist nostalgia, bioregionalism, and ecopornography. Lindholt's overt praise of radical activism is tempered all along by a call for reverence, for a sense of wonder at the living world, for a sense of place and the advocacy of a bioregional ethos.

Chapter 1 offers a fresh take on the literary and scientific qualities of early American natural histories prior to the nineteenth century. While early natural and travel histories oscillate between scientific fact and artistic license, they give early insight into many of the same sustainability issues which continue to preoccupy us today. Lindholt redeems histories that have been largely sidelined by academia, showing how they chronicle changes affecting the land and local ecosystems in ways that anticipate modern environmentalism. Not only do such histories provide precious encyclopedic records of the fauna and flora of colonial times, they moreover bear testimony to the evolution of humanism and utilitarianism in North American culture. Lindholt argues that these writings' rhetorical penchant for hyperbole links them to the origins of the American tall tale, which he traces back to seventeenth century writings where "the land's extravagant fables" were exploited "to lubricate colonial immigration" (13). They furthermore offer early glimpses of key concepts such as island ecology and ecological imperialism, pastoralism, postequilibrium ecology, conservation, and the observer effect, while they encourage us to "appreciate ecology as a shaping device, a determinant of forms" (25).

Chapter 2 focuses on "Literary Activism and the Bioregional Agenda." Studying "humanity's interpenetrations and interpretations of nature", bioregionalism calls attention to the myriad connections between communities and land that may sustain both ecology and human culture (28). The bioregionalist approach connects anthropology with ecology and geography, empowering more meaningful scholarship both within and outside of academia. Its transdisciplinary basis and interest in local places, fauna and flora, lore and peoples may drive literary activism beyond purely academic concerns, working toward mindful reinhabitation.

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Lindholt reminds us that writing becomes political as it strives to effect change. While writing driven by praxis joins philosophy and activisism in ways that can help bring about political change, literary scholars may play a key role in deconstructing and challenging the discourse produced by government officials undermining bioregional efforts. Bioregional writing and studies are thus in many ways "helping to seed new eco-cultures of peoples who know, love and care for their lands" (31).

Chapter 3 teases out ambivalent readings of Theodore Winthrop's life and writings. If his work is stamped with the geographic beauty of North West landscapes, it nevertheless "screens off offensive sites of conquest and imperial power," a serious shortcoming the Hudson River school of painters who inspired Winthrop are also admonished for (42). Often marred by religious bigotry, Winthrop's splendid depictions of landscape conceal the despoiling of land, the extermination of creatures, and the violence against native peoples which Manifest Destiny ideology gave license to. Taking issue with such misrepresentations of the land and its Native dwellers, Lindholt links Winthrop's writing to the thought-provoking concept of "ecopornography."

Chapters 4 and 5 focus on the iconography and ideology of sabotage, tracing a line of anarchist culture from the American Revolution to Edward Abbey, Earth First!, and other movements and figures of ecotage such as Neo-Luddism – a movement whose critique of and wariness towards technocracy was much influenced by Abbey. Emphasizing the malleability and sustainability of icons, Lindholt shows how these provide powerful tools to reach often disinterested audiences. Lindholt moreover pinpoints the flaws in the now-rampant term "ecoterrorism". He underlines the nonviolent philosophy which guides ecosabotage, with a clear line separating damage inflicted on machines from harm done to living things.

The longest in this collection of essays, Chapter 6 devotes close attention to analyzing the hidden motives behind the commissioning of artists by the Bureau of Reclamation. Looking closely at many paintings and other visual arts from the late 1960's onward, Lindholt reveals the Bureau's unacknowledged agenda to use aesthetic and ethical responses to sublime art in order to promote their intensive damn-building program. While ecological legislation was being passed that could bring bad press to the Reclamation Program, the imaginative work of famous artists served to shift the values associated with western dams and canals, praising the creation of recreational sites and the artistic use of innovative technologies. While kindling a sense of admiration for projects that extensively redesigned the landscape, such art simultaneously worked to erase people's very notion of and hankering for pre-dam places. Lindholt goes back here to some of the issues broached in Chapter 3, reading many of these paintings as ecopornography, in that they "[traffick] in staged intimacies and ecstasies" (124), concealing negative impacts on the environment together with an expansionist ethos that revered human technological feats.

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Chapter 7 convincingly argues that writings issued by defenders of the counter-environmental wise-use movement (WUM) deserves more attention in ecocritical studies. In spite of their pervasive use of contrarian science and their obvious upholding of ideologies promoting an endless exploitation of nature for the sole benefit of humankind, these writing may nevertheless be mind-opening in that they underscore the cultural clashes that hinder environmental politics and ecological awareness – clashes that take the form of "battles of words, of ideology, and of science" (146). These writings help understand the current tactics of "greenwashing" and "aggressive mimicry" used by various WUM groups. Moreover, if counter-environmental literature does not revel in the rhapsodic as much nature writing does, it nevertheless shares certain traits admittedly characteristic of the latter, i.e. its alleged reliance on science and cultural criticism revolving around our understanding of nature. Indeed, literature springing from the WUM should be examined and deconstructed for its counter-scientific claims that manipulate uninformed public opinion, for the ways in which it takes part in shaping socially constructed notions of nature, and because it casts a different light on the ways in which true environmental literature addresses the problems posed by such published works.

In chapter 8, Lindholt gives an insightful reading of Henrik Ibsen's 1882 play, *Enemy of the People*, and its 1950 adaptation by Henry Miller. Identifying the timelessness of the themes, struggle, and rhetorics found in this play, Lindholt shows how avant-garde this play now appears, shedding light on its continuing relevance. *Enemy* foreshadows many of the challenges still encountered by environmental scientists, journalists, and activists. While staging the various economic and discursive forces at play in environmental combats, *Enemy* highlights the politicization of science, the slippery use of certain rhetorics, the potentially tricky role of provincial presses, the dangers linked with advocacy journalism, together with the misinformation often spread by corporations and developers influencing the judiciary through lobbying groups.

In chapter 9, Lindholt recounts some of his personal experience as a professor of English at Eastern Washington University to investigate the dilemmas, pitfalls and benefits of teaching accountability to others and to place via a bioregionalist approach of environmental humanities and English composition classes in the rural West. Combining field excursions with explorations of place-based attachments, the pedagogy he has developed strives to "enlighten and empower […] students to shape the future" (174). Environmental studies, he argues, ought to help students develop a sense of responsibility that stems, on the one hand, from empathy derived from personal connections to place, and, on the other hand, from the understanding of the complexities involved in the social and political inner workings of a specific bioregion as much as in its topographical and biological formations.

Building from some of his earlier reflections on how to best combine, develop, and exploit skills in critical thinking and composition, the last chapter

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zooms in on how English classes can effectively gain greater meaningfulness from the standpoint of environmental education. Lindholt here makes a fine case for "Restoring Bioregions Through Applied Composition." Wary of academia's tendency in the field of language arts to exhibit a fascination with self-reflexive theory and abstraction, Lindholt deplores the resulting detachment and estrangement of much scholarly work, too often "arrogant, specialized, void of particularities" (186). "Consequentiality," he cogently argues, "might arise, though, from place-based or bioregional study as it couples with more personal modes of communication and the affective domain" (186). Lindholt then goes on to disentangle some of the humanist assumptions that "erect barriers between our species and nature," and that have shaped today's compartmentalized thinking in which our present environmental crisis is in great part rooted. Reactivating our perception and imagination of place, transdiciplinary ecopoetry and ecocriticism, Lindholt shows, can help humans fight the alienation and atomism characteristic of our times by restoring a sense of connection to place, affiliating both intellectually and affectively with place and the life it carries, thus developing one's "ecological identity". Teaching applied composition furthermore equips students with strong skills in deconstructing discourse through critical analysis and in using rhetoric and language in ways essential for anyone seeking to work in environmental justice and activism.

Lindholt's fine contribution to the field of ecocriticisim lies in great part in the way he stresses the need to reexamine cultural productions in the light of their environmental stakes, welding together scientific, literary, historical, semiotic, political and economic approaches. His book emphasizes the very real consequences brought about by artistic forms of discourse. Most essentially, it challenges many assumptions about academic practices and paves the way for more consequential teaching and writing in relation to environmental issues. One of the greatest qualities of this book, surely, consists in Lindholt's personal explorations of various art forms, situated environmental conflicts, ideologies and practices. Indeed, journeying through his tightly-knit yet diverse reflections, the reader is constantly guided and grounded by Lindholt's narrative scholarship, tying his analyses of art and theory to meaningful personal experiences. Additionally, the language is always rich, elegant and colorful. Lindholt's idiomatic, lively and sharp style sustains the readers' interest throughout, and convincingly illustrates the ways in which academic language can make for dynamic, thought-provoking and affective forays into studies that, one can thus never forget, indeed matter.

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Book Review: Antonia Mehnert, *Climate Change Fictions: Representations of Global Warming in American Literature* (London: Palgrave Macmillan, 2016), 254 pp.

One of the most difficult issues humanity is facing, climate change has drawn the attention of many scientists, scholars, politicians, and activists worldwide. While the dominant approach is still a purely scientific one, humanities scholars insist on examining the phenomenon as a cultural issue and propose analyzing various artifacts that tackle the problem of climate change in one way or another. Among such scholars is Antonia Mehnert, who in her recent book *Climate Change Fictions: Representations of Global Warming in American Literature* investigates the portrayals of global warming in literary fiction.

From the first pages on, Mehnert argues that cultural representations, including those in film and literature, "make an important contribution to our understanding of climate change by depicting how future generations might adapt or might fail to adapt to climatic changes" (2). She makes a pivotal addition to her contention: "[C]ultural texts pose ethical questions concerning not only the extent of the human impact on the planet, but also decisions about who or what is saved or left to die in a climatically changed future" (2-3). Mehnert thus attempts to examine literature as a medium that is capable of reflecting the socio-political complexity of climate change. She views literary narratives not just as texts but rather as tools that "mediate and shape our very reality" (3). *Climate Change Fictions* encompasses an analysis of twelve literary narratives ranging from novels to short stories, written by both already established and newly emerging authors. It is divided into six chapters in which Mehnert skillfully interweaves the political, scientific, social, and cultural aspects of global warming. She begins with the chapter entitled "Climate Change Fictions in Context: Socio-Politics, Environmental Discourse and Literature," in which she provides an overview of U.S. attitudes towards climate change, drawing the reader's attention to the political and social 'climate' of the issue. In doing so, Mehnert draws a line from the apocalyptic fears of ecological disaster as they emerged in the years after WWII to the changing attitudes towards the issue of global warming up to the presidency of Barack Obama. In the same chapter, Mehnert elaborates on how climate change can be located within the field of ecocriticism, discussing the relationship between literature and nature, and tackling the problem of representing climate change in film and literature.

The chapters that follow provide an extensive analysis of selected climate change texts. Thus, in the second chapter, "Scaling Climate Change: The Transformation of Place in Climate Change Fiction," Mehnert zeroes in on Steven

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Amsterdam's *Things We Didn't See Coming* and Barbara Kingsolver's *Flight Behavior* to "explore how a planetary transformation such as climate change impacts our understanding of locality and place and illustrate how these climate fictions ultimately present novel ways of envisioning climate change as the deterritorialized crisis it is" (53-54). From the issues of space and place, Mehnert moves to that of time, constructing a cluster of dimensions that climate change exists in and within which it should be examined. Chapter 3 – "Reimagining Time in Climate Change Fiction" – focuses on T.C. Boyle's *A Friend of the Earth* and Jean McNeil's *The Ice Lovers* to discuss perhaps the most problematic question that surrounds global warming: "How does one think about something as intangible and invisible as climate change, which does not affect one's life immediately but possibly at some time in the future?" (93). One of the functions of literary fiction, Mehnert suggests, is to give concrete form to the real but elusive danger of global warming.

"Manufacturing Uncertainty: Climate Risks in an Age of 'Heightened Security'" – the fourth chapter in the book – is devoted solely to Nathaniel Rich's recent novel *Odds Against Tomorrow*. In this section, Mehnert examines various political and economic factors that construct and influence climate change. She also looks at the matter from a reverse perspective, analyzing the pernicious influence global warming will have on politics and the economy, and investigating how Rich "not only critically challenges the growing importance of probabilistic calculations for political and especially economic decision-making, but also raises questions of how to navigate through and adequately respond to varying uncertainties in everyday life" (127). In Chapter 5, "ClimateCultures in Kim Stanley Robinson's *Science in the Capital* Trilogy," Mehnert provides an extensive analysis of *Forty Signs of Rain*, *Fifty Degrees Below*, and *Sixty Days and Counting*. In her reading of these three novels, Mehnert makes a crucial contention, namely that it is wrong to dichotomize the study of climate change according to the issues of nature and culture, and proposes to recognize "human embeddedness in nature" (150). Drawing on numerous scholars, Mehnert persuasively argues that nature and humankind are as indivisible as nature and culture, and that therefore only a complex analysis that forgoes these categorical distinctions can attain a full understanding of climate change as a multifaceted phenomenon. In the book's final chapter – "Representing the Underrepresented: Climate Justice and Future Responsibilities in Climate Change Fiction" – Mehnert examines Octavia Butler's *Parable of the Sower*, Dana Stein's *Fire in the Wind*, Benh Zeitlin's *Beasts of the Southern Wild*, as well as Paolo Bacigalupi's "The Tamarisk Hunter" to illustrate the ways in which climate change fiction deals with ethical questions such as responsibility and justice. Mehnert showcases how certain people and/or territories come to be regarded as expendable by those in power. In the narratives selected for this chapter, "climate change aggravates processes of maldistribution" (191), reflecting the ways in which real-life socio-political inequalities are compounded by environmental change.

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Examining climate change from multiple perspectives informed by political science, the natural sciences, and the humanities, Mehnert masterfully demonstrates the significant role each discipline plays in the analysis of environmental crises, even as she always foregrounds "literature's particularly well-suited means to envision this elusive and abstract phenomenon called climate change" (228). *Climate Change Fictions* is an ambitious, valuable, and above all timely contribution to environmental and literary studies. The book will be of interest to anyone who strives to understand the culture of climate change. It is, without a doubt, an essential resource for scholars and students of ecocriticism.

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Mission Statement

This journal of ecocriticism, founded in 2010, is a joint initiative of GIECO (Ecocritical Research Group in Spain) and EASLCE (European Association for the Study of Literature, Culture and Environment) and is published by the University of Alcalá as of 2014. Its principal aim is to further the study, knowledge and public awareness of the connections and relationship between literature, culture and the environment. As a virtual space, it provides a site for dialogue between researchers, theorists, creative writers and artists concerned with and by the environment and its degradation. Its pages are open to contributions on all literatures and cultures, but its special mission is to reflect the cultural, linguistic and natural richness and diversity of the European continent.

Contributions, which are subject to double-blind peer review, are accepted in five languages, in order to increase visibility and broaden the participation of scholars who are not part of the English-speaking world. *Ecozon*@ publishes original research articles, in addition to creative writing, visual arts and book reviews. Publication is open to scholars interested in ecocriticism from around the world. We recommend membership of EASLCE to our contributors and readers, but it is not a requirement for either.

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