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TOWARD A POLITICAL ECONOMY OF NEOLIBERAL CLIMATE SCIENCE

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Perhaps even more than the other types of "nature" that are said to constitute the subject matters of the sciences, "the climate", "climate change" and "the climate system" are often construed today as monoliths, essentialized and externalized from a similarly block-like "society". Policymakers, environmentalists and flood refugees are commonly understood to be connected to an independently-coherent natural world of climate through interaction points across which biophysical processes are held to impinge on an otherwise relatively self-enclosed social or human world. This is seen to happen in two ways. The first is through brute "external shocks to social and environmental systems" (Taylor 2015: 32; see also Hulme 2011) to which society must "adapt". The second is through representation of those "external" biophysical processes or systems within various "internal cultural frames" (Taylor 2015: 39), notably those of a climate-scientist profession commonly understood to have a privileged method for interpreting signals passing through interfaces with nature (Rouse 2002) while filtering out static from society. Conversely, human influence on climate is seen, as Marcus Taylor puts it, as an "outside 'forcing' to an otherwise coherent model of atmospheric dynamics" (Taylor 2015: 38). Changes in a climate pre-formulated in terms of heat transfers, CO_2 molecules, cloud albedo and methane clathrates are to be collectively "mitigated" via a management gateway through which a sparsely specified "internal" reorganization of society via energy or economic policy can be focused on a separate physical world. Thus it was considered a normal piece of global policymaking for the 2015 Paris climate agreement to set itself up as a passage-point through which a unitary "international community" would be able to formulate ways to hold global average temperature rise in a similarly black-boxed physical climate system to "well below 2° C above pre-industrial levels" (UNFCCC 2015: 21). In this way, the environmentalist homily that society or the economy depends on and subsists within a climate system, "far from marking humanity's reintegration into the world, signals the culmination of a process of separation" (Ingold 2000: 209) involving distinct systems "locked into an endless dance of adaptation" (Taylor 2015: 39).

Today, the theme that climate is a nonhuman "force of nature", interpreted by climatologists, "that enfolds upon a similarly coherent society" that duly returns the favour is "firmly engrained in the politics of mitigation and adaptation at an institutional level" (Taylor 2015: 31). In official discourse, global warming politics is seldom understood as a matter of concrete histories entangling both humans and nonhumans in surplus extraction, neocolonialism,

racism, hydrocarbon use, labour discipline and struggles over class (Malm 2014, Huber 2009, The Corner House 2014, Moore 2015) and modes of respect for and dialogue with non-humans (Smith 2007). Instead, it is shrunk into an exercise in the control or "governance" of an external, zombie climate (Boykoff, Frame and Randalls 2010), the indeterminacy of whose antics are reduced to the percentage-point probabilities that the Intergovernmental Panel on Climate Change (IPCC), à la *Star Trek*'s Mr. Spock, is constrained to present as "inputs" to the policy process (IPCC 2013, Lahsen 2005). Experts, states and private corporations become the relevant agents in a centralized, territorial, supposedly science-driven global environmental monitoring and mitigation system of "green governmentality" that moulds "environments to fit the sovereign state" (Kuehls 1998: 49) but also fuses in a "mutually constitutive" combination (Bäckstrand and Lövbrand 2007: 131) with a purportedly decentralized liberal market-environmentalist order that requires climate to be not only measurable, predictable and stabilizable but also cost-optimizable. Far more than other environmentalisms, climate activism tends to rely on the conclusions of scientists about a physical globe as "seen from above" in isolation from experience in the everyday spheres that Tim Ingold (2000) calls "lifeworlds". At official and academic meetings on global warming, climatologists empowered as spokespersons for nature regularly "present the science" and then leave the room to let policymakers or activists empowered as spokespersons for society get on with discussions about how to maintain surplus extraction in a greenhouse world. Climate deniers do their bit toward maintaining the same climate/society, science/nonscience binaries when they profess horror that some scientists might have "cross[ed] a line into policy advocacy" (Broder 2010). Environmentalists such as Bill McKibben chip in when they advocate a politics in which "physics and chemistry call the tune" to which governments dance (Romm 2011; cf. Carey 2014). Scientific panels are meanwhile convened to decide at what point "humanity's" influence on a separate "natural" world became powerful enough to justify the naming of a new, anthropocene geological epoch (Lewis and Maslin 2015). Contemporary climate politics, in short, continues to be characterized by incessant nature/society "boundary work" (Gieryn 1999, Keller 2011, Ramirez-i-Olle 2015), helping to shape both fertile research programmes and productions of ignorance, as well as institutionally embodied notions of knowability, causality and governability (Seager 2009, Israel and Sachs 2013). Under this settlement physical scientists' responsibility to society consists in protecting a privileged apprenticeship to what is construed as nonsocial; their authority and status comes to depend on conjuring (in public, at least) a nature that is predictable, controllable and separated from commons – in short, either dead or irreducibly non-human.

Should the study of the political economy of climate science fall in with this dualism-producing politics? Should it assume that climate science is a "natural kind" (Rorty 1991: 46–62), possessing an essence that places its internal procedures outside politics and economics (Woods 2007)? Should it therefore avoid attempting to trace ways in which knowledge of climate might be one with "those cultural practices and formations that philosophers of science have often regarded as 'external' to knowledge" (Rouse 1996: 239) and instead confine itself to exploring political conditions under which the posited scientific independence is and is not possible? Or – as will be presumed here – should it instead view these binaries as actively produced and themselves subject to investigation and challenge, taking its cue from widespread, longstanding resistance to the settlement exemplified by these very segregations and their associated interfaces? Today, this opposition is manifest above all in indigenous, peasant, feminist, gay rights and anti-racist politics. Examples include small-farmer movements that hold at arm's length conceptions of resources, ecosystem services or natural capital (Confédération Paysanne 2014); Amazonian defences of territory partly grounded in practices that avoid a

conception of nature as background objects over which culture is draped (Viveiros de Castro 2004a, 2004b; Kohn 2013); organized challenges to claims of "natural authority" deployed by patriarchists to justify oppression of women; and health and environmental movements that have "played a crucial role in politicizing technical domains that liberal discourse had formerly isolated from the scope of politics" (Thorpe 2008: 75; see also Epstein 1996). This resistance dovetails with various strains of post-1970s academic work in science and technology studies, which have questioned the society/nature binary, and "illustrated in rich detail the enormous problems with presuming there is any such single and definable thing as 'science'" (Tyfield 2012: 46), and insisted that the technosciences both help constitute and are partly constituted by a much broader field including commerce, colonialist history, property law, territorialization, structures of feeling, economic policy, and military, corporate and foundation patronage – all the way down to the most intimate reaches of the relata (Barad 2007), measurements and units of analysis that the technosciences feature and do not feature (Birch 2013, Kleinman 2003, Robertson 2012). Much of this work has consisted of resolutely "local" ethnographies of professional research communities that demonstrate how objects are constituted, transformed and made circulatable, histories erased, methodologies standardized, mechanized and black-boxed, laboratory labour "frozen" into various instruments, fact/value distinctions erected, and knowledge claims negotiated in particular laboratory and field settings according to a shifting variety of criteria that would be considered "non-scientific" according to the settlement sketched above (Latour and Woolgar 1979, Collins 1985, Knorr-Cetina 1981). This ethnographic approach is sometimes seen as consorting with political accommodationism. But once it succeeds in beginning to break down and "distance" the settlement at the level of what Karin Knorr-Cetina calls the "hard core" of science – "its technical content and the production of knowledge" (1995: 140; cf. Bloor 1981) – then there is no reason why it should not be understood as a crucial contribution to the more thoroughgoing political economy of science that many activists are also pursuing. Such a political economy aspires to spell out in detail, and help open up for intervention, the series of links that join even the most quotidian scientific practices with, for example, colonial history, industrial labour exploitation and neoliberalism. In doing so, it extends laboratory ethnographies – often constrained by having to focus on how cooperation among experts is achieved in the creation of transportable "factness" – into a more agonistic arena in which the structures resulting from some collaborations are resisted as threats to livelihood, liberation or survival. One way of viewing researchers as diverse as Daniel Lee Kleinman (2003), George Caffentzis (2013), Emily Martin (1989), Donna Haraway (1989), Peter Galison (2004), Robert Marc Friedman (1989), Londa Schiebinger (2004), Jason W. Moore (2015), and Salvatore Engel-Di Mauro (2014) is as contributors of materials for such a self-consciously activist political economy of science that can delineate and intervene in a contiguous, evolving, heterogeneous field of power that is both direct and indirect, agential and structural, "political" and "scientific".

One obstacle to promoting such an approach to the political economy of climate science is that, instead of being seen as a challenge to the dominant settlement, it is often interpreted according to that settlement's terms, as an attempt either to debunk climatological practice because it is not "pure" or to expose or reduce "bad influences" – such as the privatization of science, or funding for the wrong kind of research programmes – that prevent climate scientists from doing their "proper" job of deploying scientific method to represent the facts of nature correctly to society. An approach unwilling to assume *a priori* dualisms between nature and society or science and nonscience often has to do a lot of heavy lifting to show why it is not contrasting a "situated" (Haraway 1991: 183–201) with an imaginary "unsituated" climate science, but rather distinguishing various actual and possible economically situated

sets of scientific practices (and scientifically situated economic or political practices (Shapin and Schaffer 1989, Ezrahi 1990, Mirowski 1992, Kob 2015) and why it might be both possible and liberatory to engage with science and scientists for political change "within" science as well as without.

Making the task all the harder are academic border patrols that attempt to divide political economy of science off *a priori* from science and technology studies; the histories, philosophies and sociologies of science and economics; the economics of science and scientific knowledge; political theory; anthropology; postcolonial theory; political ecology; and most of all environmental activism and social and political movement-building. The fussily proprietary attitude that such boundary work reveals hinders political economists in advance from benefiting from many of the tools and collegial relations that they need if they are to come to terms with what links historical patterns of, say, financial investment, neocolonialism, resource extraction, grant funding, or agrarian class struggle with the concepts, devices and conclusions found in the gathering places of scientists, and vice versa. Indeed, it makes it hard for the study of political economy to understand itself, since it obscures the origins of "the economy" itself, whose historical specificity might have remained relatively unexplored were it not for the work of political scientists, anthropologists and science and technology scholars (Mitchell 2002, Callon 1998). Most important, if political economy of science is to concern itself not with "*whether* there is and/or should be a 'politics' of science", but rather with "securing a more democratic process of deciding *which* politics (and culture) of science dominates [sic]" (Tyfield 2012: 87; see also Kenney 2015, Harding 2004), then it cannot help but overlap with political activism. A political economy of science capable of finding its place among the activities that Joseph Rouse (1996: 237–259) calls the "cultural studies of science" will view the claim that it must be different in kind from, say, political ecology, or from political mobilization, or from science itself, with as much suspicion as it does the claim that all such activities are the same.

What does such a "difficult" political economy of climate science look like? This chapter offers one brief perspective by commenting on two quotations from the relevant scientific literature. One comes from the Intergovernmental Panel on Climate Change (IPCC), the body charged by the United Nations with formulating global scientific consensus on global warming. The other comes from research conducted partly at Resources for the Future, a Washington think tank that has advocated market approaches to environmental policy for many decades (Lane 2015) with the support of corporations such as Duke Energy, Goldman Sachs, BP, Weyerhaeuser, Chevron and Rio Tinto (RFF 2015).

Neither quotation possesses any intellectual distinction or political importance in itself. But both are appropriate platforms for suggesting what the scope of a critical political economy of climate science might be, for three reasons. First, their artless air of common sense (neither statement feels the need to burden itself with argument or evidence), which reveals the entrenched nature of the relations of political and economic domination that they represent, cries out for a political economy approach that achieves not so much an "unveiling" of influences or an opening of a black box as a "generative critique" (Verran 2001: 20–47) continuous with a collaborative crafting of effective points for fresh intervention and resistance. Second, both quotations can be analyzed as occupying intermediate positions in the overall field of political/scientific power, linking the kind of politics conventionally considered as "extra-science" (investment trends, class struggle) to various practices "within" what is conventionally demarcated as science (instrument readings, hypotheses about causal chains). Third, taken together, the two quotations indicate a significant recent transition in the ongoing "co-constitution" (Jasanoff 2004) of capital and climate science.

From enclosure to postwar settlement: the Intergovernmental Panel on Climate Change

"Underlying all aspects of [our] report," affirms a "Summary for Policymakers" put out by Working Group I of the Intergovernmental Panel on Climate Change, "is a strong commitment to assessing the science comprehensively, without bias and in a way that is relevant to policy but not policy prescriptive" (IPCC 2013: vii).

This classic statement reiterates in one crisp sentence numerous features of a longstanding settlement that attempts to govern how the sciences are supposed to relate to politics and economy and vice versa. The phrase "*the science*", with its emphatic definite article, implicitly black-boxes science as a bounded article that can influence and be influenced by politics but is constituted by processes that are distinct. It also implicitly channels, in advance, potential challenges to that science into the form of proposals for alternative "objects" that can be fixed or fetishized to a greater or lesser degree (Verran 2001). The term "*comprehensively*" tends to conceal the partial or incomplete structure of knowledge and directs attention away from the various fresh ignorances continually produced in the course of inquiry. "*Without bias*", in denying the ways climate science necessarily carries within itself attributions of causality, responsibility and property that support some interests and are prejudicial to others, positions the IPCC as a political opponent of social movements that have questioned the possibility of unbiased expertise. "*Relevant to policy but not policy-prescriptive*", embodied in the IPCC's bureaucratic division of its processes into three tracks dealing with physical sciences, socioeconomic impacts and possible policy responses, works not only to keep alive a fact/value dichotomy under assault for over two centuries but also to reify dominant postwar US structurings of political responsibility. In performing the "god trick" (Haraway 1991) of making climate both representable by knowers removed from politics and manipulable by controllers advised by the knowers, the passage helps keep spaces open for both geoengineering and carbon trading – which is one reason why investigating its political economy is crucial to social movements fighting such initiatives.

One part of this investigation could well zero in on the supercomputer-driven global circulation models (GCMs) that enable and constrain the climatological work of the IPCC (see Johnson, this volume). The "god's-eye view" (Lahsen 2005: 911) characteristic of such models, and their tendencies to reinforce climate determinism (Carey 2014) and accrete ever-increasing volumes of disaggregated physical data to the exclusion of knowledge that cannot be so easily "plugged and played", are neither accident nor conspiracy. They are rooted, rather, in postwar systems analysis, military-spurred digital developments, computer simulations of powered flight and the nonlinear fluid dynamics of nuclear explosions, Cold War-era cybernetics, World War II-era artillery-control servomechanisms and, more remotely, the mechanical feedback-control "governors" required by Industrial Revolution steam engines (Edwards 2013, Elichirigoity 1999; Beniger 1986) and the population "servomechanism" postulated by Thomas Malthus, one of the godfathers of nature/society binaries. Nor is the computerized mapping of energy flows and balances exempt from political economy inquiry. Such mapping would not be possible at all without the prior practices of commensurating heat, force and electromagnetism that resulted in circulatable units of abstract "energy", whose physical and theoretical emergence during the 19th century cannot be separated from the drive to amplify, disaggregate and discipline wage labour in Europe using fossil-fuelled engines and dynamos (Corner House 2014). If GCMs sometimes appear to the innocent eye as capable of dissociating climate change from civilizational politics, allowing it to be "medicalized" instead (Fleming 2014), this is only because they have tended to "disappear" this history into the fetish of all-purpose thermodynamic energy as one aspect of a nonsocial "nature".

Arguably, the project of measuring, modelling and manipulating in a "virtual" way various exchanges of carbon among the atmosphere, oceans, and terrestrial and geological reservoirs is well-funded partly because it invites a view of climate action as the expert governance and placement of molecules globally. Responsibility and property can be assigned according to the geographic jurisdiction from which the molecules originate. Internationally agreed methodologies for accounting for flows of greenhouse gases within state territories via commensuration of biotic and fossil emissions into a uniform CO_2 meanwhile create the possibility of nationally owned carbon sinks (Paterson and Stripple 2007) and ultimately facilitate expert calls for "the intensive management and/or manipulation of a significant fraction of the globe's biomass" (Fogel 2004: 110) by imperial arrangements whose reach matches that of GCMs themselves. Ownership by national "geobodies" (Thongchai 1994) or institutions for the management of global territory under regimes of "green governmentality" then paves the way for ownership by private entities under a worldwide regime of "green growth" (see below).

This vein of political economy of science is continuous with the ongoing work of those social movements for whom the more than half-millennium history of nature/society dualisms associated with enclosure and state and private simplifications and appropriations is a living reality. For example, the study of political economy is well-suited to investigate the roles of GCMs, cost-benefit analysis, neoclassical economics and recent statist politics in the well-documented inability of today's climate modelling/policy complex to come to terms with various indeterminacies and uncertainties (see, e.g., Lahsen 2005, Hulme 2011, Nilsson et al. 2000, Jonas et al. 1999, Jonas et al. 1998, Schulze et al. 2000, Anderson et al. 2001, Randalls 2011, Carey 2014, Schultze et al. 2002, J. A. Nelson 2008). But only an intellectual perspective informed by popular movement work will be able to place the results of such investigations in a wider narrative of the rolling self-defeats that other sciences, too, have experienced historically in performing passive, calculable, controllable, circulatable natures in the face of partly nonhuman peasant or indigenous practices of recreating "complex, heterogeneous ensembles" (Smith 2007) relating to land and labour. These practices – often characterized by cautious respect, propitiation and reciprocity across human–nonhuman boundaries – also illuminate the long history of science, capital accumulation, and accumulation's component others. If political economists studying steam and internal combustion engines as well as industrial and computing machines more generally have learned from labour movements (and vice versa), so too can political economists investigating the science of GCMs learn from many of today's popular struggles for land, forests and the atmosphere (and vice versa). Updating Marx, one might say that the apparatuses (Barad 2007) in which climatologists participate make their own "factnesses" about climate, but not in circumstances of the climatologists' – or the apparatuses' – own choosing (cf. Kleinman 2003, Paterson and Stripple 2007, Hay 1995). It is precisely this black-boxing or "structurizing" at diverse levels, moreover, that necessitates political responses that move beyond technical or moral injunctions directed at the accountability of institutions or individuals toward the building of radical social movements committed to reworking science from "within" as well as "without".

Neoliberal evolution: climate control becomes marketable

Since the 1970s, new elements have been bricolaged onto the historical nature/society settlement in which most climate science is practised. Ecosystem functions – a category partly traceable to colonial-era (Anker 2001) as well as cybernetic postwar US military innovations (Elichirogoity 1999, S. H. Nelson 2015) – have become subject to protective state regulation,

and then transformed into ecosystem services, which have become tradeable assets in transactions which are supposed to reduce regulatory costs. These assets have been fashioned and appropriated by the state and business in a process paralleling the more general privatization of public goods that has gained ground under neoliberalism, generating novel kinds of rent (Felli 2014). Advertised as being capable of addressing ecological crisis in "depoliticized" ways that help free business from constraints that might otherwise be imposed on it by environmental movements, planners or conventional regulation, markets in the new assets are also supposed to help relieve the state of much of the increasing expense of an environmental protection that is redefined to be compatible with growth or capital accumulation.

Some of what this means in terms of the content of climate sciences is neatly summarized in a 2007 article in *Ecological Economics* entitled "What Are Ecosystem Services? The Need for Standardized Environmental Accounting Units" by James Boyd of Resources for the Future and Spencer Banzhaf of Georgia State University. Boyd and Banzhaf defend a definition of "ecosystem" that is frankly "derived from a desire for consistency between conventional market accounting units and ecosystem accounting units" (626) so that "one particular set of accounting units is applicable to both of these broad applications" (617).

Boyd and Banzhaf's formulation encapsulated a conflicted movement that had been under way in climate and other sciences since at least the 1980s. For example, the 1992 UN Framework Convention on Climate Change started out by following climatologists in figuring the earth's atmosphere, somewhat in the style of the US environmental laws of the 1970s, as a zone of externalized, potentially regulatable molecules. Atmospheric concentrations of greenhouse gases, it was proposed, were ultimately not to exceed such-and-such a level; those nations not doing their fair share would be punished; and so on. But under pressure from a US regime influenced by a "liberal environmentalism" (Bernstein 2001) spearheaded by politicians, NGOs and economists, the 1997 Kyoto Protocol then converted this agreement to reduce pollutants to a certain level into entitlements to emit them up to that level, and to make those entitlements tradeable. These entitlements – the right to charge rent on this aspect of nature – were then awarded to the states of the industrialized North (Felli 2014). Under the EU Emissions Trading Scheme, such entitlements have been mainly passed on to large industrial corporations. Although many business sectors expressed misgivings early on about the uncertainty and bureaucracy this would involve them in, the potential of carbon trading to provide relief from existing or threatened climate regulation to key corporations while putting new economic assets in circulation could not but be appealing to many at a time when the roster of the ten largest companies of the Fortune Global 500 regularly featured a preponderance of private or national oil companies, car manufacturers and national grids as well as banks bent on expanding into innovative financial products. Broadening the appeal of the shift, state and private-sector entrepreneurs were urged to produce additional circulatable entitlements ("offsets") for sale by expanding the earth's capacity to compensate climatically for fossil fuel emissions. The meaning of "expanding", moreover, was widened to include "preventing a decrease in". The results were twofold. First, entrepreneurs set off on a protracted scramble to annex forest, agricultural and other activities and subsume them, in both formal and real terms, to the sequestration of carbon. Hence pulpwood plantations, forest conservation and "climate-smart agriculture" became potential sources of saleable regulatory relief for industrial carbon dioxide polluters worldwide. Second, state and private entrepreneurs went to work to find or create as many instances as possible in which the causes – and thus legal ownership – of increases in (or purported preventions in the reduction of) the capacity of the earth to "clean up" fossil fuel emissions could be traced to themselves. Having previously been conceptualized as a "natural resource that needed to be defended from the onslaught of industrialism" or as pollution

prevention (Hart and Victor 1993: 667–68; cf. Maunder 1970), climate now needed to be capitalized "efficiently" as an ownable service.

At no point can this dynamic be separated out from the evolution of climate science, whether at the level of field methodology, laboratory apparatus or computer processor. For one thing, the new economic units relied for materials on the scientific units of the predecessor settlement. Just as the market in individual transferable quotas in Norwegian fisheries after the 1980s depended on the previous construction of cyborg "fish-as-fit-for-management" and the transformation of fishers working commons into "owners and investors" (Holm 2007: 239–240; Johnsen et al. 2009), so too the emergence of carbon markets depended on the prior development of a cyborg climate of CO_2 molecules. It was merely that the "plug and play" units appropriate for atmospheric circulation models had to be modified to make them pluggable and playable in economic circulation models as well (cf. Robertson 2012: 387; 2007: 503). If the IPCC's contested commensuration of biotic- and fossil-origin CO_2 – together with a half-dozen other greenhouse gases – into a new unit of nature, the "Global Warming Potential" (MacKenzie 2009), was useful (when suitably black-boxed) for the UNFCCC's territorial inventories of responsibility for global warming, it was also crucial (again suitably black-boxed) in increasing the scope for claims that a supposedly unchanging "climate change mitigation" was being more efficiently achieved through climate markets (Lohmann 2014). But the well-funded turn to "efficient" mass production of transferrable tokens of "reduction" set up reciprocal incentives for climate science to seek and perform large numbers of further equivalences capable of expanding the universe of units of an aggregate "mitigation" process untied from any single location, pedigree, time frame, technology or set of historical entailments. Just as species offset markets encouraged the development of scientific methodologies for identifying, measuring and circulating new, species-transcending units of nature called "species-equivalents" (Pawlicek and Sullivan 2012), about which clustered new knowledges and ignorances, carbon offset markets resulted in the proliferation of methodologies for identifying, measuring and transporting greenhouse gas "reductions" that – for example – incorporated both counterfactual and actual molecular flows, creating expanded opportunities for achieving a new, globally averaged pollution and a new aggregate nature of "net zero emissions" (Lohmann 2014, 2016). Such moves tended to intensify the nature/society binaries of the older settlement on which they were built, attempting to perform natures that were even "deader": more stabilizable, more predictable, more externalizable, more fragmentable, more extensively ownable. But they also extended the unstable field of power constituted by these settlements. The nodes forming this field were multiple and diverse but never isolated from each other. They included legal reforms affirming that, while the state had power to manage the climate system from "outside", it was not to venture too far into determining who produced what in which quantities, for whom, and at what price (Felli 2015), as well as innovations encouraging the financial bundling of quantifiable carbon-cycling capacity with other ecosystem services, claims on public subsidies and timber, recreational or mineral leases (Kay 2015). They encompassed institutionalized environmentalism, governmental and foundation funding sources, research institutions, and new types of territorial control, property relations, insurance, colonialist or racist reasoning and modes of militarized repression against communities whose presence interfered with the efficient manufacture and certification of ecosystem service tokens. Not least, they included new regimes of scientific inquiry: the new property and financial settlement, the new colonial settlement and the new epistemic settlement were one.

By the same token, the contradictions and contestations that have dogged the modified settlement, limiting its ability to rescue flagging labour productivity (Moore 2015), are at once political, economic and scientific. When activist groups protest the bankrolling of programs for

Reducing Emissions from Deforestation and Forest Degradation (REDD) by the Norwegian government, the Packard Foundation and others (No REDD Platform 2011), they are also, in effect, entering technical criticisms of the quality of forest offset science. Scientific arguments against the possibility of proving that offsets are quantifiably "additional" to what would have happened without offset projects (e.g., Anderson 2012) are simultaneously blows against the colonialism that reduces "the natives" to a passive background as well as contributions to Marxist praxis. A recent activist call to jettison the EU Emissions Trading Scheme (Scrap the EU ETS Coalition 2013), similarly, resists being parsed into separate scientific and political objections. Nor will the learning necessary to setting aside academic debates that oppose social constructivism to critical realism be as easily achieved without building the committed relationships with indigenous peoples' movements that are needed to undermine the settlement that makes such disputes possible. Just as resistance to patriarchy is less effective if it does not embrace a scientific critique of the limitations of reproductive biology, and vice versa, so too resistance to the organization of industrial society around fossil-fuelled production and circulation will be less effective if it does not self-consciously join with, for example, scientific dissidents contesting the content of the science of "global warming potentials" as a part of the dominant science/politics settlement, and vice versa.

It is central to the intellectual responsibilities of the "difficult" and engaged political economy of climate science that this chapter has defended to affirm, not obscure, these lively and varied connections. Keeping alive the sense that even the most everyday details of scientific practice have a political economy, that this political economy can be both studied and challenged, and that the world need not be treated as if it were "produced by two discrete, interacting substances" called "society" and "nature" (Moore 2015) involves a willingness to treat political and intellectual alliances as one.

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