Listening to the Birds: A Pragmatic Proposal for Forestry

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ABSTRACT

Recently, natural scientists have begun to support an interpretive turn in ecology. Yet the ethical implications of interpreting nature have not been sufficiently addressed. In this essay, I use different interpretations of nature to make three distinct but related points relevant to forestry: (1) ecological narratives should be evaluated on the basis of ethical norms, (2) the choice of which interpretations of nature and ethical norms to use in environmental policy should be conducted by a process of public deliberation, and (3) scientific narratives should be denied a priori privilege over non-scientific interpretations of nature for policy purposes.

KEYWORDS

Forestry, ethics, scientific norms, interpretation, responsibility

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INTRODUCTION

Normative concerns and a pragmatic agenda

My pragmatic proposal for forestry is derived from three normative concerns. My first concern is to make explicit the ethical norms that guide scientific interpretations of nature. My second concern is to take moral responsibility for scientific interpretations of nature. And my third concern is to avoid the oppressive practice of arbitrarily denying a voice to non-humans and to non-scientific interpretations of nature in environmental policy. Moreover, my proposal is an attempt to put into practice what Hilary Putnam has termed the 'theses' of American pragmatism (Putnam 1994: 152): (1) antiscepticism (we must justify that which we doubt), (2) fallibilism (facts are not immune from criticism), (3) there is no fundamental dichotomy between facts and values, and (4) practice is primary.

What sparked this essay is that a number of ecologists have begun to acknowledge an interpretative sensibility in their research (Allen et al., 2001; Robertson and Hull, 2001). For instance, Allen et al. (2001: 475) argue: 'science of intrinsic quality needs narratives with explicit values – not just facts – particularly as it faces multiple-level complexity in advising on environmental policy'. Moreover, they suggest: 'Whereas in a modern world there is a belief in an ultimate true reference, in a postmodern world there is no such belief. In a postmodern world there are only narratives, and you must take responsibility for the narratives you tell' (Allen et al. 2001: 478). While this is a welcomed shift in epistemological beliefs and norms, these ecologists do not go far enough in explaining why they should take responsibility for their interpretations of nature. I argue that ecologists and by extension forestry scientists should take moral responsibility because their 'ecological narratives' are inherently ethical.

Listening, dialogue and moral responsibility

While forestry scientists may enlist positivistic beliefs and norms to guide ecological research, this does not absolve them of their moral responsibility towards the beings they interact with. Responsibility necessarily weighs heavily on the shoulders of scientists (Alpert 1995). Not only do scientists interpret nature by using common rules of logic and other epistemic and aesthetic norms (i.e. what is warranted, what is reasonable, what is plausible, what is coherent, what is elegant and simple, etc.) scientists also judge who and what should be listened to in their interpretations of nature. In effect, the interpretation of nature takes shape by including, excluding, listening and silencing the voices that scientists enter into dialogue with (Haila and Dyke 2006a). To listen or to silence any (human or non-human) being is to have some control over its flourishing – a power which comes with 'strings attached'. In other words, not only do epis-

temic norms guide scientific interpretations of nature, but also ethical values and responsibilities guide scientific interpretations of nature.

Steven Vogel in his 'The silence of Nature' (2006) argues against the position that humans have an ethical responsibility to listen to nature, that it speaks to us and that by implication when we silence it, we may deny it the respect and consideration it deserves. Vogel's view is that language and dialogue necessarily involves subjects asserting and justifying claims about the world, yet nature never asserts or justifies anything that can be interpreted as a truth claim (2006: 159). In other words, nature, for Vogel, simply does not speak. Vogel frames his discussion of language and dialogue by using Habermasian discourse ethics which not only offers rules for engaging in dialogue and deliberation, but grounds ethics in the preconditions of the use of the spoken word itself. Discourse ethics, however, draws upon a very narrow interpretation of language and dialogue as a means of adjudicating between competing (truth, value) claims made by rational, human beings. Discourse ethics, therefore, is not an appropriate lens through which to frame the interpretation of meaning generated from the interaction of, and dialogue between, humans and non-humans.

Dialogue between humans and non-humans involves speech acts in which meaning is reproduced, created and negotiated by means of utterances, gestures, speech genres, speech prosthesis (Latour 2004: 67–69) and (perhaps oddly) *silences*. Sometimes 'getting to the truth of the matter' is not only impossible, but irrelevant to those engaged in a dialogue. Instead, we try to understand what someone or something is 'saying' to us, the meaning of his/her/its story, plea, witness, confession, commentary, lesson, formal logical syllogism or *presence*, etc. Likewise, 'getting the story right' is more a question of which interpretation will be most convincing and compelling to a particular interpretive community given its goals, methods and theoretical presuppositions. That humans are not privy to nature's own interpretation of our speech acts does not mean that non-humans do not interpret our speech acts and respond to us in meaningful ways. Nor are humans who 'translate' nature's speech acts ventriloquists (Vogel 2006: 164), they are interpreters of nature whose interpretations are fallible and (should be) open to revision as a result of contestation, negotiation, interaction and further dialogue with humans and *non-humans*. If this were not the case, scientific interpretations of nature would be mere fictions created through dialogue among humans, not the result of careful observation, interaction and dialogue with nature. Given that Vogel presupposes a very narrow view of language as restricted to argumentative conversations between two or more rational humans (2006: 148), he must deny the intelligibility of, and the ethical responsibility arising from, listening, speaking and engaging in dialogue with non-humans.

Indeed, moral responsibility begins by listening to the voice of any being we encounter. To silence the voice of another can effectively deaden their presence (Haila and Dyke 2006b); it can be an act of (intentional or unintentional) negligence – what Michele Moody-Adams terms 'affected ignorance' (1997);

or it can literally be an act of murder (Levinas 1998). In the context of ecology, research is another word for encounter. That is to say that scientific interpretations of nature arise from interactions with others (researchers and non-researchers including humans and non-humans). Natural scientists' first responsibility therefore is to listen to the voice of those beings they interact with.

From an 'Actor-Network-Theory' perspective (Latour, 2005), moral responsibility is enacted relationally through particular networks of interactions. In his *Politics of Nature* (2004: 81), Bruno Latour points out the recalcitrance of human and non-human actors in being enlisted into a unified common world. As Latour notes, it is often the case that scientific interpretations of nature are uncertain and disputable because (human and non-human) actors interrupt the closure and the composition of our common world – some actors just do not 'interact' well or refuse to be 'related' to others in particular networks of relationships. Witness the resistance of 'weeds' to Round-Up in the human-chemical-industry attempt to annihilate them and the stark defeat of 'roadkill' resulting from too close an encounter with human-car-roadways. Hence some actors are unwelcome but persistently present ('weeds') while others are definitely excluded ('roadkill') from our common world.

According to Latour (2004), some scientific interpretations of nature are better understood as 'matters of concern' rather than 'matter of facts'. A 'matter of concern' 'agitates, troubles, complicates, and it provokes speech, it may arouse a lively controversy' (2004: 103). Forestry related examples of scientific controversies, i.e. 'matters of concern', abound. Notice, for instance, the interpretation of organic matter as either 'friend or foe' (Prescott, Maynard and Laiho 2000) in the question over the implications of (the presumed) paludification and forest productivity decline resulting from the interaction of mosses-nutrients-fires in boreal forests (Klenk, Fyles and Pare 2004). Another example is the interpretation of standing dead trees as the 'victims', 'spoils' or 'blights' of the climate-mountain-pine-beetle-industrial forestry network of relationships in lodgepole pine forests of British Columbia. To be settled, unified and provisionally accepted as 'matters of fact' scientific controversies over the 'right' interpretation of nature such as the ones noted above, which are commonplace in environmental policy, require more than the application of scientific epistemological and methodological norms. It requires democracy!

Listening to nature, dialogue and democratic process

A democratic approach to interpreting nature or settling 'matters of concern' (i.e. environmental policy making) would take shape through a political and dialogic process of deliberation about who and what to include or exclude to settle the matter in dispute – which in effect decides the kind of world we desire to live in. A democratic process does not guarantee that a chosen scientific interpretation of nature will be morally acceptable to all of those affected by

it, but then no method of decision-making can offer such guaranty. Yet Latour is right to object to having science and epistemology dictate who and what our common world should include or exclude. Scientific interpretations of nature are open-ended: 'matters of fact' may be settled for a long time, until some new network of actors speak, demanding to be taken into consideration in the 're-assembling' of our common world.

Given the iterative and interpretive process of 're-assembling' our common world what is needed is a democratic approach to environmental policy-making that fosters an open-ended method of inquiry and social learning. Dewey's pragmatic approach to democracy seems germane to the task. Indeed, from a Deweyan perspective, interpretations of our common world such as those encapsulated in environmental policies are better construed as 'ends-in-views' or plans. These plans, when acted upon 'structure' the assembling and evaluation of our common world. That is, 'ends-in-views' may be experientially evaluated as 'if-then' proposals: 'if we do such and such actions applying policy X, we believe such and such results will occur' (Dewey 1939). The value or merit of using different interpretations of nature (i.e. environmental policies) must be evaluated so that we can learn from our experiences and adapt to the changing world:

> If ideas, meanings, conceptions, notions, theories, systems are instrumental to an active reorganization of the given environment, to a removal of some trouble and perplexity, then the test of their validity and value lies in accomplishing this work. If they succeed in their office, they are reliable, sound, valid, good, true. If they fail to clear up uncertainty and evil when they are acted upon then they are false. (Dewey 2004: 90)

This open-ended process of re-interpretation and deliberation necessarily involves finding out what environmental policies work and which do not, but despite Dewey's advocacy for the 'scientific method' or what he called the 'method of intelligence', his approach does not imply the use of any particular privileged epistemological and methodological norms. Rather, Dewey held that scientific methods simply exhibit free intelligence operating in the best manner available at a given time (Dewey 1938: 535). Moreover, as Hilary and Ruth Anna Putnam have pointed out, what Dewey was concerned to argue, early and late, is that *democracy* is the precondition for the application of intelligence to the solution of social problems (Putnam and Putnam 1994: 216).

In the following essay I focus specifically on the role of forest sciences on 'assembling the social' – the enlisting of human and non-human actors into a common collective (Latour 2005). My argument is aimed the particular 'interpretive community' (Fish 1980) of scientific forestry. While the argument I present may sound familiar to those readers inclined towards, or simply aware of post-modern ethics and critiques of epistemology, my experience is that few

of my colleagues in forestry have wandered from the straight path of positivistic science, despite some notable exceptions (McQuillan 1993; Purdon 2003).

With this audience in mind, I use three different interpretations of nature to make three distinct but related points relevant to interpretive forestry. I use an interview I conducted with a forest scientist to illustrate how ethical norms shape the scientific interpretation of the lifespan of populations of specific trees and its implications for forest management practices. Second I discuss the 'emulation of natural disturbance' (END) forest management approach to biodiversity conservation. Unlike the 'fine-filter' approach of saving individual (populations of) species, the END is a 'coarse-filter' approach to the conservation of biological diversity in forestry – its mandate is to maintain biodiversity by using sylvicultural treatments that emulate the size-frequency distribution of natural disturbances. I argue that because ethical norms guide the conception of 'natural' and 'disturbance', the decision to use the END in forestry policy cannot be justified solely on the basis of science, despite its broad-cast approach to the protection of biodiversity. Third, I discuss the privileged status of scientific interpretations of nature by using augury as an alternative interpretation of the role of forest birds in natural resource management. I argue that once we recognise that ethics is part of how scientific interpretations of nature are justified, we can no longer choose among conflicting interpretations of nature for environmental policy purposes by brandishing scientific norms. Rather, in the last section, I argue that we should determine which interpretation of nature is best suited for particular forest management situations by following a democratic approach to public deliberation and environmental policy making.

THE SILVER-LEAF STORY[1]

Ed Setliff is a retired forest pathologist from Lakehead University, Thunder Bay, Canada, who continues to publish by funding his own research and doing most of his writing at home. During his long career, it became increasingly apparent to Ed that funding allocation for basic research in forest pathology followed demands set by economic uses of forests as well as the 'hot topics' that periodically sweep the field: neither of which, to Ed's frustration, appear to give northern hardwoods such as birch their 'appropriate due'.

While walking on campus one day, Ed observed diseased leaves on a clump of birch trees. He identified the disease as silver-leaf, a common fruit tree disease. This observation was the seed to a question that took Ed ten years of careful research to answer, at least partially: Is silver-leaf causing the birch die-back in North American forests? When I asked Ed if the birch die-back may have been due to the trees having attained the end of their normal lifespan, Ed not only scoffed at the question, but also at the common belief that the lifespan of birch

trees is about 80 years. He is convinced the lifespan of birch could be at least twice that number of years.

Ed's research suggests that what regulates the lifespan of a plant is not merely genetic determinism, but the result of plant interaction with microorganisms such as disease agents. Ed has investigated the pathological role and incidence of the wound pathogen *Chondrostereum purpureum* (Pers.: Fr.) Pouz. on trees in damaged forests. In one of his articles, Ed provides a historical report on past research conducted on this pathogen whose incidence was mostly observed in fruit trees of the Rosaceae family (Setliff, 2002). Surveys he and others conducted in herbaria in Canada, the United States and Norway suggests, however, that *C. purpureum* is more frequently found on Betulaceae and Salicaceae, the birch and willow families respectively. Moreover, mycoherbicide experiments support these claims. While the silvering symptom is inconspicuous on birch and other non-rosaceous trees, under certain conditions, including stem injuries, environmental conditions conducive for infection, and high levels of basidiospores (inoculum), *C. purpureum* is an important pathogen with epidemic potential for forest trees, especially species in the birch and willow families. Furthermore, where forest management practices leave large piles of hardwood slash, there is an elevated level of inoculum. In Canada, Ed remarks, 'large-scale cutting and logging provide massive amounts of slash ideal for *C. purpureum*'.

Underlying Ed's silver-leaf research are at least two majors normative concerns. The first is political and is implied by his focus on forest pathology. Ed's research suggests: 'the notion that trees in the Betulaceae and Salicaceae are short-lived may be a consequence of their disease susceptibility more so than a genetically determined lifespan' (2002: 648). Ed's statement is more than a scientific appraisal of the role of disease agents in affecting the lifespan of two particular family of trees, rather his statement reflects his judgment that it is wrong to eclipse research findings from forest pathology with theories of molecular genetics and that forest pathology can and should inform our understanding of ecological and biological processes. From a political standpoint, Ed is contesting the 'governance of science' (Fuller 2000).

In his defence of forest pathology, Ed implicitly appeals to norms of democratic scientific practice. The democratisation of inquiry, however, is not realised by applying common epistemic norms. From a pragmatic perspective, the democratisation of science requires researchers to produce and test new ideas in cooperation and dialogue with their colleagues (Putnam 1994: 173). As Steve Fuller remarked, within the republican approach to democracy 'people need to act in an environment where there is a good chance that what they say and do will be taken seriously by others, and not simply ignored or become the grounds for the curtailment of their speech and action in the future' (2000: 19). The implication for Ed is that while molecular genetics has gained ascendancy in the forest sciences, this is no reason to silence forest pathology by neglecting legitimate scientific interpretations of the lifespan of trees.

The second of Ed's normative concerns is ethical rather than political and it is related to the state of forest management in Canada. While Ed is careful not to critique Canadian forest logging practices directly in his article, nevertheless his concerns for the disregard of 'low-value' hardwoods and the waste incurred by leaving large amounts of residual slash after logging are implicit in his recent article (2002: 649):

> In Canada, extensive logging operations continue to be the mainstay of the economy and so there are enormous amounts of woody material for C. purpureum to colonize and use to produce abnormally high numbers of basiodiospores that sweep over the forest. How to address the complex biological and forestry issues this problem brings to bear will require considerable thought and understanding. Better utilization of low-value hardwoods, sanitation practices and stronger forest-protection research programs are recommended.

This passage encapsulates an emphatic plea to acknowledge the plight of 'low-value' hardwoods. In our interview, Ed remarked that his ethical duties are to 'man and nature' and that these duties are inextricably linked. Hence, the choice of the voices Ed included in his interpretations reflects his ethical point of view. Ed deliberately set out to give a voice to *C. purpureum* and 'low-value' hardwood trees to make an ethical stand against current forestry practices.

Ed's research is an excellent illustration of how ethical norms shape the content of scientific narratives. By choosing a path of inquiry that has been marginalised and partially silenced by molecular genetics, Ed interpreted the lifespan of trees as the result of tree-pathogen interaction instead of genetic determinism. While Ed does not deny that genetics are important to the lifespan of trees, he sees a purely genetic interpretation of lifespan as supporting an ethical point of view which impedes the flourishing of particular populations of hardwoods and denies them a voice in forest management. That particular hardwoods are deemed 'low value' may be due to more than forestry economics, it may be due to a bad interpretation of what determines the lifespan of trees. Indeed, what Ed's silver-leaf story reveals is that there are more or less good or bad interpretations of tree lifespan, not only because these interpretations fail to seek guidance from appropriate epistemic norms, but because they lead to morally condemnable behaviour or outcomes.

Ed's focus on the birch die-back phenomenon can be understood within the broader issues of forest biodiversity conservation as a 'fine-filter' approach to saving individual populations of species. While Ed does not propose a forest management approach to solve the problem of including the flourishing of birches within forestry practices, he does give a voice to birch in the hope that its fate will not be arbitrarily settled. In the following section I discuss a 'coarse-filter' approach to the conservation of forest biodiversity, which contrasts with the 'fine filter' approach. The 'coarse filter' approach attempts to save most species by giving voice to as many beings as is possible given the enormity and

complexity of the task. In other words, the 'coarse filter' approach attempts to provide the circumstances for a suite of species to flourish. I argue, however, that because ethical norms shape scientific interpretations of forests, even the choice of using a 'coarse filter' approach to biodiversity conservation in forest management cannot be justified by science alone.

THE 'END' OF SCIENTIFIC FORESTRY?

Forest management in much of Canada is moving towards the idea of 'ecosystem management'. The stated goal of this type of management is to maintain the ecological integrity and health of the forest (CFS 1998); however, it is difficult to define ecosystem integrity and health (Simberloff 1998) and we have a limited understanding of ecosystems (Johnson et al. 2003). Despite these difficulties, the 'Emulation of Natural Disturbance' (END) was developed as a 'coarse filter' approach to biodiversity conservation and forest management (Hunter 1993). The 'coarse filter' approach links the maintenance of biodiversity to sylvicultural practices that emulate the size-frequency distribution of natural disturbances. According to Hunter (1993: 115), the idea at the core of the 'coarse filter' approach is:

> That for any given type of disturbance, small-scale disturbance events usually outnumbered larger events, and that imitating this pattern would maintain spatially diverse forest landscapes that would provide suitable habitat for a wide range of organisms with varying spatial requirements.

The END is commonly justified by reference to evolutionary reasoning. The ecological premises of the END are (1) that periodic disturbances are inherent to dynamic forest ecosystems (Pickett and White 1985); (2) that natural disturbances are strong determinants of species composition as well as ecosystems structure and function (White and Walker 1997), and (3) that forest ecosystems and their species composition have adapted to the disturbances (Bunnell 1995). The train of argument is that by maintaining stand and landscape compositions and structures similar to those resulting from natural disturbances, we can reduce the negative impacts of timber harvest on biodiversity and maintain essential ecological functions (Bergeron and Harvey 1997).

Scientists have suggested that in practice the objective of the END is to fit within a historical range of natural variability (Landres, Morgan and Swanson 1999; Morgan et al. 1994; Parsons, Swetnam and Christensen 1999). The historical range of natural variability is a form of benchmark or reference conditions. Not only does it provide limits to the range of disturbances that could be emulated, but such benchmarks allow researchers to see if the changes occurring in current ecosystem structure and function are due to natural variation or due to management actions (Adamowicz and Burton 2003). But not all past natural

disturbances have been benign from social perspectives (i.e. hurricanes, volcanic eruptions, meteorites); hence it follows that not all past natural disturbances should be emulated.

Since not all natural disturbances are socially benign, the choice of which ones we should emulate has to be justified. Some authors suggest that the historical range of natural variability – which lies somewhere between the heterogeneity generated by non-anthropogenic disturbances and the homogeneity generated by intensive plantation management – should be determined by criteria of social acceptability (Kimmins 2004; Perera and Buse 2004). While many authors acknowledge that the choice of a historical period from which to emulate disturbances is related to what society values, they generally do not acknowledge that the concepts of 'natural' and 'disturbance' are contested in part because they are shaped by ethical norms that are problematic to at least some members of society.

The very concept of 'natural' pits humans against non-humans, as if there are clear *normative* boundaries between humans and non-humans as to what they are and what they can or should be. Clearly this is not an ethically neutral interpretation of 'natural'. There are a plethora of examples of entities that transgress the nature/culture dichotomy in their physical bodies (as networks of interacting actors) or in their use of their environment. For instance, medical procedures use animals organs and technology to replace organs in humans; genetic engineers cross animal genes with plant genes; the 'five kingdoms' of living organisms have always adapted to humanised 'non-natural' landscapes, in some cases simply by surviving but in other cases by thriving in new 'eco-humanised' niches – witness the squirrel who tore through my screened window to snack on the nuts I had left out on the kitchen table. I do not mean to suggest that there is no valuable distinction between humans and non-humans. Nor am I denying that nature has some autonomy[2] and thus should not be dominated (Katz 2002), and I am certainly not denying that the actions of humans have caused the extinction of countless non-human species due in part to the elimination of their historical niches. But I resist the temptation to interpret humanity and nature as strictly independent naturalised categories – like two self-contained, independent and isolated individuals. Rather, humans and non-humans are what they are through historically situated and embodied relationships – a perspective that Patrick Curry calls 'relational pluralism' (Curry 2003). I have strong objections to using the nature/culture dichotomy to solve problems of biodiversity conservation as it neglects the reciprocal interdependence between humans and non-humans and the cultural, ethical and political process of (1) defining what it means to be human and to be non-human, and (2) assembling humans and non-humans into a common world (Latour 2004).

An additional ethical dimension of the concept of 'natural' is its implicit appeal to authority in at least two respects. The first is an appeal to nature as an authority: which is to argue that the evolution of nature should give us the

norms to guide our conduct in nature. The second is an appeal to science as an authority: which is to argue that only scientists can understand the 'true' nature of nature and the 'law' of evolution, thus they are the most appropriate individuals to make decisions as to who and what should be included in the concept of 'natural'. It is not surprising that contemporary foresters try to evade controversy and moral deliberation by appealing to Nature for norms of action given that forestry has undergone a crisis of legitimacy in the twentieth century (Behan 1966; Luckert 2006). As Dewey once remarked (2002: 296): 'When mythology is dying in its open forms and when social life is so disturbed that custom and tradition fail to supply their wonted control, men resort to Nature as a norm.' Appeal to authority, however, is not a politically legitimate justification for belief (Pierce 1998).

Neither is the concept of 'disturbance' morally neutral as it is both descriptive and value-laden. Unless the concept of disturbance is employed quite loosely, we could not replace disturbance with the concept of change. The concept of disturbance evokes something that disrupts a harmony, stability or equilibrium (Drury 1998) irrespective of their 'static' or 'dynamic' characterisation (Botkin 1990). Ecological disturbance connotes a negative form of interruption of a historical pattern of events, i.e. disturbance stops something from happening that *should* happen from a historical or evolutionary point of view. One could legitimately ask why should the occurrence of events (or actions) in the landscape due to humans and other agents be deemed disturbances? Is this the only epistemologically correct interpretation of the action of these agents on the landscape or does it reflect a particular ethical point of view?

Indeed, it is not uncommon that those who believe in a (stable/harmonious/constant or multiscalar/hierarchical/dynamic) 'order of nature' have derived ethical obligations to fit within this 'divine', 'cosmological' or 'natural' order (Worster 1994). Historically, the natural law tradition and the stoics have held such an ethical point of view (Glacken 1967). These days, many sociobiologists take their cue from nature's order, albeit from different standpoints. As Ruse and Wilson argue: 'Ethical premises are the peculiar products of genetic history, and they can be understood solely as mechanisms that are adaptive for the species that possess them' (1994: 430). If ethics turns out to be an applied science as Ruse and Wilson would like it to be, then our decision-making would be vastly simplified: no use deliberating about whether particular 'evolutionary' values are right or wrong, they are inescapable since we cannot think outside our genetic makeup, i.e. Nature dictates the DNA Text and we should listen to what the DNA Text says (rather than deliberate about our interpretation of it). Hence not to 'follow nature', or not to listen to evolution, is from this perspective an act of deviance and transgression with potentially severe political and ecological consequences – and for some it is simply *morally* wrong (Rolston 1988). From the perspective of the proponents of the END, 'disturbance' implies deviation

from accepted (but not necessarily acceptable) norms, which they have naturalised by an appeal to evolutionary theory.

If we acknowledge that both 'natural' and 'disturbance' are concepts that are shaped by particular ethical norms what does this mean in the END? Despite the fact that the END is conceived as a 'coarse filter' approach to biodiversity conservation and sustainable forest management, as I have illustrated with the Silver-leaf Story, choosing who and what to include in scientific interpretations of forests is guided by ethical evaluative points of view. Unless we agree to have science and epistemology through the medium of evolutionary theories dictate what our common world should be, I suggest we make these kinds of decisions by public deliberation as to what and how ethical norms should be applied in particular forest management situations.

Yet in the context of public deliberation for policy making, one might question the privileged status of science given that ethical norms guide in part the scientific interpretation of nature. Why should scientific interpretations of nature hold sway, when non-scientific narratives may be just as acceptable ethically and effective pragmatically? In the following section, I discuss the privileged status of science by using a non-scientific interpretation of the role of forest birds in natural resource management. I use the example of augury to argue that non-scientific interpretations of nature should at least be 'heard' without scientific prejudice.

LISTENING TO THE BIRDS

What can and should we do when we are faced with imperfect knowledge, an environment that is indeterminate and when systematic natural resource management strategies have failed in the past? Michael R. Dove's (1993) ethnological research on the agricultural augury (a ritual practice of divination) of the Kantu' of West Kalimantan (Indonesian Borneo) not only provides an effective pedagogical example of a non-scientific interpretation of nature, but also illustrates how such an interpretation can work for a particular natural resource management situation. While the Kantu' belief system, like the END, appeals to natural phenomena to guide environmental action, in contrast to the END's evolutionary justification, the Kantu' have a spiritual justification for listening to nature. According to Dove (1993: 148): 'Kantu' divination is based on the premise that the major deities of the spirit world have foreknowledge of human events and that out of benevolence they endeavour to communicate this to the Kantu' through the medium of natural phenomena.'

The Kantu' have traditionally used augury to select their yearly swidden sites.[3] The success of their cultivation is highly variable due to the uncertain amount and timing of rainfall, the extent and timing of riverine flooding, and pest outbreaks. The Kantu' cultivate their crops in three types of environments

with differing associated degree of uncertainties: primary forest, swampland and riverine floodplain. The augural system mainly randomises site selection within the most uncertain sites (e.g. riverine floodplain due to the risks of floods, primary forests due to the risk of drought). Each individual household will listen to the birds according to their own arbitrary interpretation and a large number and variety of additional rules and caveats. Dove shows that the practice of augury completely randomises the Kantu' swiddens by undermining any possibility of linking their empirical ecological knowledge and experience to the choice of cultivation sites. However, individual risk in the augural system is partially offset by a strong communal redistribution system: when individual household's harvests fall short, the overall harvest of the households, which generally produces a surplus, is redistributed to provide for the households who did poorly.

The reason I chose the Kantu's augural system in particular to exemplify a non-scientific interpretation of nature is that Dove makes an insightful critique of the perspective of 'government official and development planners' in agroforestry in Borneo, which I believe can also be made of scientific forestry in general. The point is best introduced by quoting an extended passage (Dove 1993: 160):

> According to the augural system, systematic attempts to decipher and to master the environment can only worsen society's ability to productively exploit it. According to the development paradigm, productive exploitation of the environment is only achievable through systematic efforts to comprehend and master it. In the augural system, failure may reflect an effort to take too much information into account (viz., through trying to discern and respond to purported environmental patterns). In contrast, failure in the development paradigm is interpreted by its proponents as evidence of insufficient information. Failure in the inderterministic system of augury prompts a call (through cultural rules promoting changes in behavior) for more indeterminism; failure in the deterministic system of development prompts calls for more determinism.

Since its inception in Germany and France modern forestry has relied heavily on science to manage forests. Science afforded a method by which forests could be classified, simplified and rendered legible (Scott 1998). Producing more and better science offered greater means of control over the productivity and harvest of trees. Scientific forestry has dominated forestry practices worldwide for several centuries, but growing concerns about the destruction of biological diversity, the depletion and decreased productivity of forests, and environmental justice issues pertaining to the access to and the distribution of forest resources have created more complex, global, policy issues in forestry. This is not to deny that science has been an extremely useful tool for efficiently growing and harvesting trees, but applying more science is not likely (nor desirable) to solve the problem of managing forest ecosystems for competing ethical values.

While certain ecologists maintain that science should be taken more seriously than other forms of knowledge (Allen et al. 2001: 484) or that its methodological 'rigour' bestows it more legitimacy than other contextualised knowledge claims (Robertson and Hull 2001), it is not necessarily the case that scientific interpretations of nature are the best epistemologically, ethically and practically for resolving all environmental issues. There is a certain irony and inconsistency in defending post-modern epistemology and ontology while maintaining a strict adherence to positivistic methodological norms (Yanow 2006).

The upshot for an interpretive forestry is that non-scientific interpretations of nature such as the Kantu' augural system cannot be dismissed a priori for policy purposes because of lack of scientific legitimacy. The use of the epistemic norms themselves do not hold sway unless we have understood and learned to identify with a particular scientific evaluative viewpoint (Putman 2004: 69). To insist that the Kantu' should use science to justify their interpretation of nature is to deny the actual randomness of their ritualistic practice. Though I have expressed (translated) its ritualism in terms familiar to ecologists (randomisation, uncertainty, indeterminism and complexity), augury remains entirely non-scientific because it essentially undermines the attempt to link empirical ecological knowledge and experience to the choice of cultivation sites.

Dove points out that the complete randomisation of swidden site selection is an effective strategy for cultivation in the tropical forest because environmental conditions are complex, indeterminate and uncertain. That is not to say that we could or should practice ritual forms of divination to manage natural resources even though such practices have been successful in other circumstances (Rappaport 1968), but we can imaginatively adapt them to analogous natural resource management situations. It does not require too much of a stretch of our imagination to think that perhaps sustainable management of forests in other parts of the world may require more of an unintegrated planning process, striving not for an optimal solution but for pluralistic ones (Dove 1993: 162). Nothing but prejudice stops us from considering non-scientific interpretations of nature.

Indeed, both the END and Kantu' augury are justified to a certain extent on the basis of the complexity of ecosystem dynamics and the uncertainty resulting from human practices on the landscape, and both depend on an interpretation of a normative order stemming from nature to guide our actions. But while END proponents 'listen' to nature, they seek an integrated and optimal solution rather than an indeterministic approach to biodiversity conservation and sustainable forest management. Yet, the uncertainties facing forests given climate change in the near and distant future suggest that perhaps a process of randomising management practices over the most 'complex, indeterminate and uncertain' parts of the forested landscape may be a sustainable practice and should be considered as a suitable option[4].

LISTENING AND DIALOGUE

A sceptical forestry colleague could say: 'it is absurd to think that we have to deliberate about each and every single entity that is going to be included or excluded in our interpretations of nature – the process would be endless and we could never get anywhere because the door would always be open to voices either demanding to be reconsidered or to voices newly discovered!' I would reply that dialogue as to whom and what to include within scientific interpretations of nature occurs all the time even if we do not and cannot pay attention to all possible voices all the time. Nor should we (even if we can imaginatively) doubt all interpretations – criticism and re-interpretations arise because of doubt, but doubt also needs justification (Putman 2004: 119). Scientists may be busy at work in their lab and at their computers (in dialogue with non-human actors), but they constantly also engage their colleagues in dialogue about each other's work, theories, projects, hypotheses and writings (Latour 1987). These dialogues are an informal vetting system, where the voices of innumerable (assemblages of) actors are being heard and being silenced.

I can easily imagine other forestry colleagues being disturbed by the idea that ethics is intrinsic to interpreting nature and arguing that epistemological and methodological norms are sufficient for science's purpose: to make true statements about nature. From this perspective, even if different interpretations of nature arise within scientific practice, given enough time, scientists will converge on the True interpretation of nature. Ethics has nothing to do with Truth. To such an argument I would reply, what about birch and other 'low-value' hardwoods? Should I simply interpret Ed's story as another step towards revealing the true interpretation of the life-span of trees, or might I question the reasons why Ed did not rest on genetic determinism as a convenient and sufficient interpretation? I believe that what Ed's silver-leaf research suggests is that in forestry infatuation with new technological disciplines such as molecular genetics can and does arbitrarily silence the voice of more or less traditional disciplines and the voice of 'low value' hardwoods – which not only narrows possibilities of research but can and has arbitrarily curtailed the well being of particular humans and non-humans – an outcome which should not be interpreted as the necessary result of 'normal science' (Kuhn 1970). Rather, if we as a collective are to accept that 'low-value' hardwoods and forest pathology are not welcome in our common world, then this decision should be the result of public deliberation, which should include the presence of forest pathologists, and representatives of birch and other 'low-value' hardwoods such as Ed.

In the realm of policy making, the representation of voices is always selective and its legitimacy is especially problematic for non-humans in deliberative contexts (O'Neill 2001). However, from a pragmatic point of view, insofar as environmental policies are shaped by ethical interpretations of nature it makes sense to evaluate these policies by a process of democratic deliberation (Castle

1996; Farber 1999; Norton 2005). Nevertheless, democratic deliberation does not have to be restricted to a process of argumentation to convince others to accept the most coherent theory or scientific interpretation of nature in the aim of achieving a consensus (Shotter 2006: 117; Young 2000). Given the prima facie legitimacy still afforded to scientific interpretations of nature, the policy arena is not a level playing ground; all do not have equal voice. Rather, public deliberation may be a means of revealing conflicts or the voice of the mute that would ordinarily be hidden, unheard or smothered (O'Neill 2006: 276).

From a Deweyan perspective, democratic deliberation must (at least) listen to those voices which are most affected by the decision to be included or excluded from our common world. The public aspect of this process ensures that the interests considered are broader and more inclusive than individual private preferences (Goodin 1996; Minteer 2005). The deliberative aspect is enlisted as a dramatic rehearsal in imagination of various competing possible lines of action (Dewey 2002 [1922]; Goodin 2000). Moreover, Dewey's method of social learning through deliberation offers a means to 'adjudicate' (Putnam 1990) between different interpretations of nature based on conflicting evaluative standpoints.

In other words, environmental policies should be evaluated on the basis of public deliberation rather than on the basis of scientific epistemic norms because any interpretation of nature may or may not be appropriate in particular management situations. But this is not to say that environmental policies should necessarily be treated as 'hypotheses' to be tested scientifically as currently advocated by some of the lead proponents of adaptive management in ecology (Walters and Holling 1990)[5]. For to endorse 'adaptive management' in forestry policy making as construed, for instance, by Brian Norton in his *Sustainability : A Philosophy of Adaptive Ecosystem Management* (2005) emphasises the evaluative point of view of science and its evaluative criteria (epistemological and methodological norms), often at the cost of denying legitimacy to interpretive or altogether non-scientific evaluative and procedural norms. Rather we should expect evaluative and methodological criteria to evolve as the interpretive and deliberative process responds to the changing world.

CONCLUSION

Given that scientific narratives are products of encounters with others, these interactions are not subject solely to scientific norms, but to ethical norms as well. How nature is being interpreted, for what purpose, and who and what stands to gain and/or lose from the interpretations are ethical questions that not only shape the content and implications of scientific narratives but also contextualise their truth-value.

Ironically, recent moves to acknowledge the partiality and situatedness of ecological knowledge, and its potential to accommodate and justify a plurality of narratives, is offset by a tendency to hold firm positivistic methodological norms and the positivistic dream (or nightmare) of a single master language (science) that will resolve all our environmental issues. To paraphrase Putnam: I would suggest that perhaps some conceptions of the process of inquiry and environmental policy-making have far too narrow a sense of the wealth and the value of diverse interpretations of nature, and perhaps this makes it easier for some of us to contemplate the idea of a single language, a single interpretation, and a single voice to guide policy decisions – birds notwithstanding.

NOTES

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[1] This section is based on an interview that is part of broader study I am conducting on the ethics underlying the 'emulation of natural disturbance' forest management paradigm in Canada.

[2] Unlike Katz (2002), I do not believe nature's autonomy implies its total isolation and independence from humans: leaving nature alone. When a being or a landscape has been dominated for a long time, its capacity to flourish may not be restored by simply leaving it alone – in fact to do so may cut it off from the very thing it needs to flourish: responsible relationships. To engage in relationships necessarily changes the parties involved. To be closed to change is to protect ourselves and others from the risk of domination but it is also to deny ourselves and others the very real rewards of and opportunities for growth in responsible relationships.

[3] Dove (1993) reports on the research he conducted among the Kantu' from 1974 to 1976. The description of the Kantu' augural system is drawn entirely from his work.

[4] While the complete randomisation of sylvicultural practices over particular landscapes may incur logistic and market-related problems, these are not intractable. Moreover, there are already mechanisms in place that afford some means of redistribution of costs and risks of forestry activities, i.e. stumpage rates, which may be usefully combined with the randomisation of sylvicultural treatments to address the uncertainties facing forestry.

[5] My proposal differs from two prominent environmental scholars who have proposed adaptive management as an experimental method in environmental policy. In the first instance, because Lee promotes strictly scientific interpretations of nature as the only legitimate hypotheses to test under the assumption that 'science offers the best-known route to reliable knowledge' (see Lee, 1993). In the second instance, because Norton adopts Pierce's theory of truth (see Norton, 1999) which is unnecessary and wrong – as Putnam (2002: 124) has pointed out: 'it is a wholly contingent question whether every truth could, "even in principle," be learned by beings such as ourselves, and it is deeply imbedded in the theories of present-day science that for a number of reasons the answer

to that is that, as a matter of contingent empirical fact, there are many truths that are beyond the power of our species to ascertain'.

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