Full citation: Carolan, Michael S. "Ontological Politics: Mapping a Complex Environmental Problem." *Environmental Values* 13, no. 4, (2004): 497-522.
http://www.environmentandsociety.org/node/5919

Ontological Politics: Mapping a Complex Environmental Problem*

MICHAEL S. CAROLAN

Colorado State University
Department of Sociology
B236 Clark
Fort Collins, CO 80523–1784, USA
Email: mcarolan@lamar.colostate.edu

ABSTRACT

What *is* an environmental problem? Philosophers of science and sociologists of knowledge have been writing for more than a decade about the de-centred, multiple object. Yet what if this insight were applied to the realm of environmental problems? What would be revealed? These questions are explored in this paper by examining the ontology of environmental problems. Ethnomethodologists, social constructionists, and sociologists of knowledge have all painted a descriptive picture of a thoroughly sociological ontology; an ontology that is fluid, at times de-centred, and (at least potentially) multiple. Yet if ontology is social, and thus multiple, than it is also ultimately political. But multiplicity need not imply fragmentation. It can be coherent, but this requires both coordination and trust. To give further visual and conceptual shape to this argument a heuristic model is constructed. Through this model I 'map' a handful of environmental problems – in terms of their 'complexity' and 'epistemological distance' – and in doing so give focus to the ontologically diverse nature of environmental problems today. A case study involving a particularly contentious environmental dispute is then examined so as to give the argument additional focus and an empirical grounding.

KEYWORDS

Translation, coordination, complexity, trust, environmental problems, modernity

Environmental Values **13** (2004): 497–522

INTRODUCTION

For decades, environmental sociologists have been studying environmental problems – in terms of power, money, capital, race, class, gender, and so on. To this end, considerable energy has been directed to better understanding what constitutes an environmental problem and the social, political, and economic consequences that result. Yet, the underlying question still remains: what *is* an environmental problem? While we diligently examine the social relationships therein associated with environmental problems, can we also speak with the same authority to the *is* of environmental problems – to the *ontology* of environmental problems?

The *is* of environmental problems remains relatively unexplored. Yes, socio-environmental scholars have found value in examining the social relations of knowledge at work in environmental debates. But what if knowledge is not the only thing being contested in such instances of contestation? What if that which knowledge represents – reality – is also (at times) conflicting? What if multiple knowledges reflect not only varying positions but, in certain situations, a multiple ontology?

Taking cues from philosophers of sciences, environmental sociologists have been correct to assert that environmental 'facts' do not speak for themselves, independently from the realm of the social. Environmental facts, rather, speak because we do (although not all with an equal voice [Freudenburg 2000]). The degree to which we speak for environmental facts, however, varies. In other words, some environmental facts do seem to 'speak' for themselves more so than others.

For instance, an oil spill speaks much louder to us than, say, dioxin. Unlike with dioxin, we do not need an expert or complex test to alert us to the presence of an oil spill; we can see it engulfing the water like a black ominous cloud, reeking havoc on anything unfortunate enough to come into its path. Dioxin, however, is different. We cannot see it, taste it, or feel it, so we must rely upon other things to do our seeing, tasting, and feeling for us. Dioxin does not 'speak', then, so much as do machines and computer printouts, which we in turn analyse and ultimately give voice to.

Environmental problems thus vary by *epistemological distance*. We are epistemologically 'closer' to some environmental 'facts' (e.g., oil spills) than to others (e.g., dioxin). But environmental problems vary in another important respect as well: by their *complexity*. At the risk of oversimplification, some environmental problems are less complex (such as a stray piece of litter lying alongside a road) than others (like global warming). We will return to these concepts repeatedly – epistemological distance and complexity – for they serve as the foundation for a conceptual model through which we will examine, categorise, and ultimately 'map' a handful of environmental problems.

Which brings us to ontological multiplicity. As I argue, as epistemological distance and complexity increase, so too does the multiplicity of the object. Environmentally minded scholars have been quick to point to any number of 'forces' at work in environmental disputes: from embedded relations of power (e.g., Carolan and Bell 2003, 2004; Darier 1999; Freudenburg 1996, 2000; Quigley 1999) to 'crisis tendencies' between systems (e.g., Fisher 2002), from capitalism (e.g., Carolan forthcoming; Benton 1990, 1991, 1993, 1996; Burkett 1996, 1997; Dickens 1992, 2002; Foster 1999) to rational structures (e.g., Murphy 2002), and from gender (e.g., Haraway 1989, 1991; Miles and Shiva. 1993) to race (e.g., DeChiro 1998; Peluso 1992). But what if there is also, at least at times, something even more fundamental at play here; something which ultimately points to the very reality of the debate itself – to ontology, the politics of ontology, and the multiplicity of the object that ensues?

As argued by postmodernists and poststructuralists alike, knowing subjects should not be viewed as coherent wholes, but rather as multiple assemblages – the devolution from Subject to de-centred subjects. Yet, why does not the same hold true for the object? Perhaps it does (Daston 2000; Latour 1988, 1999; Law 2002a, 2002b; Mol 2002a, 2002b). Ultimately, this is a paper that suspends the assumption that ontology is always singular, thereby examining that very assumption. For if reality has the potential of being multiple then it also has the potential of being political. *Ontological politics* (Mol 2002a): this should be of interest to us all.

This is not, however, a project of difference without foundation, where all that is solid melts into thin air. Rather, it is a suggestion to view the traditionally perceived solid, fixed foundation as a bit more fluid. I do this by grounding the following analysis within the socio-material complexities of a very real environmental dispute. The scene of the case study: southern Oregon/ northern California (USA) – the Klamath Basin. The cast of characters: grain and potato farmers; Native Americans; other local community inhabitants; the state (in various organisational guises); the California coho salmon; chinook salmon; bald eagles and other feathered wildlife; the endangered Lost River and Shortnose suckers; and the Green sturgeon. The problem: not enough water for all the interested parties – or is it?

This is a story not unlike others currently being told throughout the world: farmers in need of water to irrigate their fields; certain species of (in this case) fish in need of water to survive or face extinction. Yet there is not enough water for both – what to do? What first presents itself as a water *quantity* problem (namely, one of not enough water), however, soon begins to shift: it's a water quantity problem – shift – it's a water quality problem – shift – it's a water temperature problem – shift – it's a water habitat problem – shift.

The organisation of this paper is as follows. I begin by further elaborating upon the aforementioned interrelationship between 'epistemological distance' and 'complexity' and what this ultimately means for ontology and multiplicity.

From this I develop a heuristic model so as to give further visual and conceptual shape to the diverse multifaceted nature of environmental problems today, mapping a handful of environmental problems in the process for clarity. This is followed by a brief introduction to the empirical case study, after which I discuss the ontological multiplicity therein contained. Once the door has been opened to the possibility of ontological multiplicity, I map the 'Klamath crisis' within the aforementioned heuristic model. To conclude, I return to the model by speaking to the issue of trust and its role in helping to resolve ecological conflicts stemming from complexity, epistemological distance, and, ultimately, ontological multiplicity.

CREATING A CONCEPTUAL MAP

Ontology has traditionally been a branch of metaphysical inquiry. Yet there are hints among sociologists and philosophers alike that indicate a very social character to reality. Peter Berger and Thomas Luckmann (1967) indicate so much in their classic, *The Social Construction of Reality*.[1] Ethnomethodologists have developed this argument even further. Through Garfinkel's (1967) now famous 'breaching demonstrations', ethnomethodologists have empirically illustrated a thoroughly social ontology; a reality that is co-structured, fluid, and intersubjective. This, in conjunction with a recent flood of scholarship from among sociologists of knowledge and philosophers of science (e.g., Daston 2000; Latour 1999; Law 2002a, 2002b; Law and Urry 2002; Law and Singleton 2000; Mol 2002a, 2002b; Mol and Law 2002), all paint a descriptive picture of what could be understood as a deeply sociological ontology. But if ontology is social, than it must also be fluid, at times de-centred, and, ultimately, multiple. To suggest otherwise would be too deterministic, too unvarying, for our sociological sensibilities. (This is not to suggest, however, that reality is not real; a point I will take up later.)

The question of relevance, however, may still linger for some. Why should environmentally-minded scholars concern themselves with such a seemingly detached issue as ontology? Or, more to the point: what, if anything, do inquires into reality have to with the environment and socio-ecological relations in particular? What I wish to forward is an approach to ontological inquiry that we can use. A *pragmatic ontology*, if you will.

Scholars have found great value in examining environmental problems in epistemological terms; in terms of knowledge and contested knowledges (e.g., Carolan and Bell 2003, 2004; Haraway 1989, 1991; Latour 1988, 1998; Rutherford 1999; Sandilands 1999). But what if we were to dig a little deeper; to that which knowledge represents – to reality? Indeed, such would explain why some environmental disputes are so seemingly irresolvable, for the very thing that is being contested shifts as actors move in, out, and through the story.

Postmodernism, deconstructionism, and poststructuralism have been helpful (if for nothing else) in awakening us from the Enlightenment dream of the coherent, centred subject. But the perspectivalism that has since ensued, while multiplying observers, knowledge, and truth, leaves the object observed alone, untouched, and singular (Mol 2002a). The goal, then, is to find a way beyond mere perspectivalism without losing coherence; to reach ontological multiplicity without the fragmentation of postmodernism.

Perhaps the best way to wade through these difficult and murky waters is by example. To this end, let us examine some relatively common environmental problems that routinely make their way onto socio-political radar screens (and which have already been mentioned): namely, litter, oil spills, dioxin, and global warming.

First, how do these 'problems' differ? Immediately, one might say that they increase in order of their geophysical scope: litter is a local phenomenon, oil spills and dioxin drift are transnational phenomena, and global warming is a global phenomenon. Perhaps one might also assert that each represents a problem that is progressively more contentious (more political) than the last: oil spills are generally more divisive than litter, dioxin more so than an oil spill, and global warming more than dioxin. Indeed, the two are strongly interrelated: as phenomena become increasingly global the potential for divisions and conflict multiply.

But I argue there is more to it than merely different perspectives and conflicting social relations of knowledge and embeddedness. Clearly, there are many reasons why litter is less contested than global warming; to explain them all would require a paper itself. What I want to give focus to, rather, is how these environmental problems relate in terms of their epistemological distance and complexity, and thus give voice to an aspect of environmental problems that has, as of yet, remained strikingly silent.

Take the myriad of ways we 'see' environmental problems. We 'see', for example, litter and dioxin quite differently – indeed, in conventional terms we do not 'see' dioxin directly at all. In reference to our four environmental problems, then, litter and oil spills can both be directly seen, dioxin and global warming cannot. This is not to say, however, that our *epistemological distance* to litter and oil spills is necessarily equal. An empty soda can thrown in the ditch is, relatively speaking (and forgiving the awkward philosophical terminology), epistemologically near to us. We can directly see it, touch it, and even taste and smell it if we need to. We do not need instruments to detect its presence (unless it happens to be buried) and its boundaries are clear and distinct. This also suggests it is a 'problem' of relatively low *complexity*: you can either pick it up or leave it, and while it may be un-aesthetically pleasing to the eye, by itself, it is cause for little immediate social, political, and ecological concern. (Some may therefore contend, and rightly so, that for these reasons a discarded soda can, by itself, is not an environmental problem. That is, in part, my point: the

less complex and epistemologically distant an issue is, the less likely it will be construed as a 'problem'.)

An oil spill, on the other hand, is both of greater epistemological distance and of greater complexity. Sure, we can perceive it floating on the water's surface, blackening beaches, killing marine life, and fouling the air. We can thus see it, touch it, taste it, and smell it. But there are other aspects of an oil spill that are not as readily seen – such as its impact on hydrological cycles, marine habitat, and problems stemming from oil contamination. In some instances, then, we do need other instruments to do our seeing, smelling, and feeling for us. And in those instances, we experience the oil spill through the instruments we employ – through a process called *translation* (Callon 1986; Callon and Latour 1981; Latour 1987, 1988, 1999; Mol 2002a).[2] In addition, an oil spill is, relatively speaking, more complex a phenomenon than is litter. It interacts with eco-systems in ways beyond those of the aforementioned soda can lying in the ditch, affecting biological organisms and hydrological processes alike, both directly and synergistically.

What about dioxin and (human-induced) global warming?[3] How do they compare in terms of epistemological distance and complexity? First, we cannot 'see' dioxin and global warming directly. Sure, we can 'see' the tumour that one might get from being exposed to dioxin, just as we can 'see' the shrinking of the polar icecaps from global warming. But cancer is not dioxin just as shrinking polar icecaps are not global warming – they are cancer and shrinking polar icecaps. Significant degrees of translation are occurring here too.

This is not to say, however, that in terms of epistemological distance and complexity dioxin and global warming are identical. Clearly, global warming is a more complex phenomenon than is dioxin. Global warming is just that, *global* warming. Its reach envelopes the entire eco-system, and the many variables and synergistic interactions therein implied. Dioxin, on the other hand, while arguably a more complex phenomena than either an oil spill or litter (due to the realities of bio-accumulation, atmospheric conditions, and the like), does not possess that all-enveloping global (and systemic) reach, which we see in global warming.

Dioxin and global warming also vary in terms of their epistemological distance. While we can neither directly 'see' dioxin nor global warming, we can indirectly 'see' dioxin through machines, instruments, and computer printouts. There are, however, no such comparable instruments or machines that can do our seeing of the object 'global warming' for us. Rather, we look for *indications* of the object's (global warming) presence in our attempts to 'see' it. We look at sea levels, carbon emissions, global mean atmospheric temperatures, and glacial thickness in our attempts to 'experience' this phenomenon – this thing – we refer to as 'global warming'. But are these things, in isolation or collectively, *the* object 'global warming'?

Perhaps, then, we can say (at the risk of oversimplification) that dioxin is one step removed from our realm of direct experience: we can experience the machines which experience dioxin. Global warming, on the other, is even further removed from our realm of perception. While we experience phenomena (e.g., rising sea levels, rising mean atmospheric temperatures, rising carbon emissions, etc.) that give indication of this thing we call 'global warming', they are ultimately still just that – indicators of an otherwise highly complex, epistemologically distant object.[4]

Mapping Environmental Problems

Figure 1 places complexity and epistemological distance together in a two-dimensional array: the X-axis represented by complexity; the Y-axis represented by epistemological distance. In addition, emanating outward are concentric lines, each representing a different order of ontology – labelled as 'first order', 'second order', and 'third order' (which I explain in a moment). Let me be clear: this chart represents a heuristic device; the placement of the outward emanating concentric lines is based upon judgments on my part, and the precise location of the various 'environmental problems' mapped are open to dialogue. Such ambiguities are inevitable. Yet this need not preclude the model from providing valuable conceptual insight.

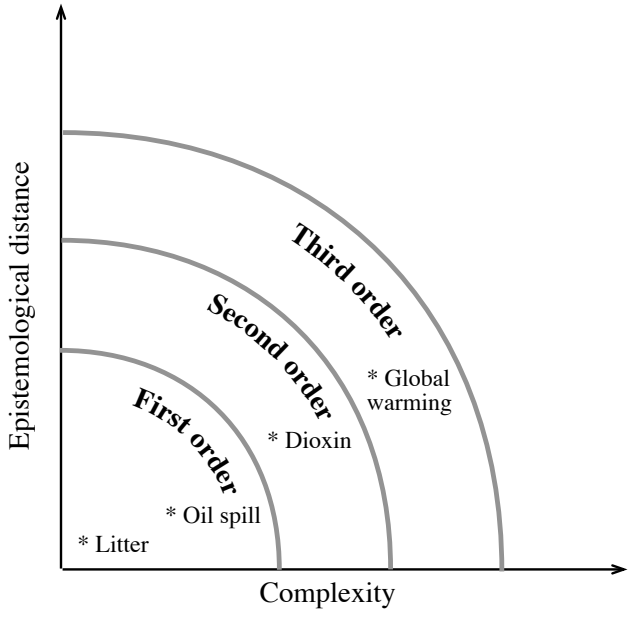

FIGURE 1. Organising environmental problems according to their ontological order

Allow me now to explain what is meant by the outward emanating concentric lines representing the *three orders of ontology*. In terms of existence, environmental problems reside in three states: those you can directly 'see' (e.g., litter and oil spills), those you can indirectly 'see' through the use of instruments (e.g., dioxin), and those you can only indirectly 'see' indirectly (e.g., global warming). And environmental problems move from the first, to the second, to ultimately the third order as complexity and epistemological distance increase.

See Figure 1: Here, I locate litter and oil spills within the first order of ontology. As earlier discussed, litter represents an environmental problem that is both relatively uncomplex and epistemologically immediate. It can be directly seen. Its borders are both clear and distinct. And, by itself (in terms of the aforementioned soda can in the ditch), it is relatively benign and undifferentiated at a systems level. Oil spills, on the other hand, represent an environmental problem of greater complexity and epistemological distance than that of litter (thus its placement relative to litter on the chart). Nevertheless, we can still directly 'see' it (which itself has significant social and political ramifications), and for that reason I locate it within the confines of a first order ontology.

What about dioxin? Dioxin represents a degree of both complexity and epistemological distance still greater than that of both litter and oil spills. It can only be 'seen' indirectly through the various instruments and printouts that we employ, and its interactions with ecological, biological, and atmospheric systems exceed that of either litter and oil spills. Thus, I place it within the realm of a second order ontology.

Finally, global warming. Global warming entails the greatest degrees of complexity and epistemological distance of all aforementioned 'environmental problems'. Sufficient data does indeed exist to allow scientists to conclude that over the past century the average temperature of the earth's atmosphere has increased by approximately 0.5 degrees centigrade. Moreover, the amount of greenhouse gases and carbon dioxide has steadily been on the increase since the dawn of the industrial revolution. We also know how much methane is in the atmosphere today, or even how much carbon dioxide was in the atmosphere 150,000 years ago by exhuming trapped gases in the polar ice caps. In the end, however, while we may indirectly experience, say, rising mean atmospheric temperatures and increasing carbon in the atmosphere, these do not equal that which *is* global warming, at least not initially. *Translation* must first occur in our initial perception of these phenomena – through the machines, models, and computer printouts we employ. But then it must occur *again*, so as to translate these phenomena into that which *is* global warming. Given these factors, I have located global warming within the realm of a third order ontology: as something we indirectly experience indirectly.[5]

By now it should be clear that complexity and epistemological distance are closely interrelated; an increase in one typically implies an increase in the other. Indeed, this division is a conceptual one. One could no more analytically separate complexity from epistemological distance than they could separate the two sides of a coin. This distinction is constructive for the tasks at hand, however, for it

allows us to develop a heuristic chart from which we can 'map' environmental problems and begin to think about those problems in new ways.

The Social (Yet Real) Reality

Before moving discussion and analysis to the context of the aforementioned case study, I would first like to speak to what a sociological ontology means in the context of (critical) realism (e.g., Archer 1995; Archer et al. 1998; Benton 1981; Bhaskar 1978, 1989; Collier 1994). Is there still room for realism in a sociological ontology? Yes, there is.

It is important to recognise that this position does not deny, nor question, the existence of a material reality 'out there'. Dixon does exist; as does litter. Global warming too has a materiality. Reality, however, is not enacted equally in every ontological order. The laptop on which I am writing this paper *is*, in part, according to my relation with it. Yet the *is* of my laptop is surely different than the *is* of the ozone layer that exists miles above my head. While I can directly see my laptop, the same cannot be said for the ozone layer. To 'see' the ozone layer requires, for example, satellite images (such as those from FASAT Bravo satellite) of earth's atmosphere. But such images are not the ozone layer – not until, at least, translation occurs.

Through translation, reality shifts. But it shifts not because the materiality is itself fragmented, un-centred, and fluid. (While such appears to be the case at the quantum level – within which non-linearity reigns supreme – the emergent properties of reality beyond that of subatomic particles appear much more stable.) Rather, shifts in reality occur because the object itself has shifted. Remaining with the ozone layer example: through translation, the *is* of what we perceive changes from 'images of the earth's atmosphere from a polar orbit' to 'the ozone layer'. In other words, translation changes the *is*. This change is, I know, subtle, but it happens. Through translation, 'rising mean atmospheric temperatures' become 'global warming' and 'positive plume tests' become 'dioxin'. In other words, the object changes through translation, but the (sub)structure of reality does not.

Notice that I never once use the words 'made' or 'constructed', for such suggest the (social) construction of an object that is released onto the world. Objects are not made, but our orientation to them changes as the complexity surrounding those objects, and thus our epistemological distance to them, increases. This position is therefore *prima facie* a form of (critical) realism because translation presupposes the translation of some*thing* into some*thing* else.

Let us now turn attention to the following case of an environmental dispute to further develop and give greater clarity to the ideas that have been introduced: a case involving an environmental problem located squarely within the third order of ontology; where that *is* is multiple, and the ontological politics that inevitably ensued.

MICHAEL S. CAROLAN

CRISIS IN KLAMATH BASIN

Nestled on the California-Oregon border (USA), the Klamath Basin is an impressively diverse site, culturally, socially, ecologically, and economically speaking. But with diversity also often comes tensions – complex conflict that cannot be easily resolved with a few strong words here or the signing of the legislative pen there. It is in this respect that the Klamath Basin, while a unique environmental problem in many respects, nevertheless shares commonalities with environmental problems the world over – it is complex, multiple, and not easily resolvable. While this, then, is a story about a place called 'Klamath Basin', it is a story familiar to us all.

Westward expansion of the United States brought (white) settlers to the basin in the late 1800s. In an attempt to make their lands attractive for further settlement, the states of Oregon and California (under the 1902 Reclamation Act) relinquished lake and wetland areas located in the Klamath Basin to the federal government for purposes of draining the land for eventual agricultural homesteading. This was consequently followed by the Klamath Reclamation Project, authorised by the United States government, on May 15, 1905. In the same spirit of the Reclamation Act of 1902, the Klamath Reclamation Project was marshaled in to convert 'unproductive' land – marsh, deserts, wetlands, and the like – into 'productive' farmland, all of which was accomplished through the construction of dams, diversion channels, canals, and dikes that now dot the region. All homesteads in the Basin were then assessed a fee for the Project's construction, which thus guaranteed (or so it was believed) their rights to the Project's water. Water rights in the Basin were further solidified (at least for a time) in 1957, when both Oregon and California ratified the Klamath Compact. This established hierarchical priority of water use as follows: 1) domestic use; 2) irrigation use; 3) recreational use, including use for fish and wildlife; 4) industrial use; and 5) generation of hydro-electrical power. Eerily absent from this list, however, were the Native Americans.

With the Oregon Territorial Act of 1848, the Native Americans become formally recognised by the government. In 1864, the Klamath, Modoc, and Yahooskin Indians signed a treaty with the federal government creating the Klamath Indian Reservation. Through this Act, Native Americans agreed to relinquish residency on specific tracts of land, while retaining the rights to hunt and fish these lands. Moreover, The Winters Doctrine of 1908 – in accordance with the 1909 Doctrine of Prior Appropriation (which grants water rights according to the standard 'first in time, first in right') – granted senior waters rights to North American Indian tribes since they were there first, which the courts deemed dated back to 'time immemorial'. Although the government later bought out the reservation in a (forced) settlement, the court has since ruled that those original tribal rights – dating back to 'time immemorial' – remain, including, most importantly, water rights. And here, as they say, is the rub.

This involves the same water the government has since developed for agricultural irrigation. The same water necessary for the very survival of various species of fish. The same water that flows to national wildlife refuges set up to support a variety of waterfowl (including the 'threatened' Bald Eagle). And the same water that represents the cultural life-blood to Native Americans in the area. In all, there are approximately 700 claims to water in the Upper Klamath watershed (which does not include the numerous 'claims' that animal species also have to the water), which overlap in roughly 5,600 places. Needless to say, even in the wettest of years there could not possibly be enough water to satisfy all interested parties.

It is now ultimately up to the states of Oregon and California to determine who has the first right to the water: the fish, the farmers, the Native Americans – who? This very process has been under adjudication for approximately 28 years, and is still nowhere near complete. What would happen, then, in an unusually dry year? Enter the summer of 2001.

Tensions Flare in 2001

Over the winter of 2000–2001, the amount of snowfall the Cascade Mountains received was twenty-nine percent below normal, resulting in a significant decrease in runoff into the Basin. A state of drought emergency was thus declared in the spring of 2001. On April 6, 2001, the Bureau of Reclamation Project Area Office mailed notices to Project water users (the farmers) notifying them that water would not be available for use until such time as the 2001 operation plan or other such written notification was completed. In short, the spigot had been effectively turned off for ninety percent of basin farmland – encompassing 210,000 acres and supporting 1,400 farms (on which are produced oats, barley, wheat, potatoes, and sugar beets). The Endangered Species Act of 1973 (ESA) mandated this act so as to protect two species of sucker (fish) – the Lost River and Shortnose suckers.[6]

Without this water, many farmers were unable to irrigate their crops, and as a result suffered significant crop losses. Farms went out of business, rates of depression increased (as did rates of alcoholism, domestic abuse, and suicide), racial tensions flared, and community divisions widened. Farmers blamed the 'environmentalists' for placing the needs of a 'junk fish' ahead of those of humans. Conservationists blamed the government for having financed (and for continuing to finance) the Project in the first place. Still others blamed the US Fish and Wildlife Service for having listed the Lost River and Shortnose sucker as 'endangered', thereby providing them protection under the ESA. It appeared that everyone knew who was to blame, but no one could agree as to who that was. And the conflict only amplified the longer precipitation remained sparse and the dry hot conditions persisted.

A selective timeline of that fateful summer is as follows. In May (2001), an estimated 13,000 people gathered to peacefully protest the water shut off. In June, Congress allocated a $20 million relief package for Basin farmers affected by the shut off. In July, protesters yet again gathered, this time at the headgates of one of the irrigation canals (one of the aforementioned 'spigots', if you will), which taps into Upper Klamath Lake. They then proceed to open the headgates. In response, U.S Marshals were called in to enforce the Endangered Species Act and to restore order. The protesters then proceeded to set up a headgate encampment alongside the stationed Federal Marshals. Finally, in September, the headgate encampment peacefully dispersed, citing the need for national unification in the wake of the '9/11' terrorist attacks, followed by the dispersion of the Marshals.

But this is not the end of our story. The year 2002 brought with it below normal levels of precipitation. This, along with excessive heat, resulted in one of the largest fish kills in the history of Klamath River in September, 2002, where 33,000 Chinook salmon died over the course of just a few days. The spigot to the Project was turned back on for the farmers in 2002. This time it was the fish, instead of the farmers, that suffered (as exemplified by the aforementioned fish kill). And while U.S Marshals were not called up at any point in 2002 to restore order, the tensions from the year earlier remained – as can be witnessed by the number of lawsuits brought about by this crisis.

As for what the future holds, only time will tell. The mountains received only half their average moisture during the winter of 2002–2003, which has a lot of people – farmers, Native Americans, environmentalists, and state agencies (just to name a few) – very concerned. It appears, yet again, that there will not be enough water to go around to all interested parties; more lives may very well be lost (perhaps even entire species), farms may go under, and crops may wither. Yet two things are for certain: tempers will flare and the conflict will continue.

In the following section, I investigate the Klamath Basin as representing a *crisis multiple* – a single debate around a multiplicity of objects. I begin by describing the shifting object under debate: low Upper Klamath Lake levels – shift – insufficient water for irrigation – shift – the listing of certain fish as endangered species – shift – too many thirsty mouths at the water spigot – shift – poor water quality – shift. Followed, then, by a look into how the multiple nevertheless remains connected – 'as more than one, but less than many' (Law 2002a: 3).

CRISIS MULTIPLE[7]

The Lost River and Shortnose suckers became federally listed endangered species in 1988 due to a precipitous decline in their numbers over only a few decades.[8]

Historically, these fish were abundant in the Upper Klamath Lake and were an integral piece of local Native American culture as well as a staple of their food supply. By 1988, however, numbers for the Lost River and Shortnose suckers were estimated to be at around 12,000 and 3,000, respectively (a decline of roughly 95 percent from estimated levels in the mid-1960s) (Copperman and Markle 2001). Due to the protection given to them by the Endangered Species Act, these fish are now given water right priority in times of limited supply, such as in 2001.

The 'problem', then, is relatively straightforward (or is it?): not enough water. Suckers and farmers have lived harmoniously for a century; there have simply been a few extremely dry years. More water will come – eventually. The 'problem' will resolve itself – in time. Right?

By listening to individuals and organisations embedded within the crisis, however, one quickly realises that this straightforward problem is really much more complex. What is one quickly reveals to be more than one. It's multiple.

The discussion that follows provides a glimpse of one such case of an environmental problem of both significant complexity and epistemological distance resulting in a de-centered object of dispute. Complexity and multiplicity are, of course, difficult phenomena to examine without somehow betraying their very complexity and multiplicity. In what follows, then, I intentionally try not to tie these multiplicities too tightly together; that will come in the section to follow. Instead, the purpose here is to open our intellectual minds to the possibility of ontology multiple within environmental problems. What I provide in this section, then, is a sketch of ontological multiplicity that nevertheless retains some of its complexity and disarray; that shifts from one reality to the next, with little notice or care. Now, on to that shifting reality.

As mentioned earlier, many individuals and organisations alike see the crisis as a water quantity problem – a problem of simply not enough water. But what is 'enough water'? That depends, in part, upon what is *done* – the *doing* of ontology.

For some, 'enough water' is that which will sustain and bolster sucker populations. For others, 'enough water' is determined by historical average levels of rain fall and snow pack. In either case, however, one thing can be agreed upon: there is not enough water. Still others, however, such as some of the farmers I spoke with, believed there is 'enough water', but it is simply being allocated in an improper manner – specifically, to fish versus their fields.

Instead of focusing on each of these claims about what *is* 'enough water', let us just focus on the first claim: 'enough water' is that which will bolster and sustain sucker populations. For even within this specific claim, the problem of 'enough water' is not singular. For example, models and methodologies differ among scientists when defining 'enough water' for the endangered fish – resulting in multiplicity. 'Enough water' is thus a Klamath Lake elevation of 4,141 ft. above sea level for some, more for others, and less for still others. Again, it

all comes back to what is done; what models and methods are employed, the assumptions that are made, and the numbers that are inserted.

It did not take long, however, to realise that 'the problem' was not fixed merely to this issue of 'enough water'. For example, in the following statements respondents shift between the problem *as* water quantity and the problem *as* water quality.

> 'I don't know how else to say it – there's simply not enough water for everyone. For those [sucker] fish, the water has just been too warm for them'

> 'Those fish kills were a wakeup call to a lot of people. We need to keep the [Upper Klamath Lake] elevation at at least 4,140 ft. We need to provide plenty of good, cool, fully oxygenated water downstream.'

Yet, even if we were to leave aside the shift between water quantity and water quality, the issue of water quality is itself far from centred and coherent. For what *is* water quality? Here we get into examples of what some scholars call the 'performativity of method at work' (Law and Urry 2002). Of methods making what *is* (reality) multiple.

Tests for nutrients test for just that, *nutrients* (and a limited number of nutrients at that). Tests for pH test for just that, *pH*. Tests for oxygen levels test for just that, *oxygen levels*. Tests measuring water temperature test for just that, *water temperature*. To put it bluntly: under the right conditions (I discuss this qualification in a moment), method makes reality.

This assertion, however, is not as existentially shattering as we might at first believe it to be. The Hawthorn Effect and the double hermeneutic, for example, are concepts which ultimately describe the shaping of reality through scientific practice. Foucault too has, in not so specific terms, made similar assertions. Philosophers of science and sociologists of knowledge – from Latour, to Law, to Hacking – however, have taken this argument one step further: applying what was previously directed toward only social scientists and the social scientific method to the bedrock of Western culture itself – natural science and its methods, tools, and artefacts.

To speak of water quality, then, is to speak of the method(s) employed. Testing for nutrients? – water quality *is* nutrient levels. Testing for levels of oxygenation? – water quality *is* levels of oxygenation. Testing for pH? – water quality *is* pH. Testing the water for a variety of contaminants, nutrients, and other phenomena? – water quality *is* such tests in aggregate. And the more complex and epistemologically distant a problem is, the greater the likelihood for such examples of ontological multiplicity through method.

Philosopher J. L. Austin (1965) has argued that if particular words are uttered at the right moment and at the right place – constituting what he described as a 'felicitous' condition – then they are not only words but also actions. A common example of this language-as-action places us at a marriage ceremony (the

'right place') where, after your vows are stated (the 'right moment'), you utter 'I do' and find yourself married. For Austin, this would be an example of the performative: a word (or set of words) that is also an action.

So what does this tell us? The aforementioned statements taken from the Klamath Basin about what *is*, and those to follow, are more than just words – more than mere statements (what Austin called 'constative'). Like an 'I do' at a marriage ceremony, they also (at times) make a difference. They not only describe what *is*, but under the right conditions, perform it, making that *is* real. Through words, pictures, models, instruments, and printouts, then, objects have the potential to shift, wobble, and multiply. (More on this in a moment.)

> 'I'll tell you what the problem is: those "junk" sucker fish being protected by the ESA [Endangered Species Act]. That's the problem.'

> 'This problem has been brewing for a hundred years now. Poor water management over the years led to this. This is just the tip of a much larger iceberg.'

Again, the whirlwind of multiplicity continues. But what interests me in these quotations is not the fact that each points to something different when pointing to *the* problem. Instead, attention is focused on how the first statement reveals the *is* of 'the problem' to be a *condition*, while the second statement reveals the *is* of 'the problem' as a *process*.[9]

> 'Fish are fish; why don't they just raise them in hatcheries? Wouldn't that solve the problem?'

> 'If we could just dredge the lake, all would be solved'

In these statements, 'the problem' is enacted as a present condition; something that is now, without a history (or at least its history is unimportant). Others, on the other hand, enact 'the problem' as a process, which cannot be removed from the historical social field out of which it developed.

> 'It's a product of our Western ethos; that nature is there purely for our use.'

> 'It comes from the 'land-grab' mentality of western politics. You can't understand this crisis unless you look at it within its larger cultural and historical context.'

Such tensions are neither benign nor unimportant. What is significant for us at present is how these tensions shape and enact reality(s). In short, they have a performative quality. One enacts one reality; the other, another reality. Depending upon which 'problem' you 'see' – a condition or a process – thus shapes how you engage, speak, and ultimately enact that reality.

My guess is that a 'problem' that *is* a condition would more likely be enacted through (quick) technological fixes and those alone. On the other hand, a 'problem' that *is* a process would more likely to be performed through actions and words that redress it historically, and have aims toward long-term systemic resolution. In short, the viewing of the Klamath Basin crisis as either a condi-

tion or a process shapes how the crisis is *done*, what the crisis *is*, and ultimately what the response will be. This provides 'the problem' with even further room to manœuvre and shift. Just when you think you have 'the problem' squarely within your grasp, it shifts in yet another unexpected way – which, in this case, is in and out of history.

> 'Before the crisis, maybe one out of twenty of my patients had been diagnosed with depression. Now, it's more like one in three, and the amount of antidepressants handed out increased by some 500 percent. I can't explain the hopelessness that sits at the core of many of these people. It eats me up sometimes. In the months following the shutoff, there were roughly 50 divorces, three deaths from heart attacks, and two suicides. Some of my patients even talked about blowing up the dam.'

> 'Right after the shut off my brother started drinking real bad. He just gave up. Well, he was divorced about six months later.'

> 'You hear more racial epitaphs than you used to. There's a lot of anger all the way around. Some people are actually afraid to go into town now. But the children; they come home from school with such terrible stories: called names, picked on – it's just terrible.'

By listening to peoples' stories, 'the problem' takes shape that is material and active, real and performed. The environmental 'crisis' in Klamath Basin involves more than fish, farmers, and water. It consists of taking antidepressants, caring for your child's safety, and helping others. It is a problem involving suicides, heart attacks, and divorces; of getting into fights at school and being fearful of going into town. It is something that is done to residents of the Klamath Basin. But also it is something that, as residents of the Klamath Basin, they do.

The strategy of ontological politics is never forgetting about these performances that go into reality. Never forgetting about the methods, the models, the pH tests, and the computers, for these ultimately shape what *is*. Never forgetting about the enacting of reality that agents do and have done to them, and how through performance ontology becomes multiple. The Klamath Basin 'crisis' is thus not of a first order ontology. Sure, we can see the fish kills, the withering crops, and the dried up irrigation channels. But, as we have seen, this is not what the crisis *is*. What it *is* is so much more. Nor is it solely of a second order ontology. While tests, models, and methods are utilised to indirectly 'see' the crisis, even that which is indirectly 'seen' osculates, never remaining fixed for more than an instant.

Instead, the Klamath Basin crisis can be located within the realm of a third order ontology. It represents a degree of complexity greater than with, say, dioxin, involving hydrological systems, agronomical systems, biological system, eco-systems, and, ultimately (as will be discussed in the next section), sociocultural systems. Moreover, it is a problem involving significant epistemological

distance. Interactions within and between those aforementioned systems, while immensely complex, are also often far from our epistemological reach – thus the resulting multiplicity.

As suggested earlier, if ontology is multiple, then it is also political. Ecological debates are becoming both more complex and epistemologically distant. The days of environmental crises that can be easily seen and quickly contained are rapidly becoming a distant memory. The global environmental problems of the twenty-first century are thus likely to become increasingly multiple as they move further and further beyond our epistemological reach. What, then, are we to do? With people ultimately talking about different objects, how can we ever hope for consensus and cooperation? In the following section, I address these questions. I can, however, divulge this much: there is still hope. Remember, multiplicity does not necessarily mean fragmentation. All that is solid does not melt into thin air.

MULTIPLICITY AND TRUST

While unique in certain respects (although such 'crises' around water are becoming increasingly common throughout the world), the environmental conflict occurring in the Klamath Basin is also, in other respects, quite common. It involves complexity and epistemological distance, which can lead, ultimately, to not only diverging 'facts', but, as we have seen, a diverging reality upon which those 'facts' stand. Yet if reality is social – and thus multiple – than it is also political. How, then, does this ontological politics play out in the case of an environmental dispute? How does that which is multiple stave off fracturing into incoherence?

According to German social theorist Niklas Luhmann (1979), trust is essential for manœuvring within systems of complexity. Trust allows us to 'develop forms to account for the other, the hidden side of things, the secrets of nature, the unexpected surprise, the inaccessible, or (in modern terms) the complexity' (Luhmann 1988: 96). For Luhmann, trust has become an essential mechanism for what he terms 'complexity reduction'; a component which is particularly necessary for modernity, given its increasingly differentiated and complex nature. 'The world presents itself as unmanageable complexity, and it is this which constitutes the problem for systems which seek to maintain themselves in the world' (Luhmann 1979: 4). Without this foundation of trust, we would be prevented from even getting out of bed in the morning, becoming 'prey to a vague sense of dread, to paralyzing fears' (Luhmann 1979: 4).

What makes Luhmann's work on trust so salient to the analysis at hand resides in his ability to articulate the significant role trust plays in holding complexity together. Just one such example: When I mail a letter, I trust that the postal employees will not read my letter, but rather will speed the letter on its way. I

trust the employees to deliver the letter to the address I requested. And I trust my friend, to whom the letter has been sent, to actually read the letter and not simply throw it away (clearly, there are other forms of trust that go into mailing a letter, but for brevity, I will stop here). Through trust we mail letters, ride airplanes, use national currency, and drive on roads, just to name a few examples (see, e.g., Sztompka 1999; Hardin 2002). Trust allows us to navigate through the waters of the unknown, uncertain, and complex without succumbing to the waves of dread that every so often rock our existential boat. I question, however, Luhmann's assertion that trust serves as a mechanism of, in his words, 'complexity reduction'. The complexity of the postal service remains, with or without trust. The same can be said for global markets, telecommunication systems, air traffic systems, and even global warming. Trust does not reduce complexity, it only holds it together – the complexity still remains. Through trust we are able to coordinate complexity, not reduce it.

Where does this leave us then in regards to ontology and multiplicity? Clearly, Luhmannian systems theory has little to say of ontology (let alone ontological multiplicity). Yet the modern social system described by Luhmann parallels remarkably well, in terms of its epistemological distance and complexity, with those 'environmental problems' located within second and third orders of ontology. They too are phenomena which are complex and epistemologically removed from the realm of direct experience.

So here we are: as environmental problems inch further out into the second and third orders of ontology, the more important trust becomes in holding together the multiplicities that ensue (Figure 2). How, then, has trust in the case of the Klamath Basin crisis served to coordinate this into a patchwork of singularity?

A detailed ethnographic account of the 'Klamath crisis' and the historical context out of which it developed would be needed to fully articulate the social relations of trust within the crisis and the shifting nature of those relations over time. This is not the place (nor do I have the space in the few pages that remain) for such a detailed analysis. Instead, my intention is to provide a more general description as to the extent to which this multiplicity was, or was not, coordinated, from which we can then draw some tentative conclusions about how complex ecological conflicts in general may be resolved, and the role that trust plays in that resolution.

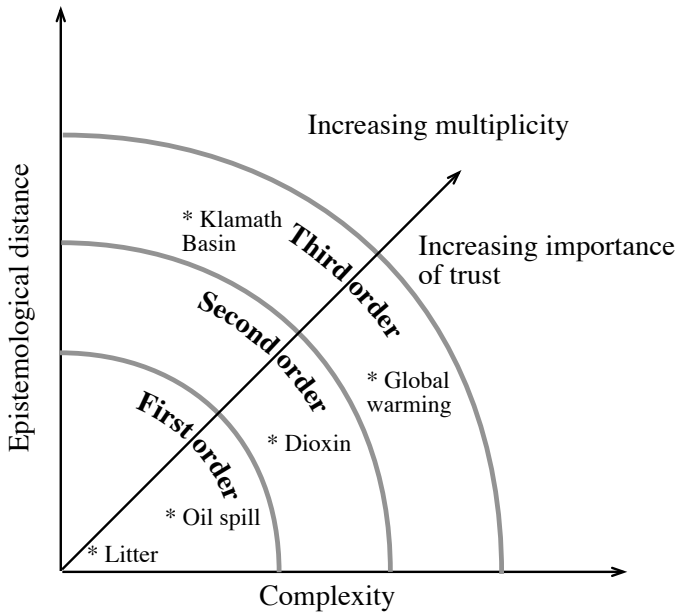

FIGURE 2. The rising salience of trust as epistemological distance and complexity increase

So why does this 'crisis' remain so very contentious (to the point of Federal Marshals having to be called in)? And is there any hope for resolution? As earlier described, the Klamath Basin crisis involves a varied cast of characters: farmers and fish to be sure, but also conservationists, Native Americans, state agents, and other local non-farming residents – a heterogeneous case study to say the least. But with this great diversity is also intra-group homogeneity, creating both 'insiders' and 'outsiders' for all social players involved. Social capital theorists provide me with a conceptual language to give greater specificity to what I am speaking of: namely, that of 'bridging' and 'bonding' social capital (e.g., Nan 2002). Let me explain.

In general terms, bonding social capital refers to those social networks which reinforce group homogeny and boundaries. Through bonding social capital the 'insider'/'outsider' dichotomy of the group is maintained. As its label suggests, this form of social capital represents those social relations that *bond* networks of trust, networks of power, and networks of knowledge together.

Bridging social capital, on the other hand (and, again, in general terms), is literally that: those social relations that *bridge* social networks together (reminiscent of Granovetter's [1973] 'strength of weak ties' thesis). As such, it can bring previously separate networks together and allow them to exchange

properties, be they values, knowledge, ideas, etc. Through this, once divergent social networks connect, thereby allowing coordination to occur.

In the Klamath 'crisis', we find both processes at work (although to different degrees). The social networks of both Native Americans and farmers in the Klamath basin have historically been (and largely remain) homogeneous. One gets a clear sense by group members who is considered within the social network and who is not. Meetings, organisations, tribal councils, parties, and 'get-togethers' that occur within the groups generally stay within the groups. In terms of social capital, then, one could argue that there is a much higher degree of bonding social capital among actors involved within the Klamath 'crisis' than there is bridging social capital. In other words, there is much interaction *within* social networks, but little *between* those networks.

Yet the networks at play in this story encompass more than just farmers on the one hand and Native Americans on the other. The Bureau of Reclamation has its network(s), so do the Oregon Natural Resources Council, bird watchers, hunters, fishermen and women, and local business owners (to name only a few). And at places these networks overlap, sometimes even to a significant degree. But in other places – in fact in many other places – little overlap is evident. In other words, the social 'bridges' have yet to be established to any significant extent. Yet it is through these bridges that ontological coordination is nurtured and maintained.

Coordinating complexity, and the multiplicity that inevitably ensues, however, requires these very bridges, and the trust therein contained. To trust a social network is to not only trust much of their knowledge to be true (Carolan and Bell 2003), but also to trust in their reality. This *bridging trust* has yet to be nurtured in the case of the Klamath 'crisis'. The social networks of trust have yet to span across networks, thereby bridging and thus coordinating with those networks as they do. Networks of trust remain firm among farmers, as they also do among Native Americans, Bureau of Reclamation agents, and the like. Such networks are still tentative, however, between social groups. There is, however, a glimmer of hope. Just such a strategy is beginning to be employed. The bridges of trust are slowly being established.

The Klamath Basin Ecosystem Foundation recognises the importance of trust in conflict resolution. Its mission: to unite; to build networks; and to make social boundaries more permeable to all concerned actors. This 'bridging' mission of the Foundation, however, is not merely an example of politically-correct hyperbole, where the only thing inclusive about its goals is who it is willing to collect money from in regard to membership dues. Its discourse goes much deeper – into its very organisational structure. A look at its Board of Directors and this point becomes immediately clear. It includes local (non-agriculturally employed) residents, employees of other environmental and/or conservation organisations, Klamath area farmers, a Klamath Tribal member, environmental

consultants, and a representative from a local public electrical utility. And the Executive Director of the Foundation: a local rancher.

This lack of trust that I earlier described between divergent social networks has not been lost on the Director:

> 'We just need to get people talking to one another again. To talk about anything; it doesn't have to be about farming or water, just anything. They've got to get to know one another not as 'friend' or 'foe' – you're either with us or you're against us sort of thing – but rather as people. That's the only way we can begin to work toward some sort of resolution.'

This is the goal: to bring people to the table – farmers, Native Americans, conservation biologists, state agents, etc. If you have a stake, you have a voice.

Granted, to speak of an open dialogic environment and of having the proverbial 'open table' around which all interested parties can sit is all too often unrealistic in real life disputes – people clash, not everyone wishes to be at the table, and rarely are all voices equally heard (even among those who are at the table). And this is the reality within which the Foundation has to work. Nevertheless, the goal remains: to bring people together and bridge social networks.

THE COMPLEX ENVIRONMENT

As we embark into the twenty-first century we enter into a world significantly different from that our ancestors entered into a century earlier: a world that is highly complex, differentiated, and with a degree of epistemological distance that has never been experienced before.[10] With modernity have come an increasing number of ecological problems that are beyond our direct epistemological and phenomenological reach: radiation, dioxin, global warming, the hole in the ozone, mercury, radon, endocrine disrupters, PCBs, and so on. Yet, while modern environmental problems continue to take on an increasingly global character, they concomitantly remain very local in an important respect: through method. The issue of ontology will consequently become progressively salient for socio-environmental scholars as method becomes the medium through which we experience, and help to make 'real', environmental problems.

Ontological politics is not a call to remove environmental debates from the vulgar reality of social life – from power, money, or other mechanisms of distortion. On the contrary, it calls for just the opposite: to further ground those debates within that very social fabric. In doing this, we find the stable fixed object to be a little less centered than we once thought, and at times, under the right conditions, multiple. This need not suggest, however, that we dive headlong into the trawls of fragmented postmodernism. We must therefore speak not just of multiplicity (as postmodernists have done with abandon for years), but also

of how that multiplicity becomes coordinated into coherent, comprehendible wholes. Which brings us to trust.

Luhmann (1979) remarked on the importance that trust plays in modern (complex) social systems. Like modernity, environmental problems are becoming increasingly complex and epistemologically removed from our lifeworld, causing them to shift and multiply. Consequently, in light of our environmental problems today, perhaps even Luhmann himself underestimated the importance that trust will continue to play for us moderns.[11] For as human activity reaches further into *the beyond* of the environment, so too must we rely increasingly upon trust to bring that beyond back into the social.

NOTES

[*] I would like to thank Belinda Backous for having taken the time to read and comment on an earlier manuscript. An earlier version of this paper was presented at the 'Governing Environmental Flows' conference, organised by the Environmental Policy Group, Wageningen University and the International Sociological Association (RC-24), Wageningen University, Wageningen, The Netherlands, June 13-14, 2003. Thanks to all those at this conference who took the time to comment on this earlier manuscript.

[1] American philosopher John Searle (1995) later reigns in what could be described as Berger and Luckmann's strong-constructivism with another impressive text – *The Construction of Social Reality* – while retaining some of the undertones that still point to the social nature of our ontology.

[2] Namely, the instruments *translate* their direct experience of the oil spill into something that we can experience directly. And, as in any translation, shifts are inevitable. Representations are never perfect, thereby opening the door to epistemological and ontological multiplicity.

[3] By 'global warming' I am referring to human-induced-global-warming; the contention that rising mean atmospheric temperatures (the reality of which is fairly undisputed) are the direct result of *human activity*.

[4] Some may question my conceptualisation of 'global warming' as an object. My point is that we, as a society, tend to treat it as such: as a thing, an object, which we can fix our scientific gaze upon and ultimately 'see'.

[5] One will find this realm of ontology as having certain affinities with Knorr Cetina's (1999) 'liminal knowledge'.

[6] The Lost River and Shortnose sucker were place on the Endangered Species List in 1988.

[7] The research that this section draws from was conducted between September 2002 and May 2003. In all, thirty interviews were conducted. Methods employed were semi-structured phone interviews, semi-structured face-to-face interviews, informal unstructured interviews, and participant observations.

[8] The Green sturgeon may soon be added to the list. It is only found in three river systems, all of which are located in the Pacific Northwest of the United States.

[9] This distinction – between condition and process – is fully explored in Mol (2002a).

[10] A conclusion coincidently also reached by Max Weber (1967 [1922]) nearly a century ago when speaking of the twentieth century's complexity in relation to that of the nineteenth century.

[11] This is not to say, however, that Luhmann was silent on the issue of contemporary environmental problems (see, e.g., Luhmann 1989).

BIBLIOGRAPHY

Archer, Margaret. 1989. *Culture and Agency: The Place of Culture in Social Theory*. Cambridge, UK: Cambridge University Press.

Archer, Margaret, Roy Bhaskar, Andrew Collier, Tony Lawson, and Alan Norrie (eds.) 1998. *Critical Realism: Essential Readings*. London; New York: Routledge.

Austin, J. L. 1965. *How to Do Things with Words*. Oxford: Oxford University Press.

Benton, Ted. 1981. 'Realism and Social Science', *Radical Philosophy* **27**: 13–21.

Benton, Ted. 1990. 'Marxism and Natural Limits', in *Socialism and the Limits of Liberalism*, edited by Peter Osborne. London: Verso, pp. 66–98.

Benton, Ted. 1991. 'Biology and Social Science', *Sociology* **25**: 1–29.

Benton, Ted. 1993. *Natural Relations*. London: Verso.

Benton, Ted (ed.) 1996. *The Greening of Marxism*. New York: Guilford.

Berger, Peter and Thomas Luckmann. 1967. *The Social Construction of Reality: A Treatise on the Sociology of Knowledge*. Garden City, NY: Doubleday.

Bhaskar, Roy. 1978. *A Realist Theory of Science*. Hassocks: Harvester Press.

Bhaskar, Roy. 1989. *Reclaiming Reality*. London: Verso.

Burkett, Paul. 1996. 'Some Common Misconceptions about Nature and Marx's Critique of Political Economy', *Capitalism-Nature-Socialism* **7**: 57–80.

Burkett, Paul. 1997. 'Nature in Marx Reconsidered', *Organization and Environment* **10**: 164–83.

Callon, Michel. 1986. 'Some Elements of a Sociology of Translation', in *Power, Action and Belief*, edited by John Law. London: Routledge and Kegan Paul, pp. 196–229.

Callon, Michel and Bruno Latour. 1981. 'Unscrewing the Big Leviathan: How Actors Macrostructure Reality and how Sociologists Help Them to Do It', in *Advances in Social Theory*, edited by K. Knorr Cetina and A. Cicourel. London: Routledge and Kegan Paul, pp. 277–303.

Carolan, Michael S. forthcoming. 'The Conspicuous Body: Capitalism, Consumerism, Class, and Consumption', *Worldviews: Environment, Culture, Religion*.

Carolan, Michael S. and Michael M. Bell. 2003. 'In Truth we Trust: Discourse, Phenomenology, and the Social Relations of Knowledge in an Environmental Dispute', *Environmental Values* **12**: 225–45.

Carolan, Michael S. and Michael M. Bell. 2004. 'No Fence Can Stop it: Debating Dioxin Drift from a Small US Town to Arctic Canada', in *Science and Politics in the International Environment*, edited by N. Harrison and G. Bryner. Boulder: Rowman & Littlefield, pp. 271–95 .

Collier, Andrew. 1994. *Critical Realism*. London: Verso.

Copperman, Michael S. and Douglas F. Markle. 2001. 'Review of Relationships between Lost River and Shortnose Sucker Biology and Management of Upper Klamath Lake' Assessment of Klamath Water Allocation (Draft), Oregon State University, December 14.

Darier, Eric (ed.). 1999. *Discourses of the Environment*. Cambridge, MA: Blackwell Publishers.

Daston, Lorraine (ed.). 2000. *Biographies of Scientific Objects*. Chicago, IL: University of Chicago Press.

DeChiro, Giovanna. 1998. 'Nature as Community: The Convergence of Environment and Social Justice', in *Privatizing Nature: Political Struggle for the Global Commons*, edited by Michael Goldman. New Brunswick, NJ: Rutgers University Press, pp. 120–43 .

Dickens, Peter. 1992. *Society and Nature*. Philadelphia: Temple University Press.

Dickens, Peter. 2002. 'A Green Marxism? Labor Processes, Alienation, and the Division of Labor', in *Sociological Theory and the Environment: Classical Foundations and Contemporary Insights*, edited by Riley Dunlap, Frederick H. Buttel, Peter Dickens, and August. Gijswijt. Boulder: Rowman and Littlefield, pp. 51–72 .

Fisher, Dana R. 2002. 'From the Treadmill of Production to Ecological Modernization? Applying a Habermasian Framework to Society-Environmental Relationships', *The Environmental State Under Pressure* **10**: 54–64.

Foster, John Bellamy. 1999. 'Marx's Theory of Metabolic Rift: Classical Foundations for Environmental Sociology', *American Journal of Sociology* **105**: 366–405.

Freudenburg, William R. 1996. 'Strange Chemistry: Environmental Risk Conflicts in a World of Science, Values, and Blind Spots', in *Handbook for Environmental Risk Decision Making: Values, Perceptions & Ethics*, edited by C. Richard Cothern. Boca Raton, FL: Lewis Publishers, pp. 11–36.

Freudenburg, William R. 2000. 'Social Constructions and Social Constrictions: Toward Analyzing the Social Construction of "The Naturalized" as well as "The Natural"', in *Environment and Global Modernity*, edited by Gert Spaargaren, Arthur P.J. Mol, and Frederick Buttel. London: Sage, pp. 103–119.

Freudenburg, William R, Scott Frickel, and Robert Gramling. 1995. 'Beyond the Nature/Society Divide: Learning to Think About a Mountain', *Sociological Forum* **10**: 361–92.

Garfinkel, Harold. 1967. *Studies in Ethnomethodology*. Englewood Cliffs, NJ: Prentice-Hall.

Granovetter, Mark. 1973. 'Strength of Weak Ties', *American Journal of Sociology* **78**: 1360–80.

Haraway, Donna. 1989. *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. London: Routledge and Chapman Hall.

Haraway, Donna. 1991. *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Free Association Books.

Hardin, Russell. 2002. *Trust and Trustworthiness*. New York: Russell Sage.

Knorr Cetina, Karin. 1999. *Epistemic Cultures: How the Sciences Make Knowledge*. Cambridge,m MA: Harvard University Press.

Law, John. 1994. *Organizing Modernity*. Oxford: Blackwell.

Law, John. 2002a. *Aircraft Stories: Decentering the Object in Technoscience*. Durham, NC: Duke University Press.

Law, John. 2002b. 'On Hidden Heterogeneities: Complexity, Formalism, and Aircraft Designs', in *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol. Durham, NC: Duke University Press, pp. 116–41.

Law, John and John Urry. 2002. 'Enacting the Social', Centre for Science Studies and Sociology Department, Lancaster University. <http://www.comp.lancs.ac.uk/sociology/soc099jlju.html> (last accessed, March 30, 2003).

Law, John and Vicky Singleton. 2000. 'Allegory and Its Others', Centre for Science Studies and Sociology Department, Lancaster University. <http://www.comp.lancs.ac.uk/sociology/soc051jl.html> (last accessed, March 30, 2003).

Latour, Bruno. 1987. *Science in Action*. Milton Keynes: Open University Press.

Latour, Bruno. 1988. *The Pasteurization of France*. Cambridge, Mass: Harvard University Press.

Latour, Bruno. 1999. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.

Latour, Bruno and Steve Woolgar. 1979. *Laboratory Life*. London: Sage.

Luhmann, Niklas. 1979. *Trust and Power*. New York: John Wiley & Sons.

Luhmann, Niklas. 1988. 'Familiarity, Confidence, Trust: Problems and Alternatives', in *Trust: Making and Breaking Cooperative Relations*, edited by D. Ganbetta. Oxford: Basil Blackwell, pp. 94–107 .

Luhmann, Niklas. 1989. *Ecological Communication*. Chicago, IL: University of Chicago Press.

Miles, M. and V. Shiva. 1993. *Ecofeminism*. London: Zed Books.

Mol, Annemarie. 2002a. *The Body Multiple: Ontology in Medical Practice*. Durham, NC: Duke University Press.

Mol, Annemarie. 2002b. 'Cutting Surgeons, Walking Patients: Some Complexities Involved in Comparing', in *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol. Durham, NC: Duke University Press, pp. 218–57.

Mol, Annemarie and John Law. 2002. 'Complexities: An Introduction', in *Complexities: Social Studies of Knowledge Practices*, edited by John Law and Annemarie Mol. Durham, NC: Duke University Press, pp. 1–22.

Murphy, Raymond. 2002. 'Ecological Materialism and the Sociology of Max Weber', in *Sociological Theory and the Environment: Classical Foundations and Contemporary Insights*, edited by Riley Dunlap, Frederick H. Buttel, Peter Dickens, and August. Gijswijt. Boulder: Rowman and Littlefield, pp. 73–89.

Nan, Lin. 2002. *Social Capital: A Theory of Social Structure in Action*. Cambridge: Cambridge University Press.

Peluso, Nancy L. 1992. *Rich Forests, Poor People: Resource Control and Resistance in Java*. Berkeley, CA: University of California Press.

Quigley, Peter. 1999. 'Nature as Dangerous Space', in *Discourses of the Environment*, edited by Eric Darier. Oxford: Blackwell, pp. 179–80.

Rutherford, Paul. 1999. 'The Entry of Life into History', in *Discourses of the Environment*, edited by Eric Darier. Oxford: Blackwell, pp. 37–62.

Sandilands, Catriona. 1999. 'Sex at the Limits', in *Discourses of the Environment*, edited by Eric Darier. Oxford: Blackwell, pp. 79–94.

Searle, John R. 1995. *The Construction of Social Reality*. New York: The Free Press.

Sztompka, Piotr. 1999. *Trust: A Sociological Theory*. Cambridge: Cambridge University Press.

Weber, Max. 1967 [1922]. *Economy and Society*, edited by Guenther Roth and Claus Wittich. Berkeley, CA: University of California Press.