Ecological Management, Cultural Reform, and Religious Creativity

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Complex environmental problems frustrate practical reasoning and scientific research, and thereby challenge relations between ethics and ecology. Sustainability crises, in which human powers affect ecological systems in ways that jeopardize basic social values, become practical problems only as cultures create capacities to take responsibility for them. They become real problems, that is, only as cultural reform processes generate ways to confront and learn from social crises. Issues such as climate change therefore require professionals who can make challenges to environmental science and moral culture into sites for adaptive learning and social change, thereby making inchoate threats into intelligible civic problems.

How to make crises into problems shapes an ongoing debate over competing strategies of practical reason. Should ethics critique the cultural worldviews and metaphysical assumptions at root of environmental crises, or should it develop practical responses to specific problems from broadly available cultural values? The question seems to force a dilemma: choosing the cosmological route lets one critique the depth of problems, but at the cost of distance from the moral imagination and political values of most citizens, while choosing the pragmatic route lets one deploy cultural values to support specific policy solutions, but at the cost of being constrained by the modest reforms those values permit.

Work in religious ethics, and its companion field of religion and ecology, tends to pursue a cosmological strategy, examining background worldviews and ontological assumptions in order to challenge the cultural ideas that underlie sustainability problems. This approach allows ethicists to critique deep cultural roots, but at the cost of distance from the way particular moral communities can respond to environmental problems and of abstraction from the specific problems faced by ecological science. Because our scholarship has often been abstract from science-based interpretation of problems and from the cultural reform processes by which communities generate responses to them, I have elsewhere argued that religious ethics should adopt methods from the problem-based approaches proposed by pragmatists. Problem-based methods allow religious ethicists to better critique and cultivate the ways communities invent moral change in response to practical challenges.[1]

Here I argue the other side; that problem-based approaches can benefit from considering the role of religious communities in generating cultural reform. Pragmatic approaches depend on cultural reform when they use adaptive ecological management as an instrument to deal with complex problems. Adaptive management is primarily a tool for doing ecological research in conditions of uncertainty, but as I will show, can be extended as a civic process of ethical

1 Willis Jenkins, "After Lynn White: Religious Ethics and Environmental Problems," *Journal of Religious Ethics* 37, no. 2 (2009).

reflection. Approaching specific problems forged from broadly available cultural values and then reassessing values and principles in response to how management schemes affect the problem can help communities revise their moral values as they learn from science-based responses to environmental problems. An important implication of this approach: ecological scientists and managers must become adept participants in moral culture.

Adept participation in moral culture should include attentiveness to how religious projects create cultural reforms. Stimulating cultural change adequate to sustainability problems requires that ecological managers go beyond acknowledging the values held by citizens, in order to understand how moral communities revise their values by creating new moral capacities from their beliefs. Moreover, in face of the most complex problems, the creative enactments of responsibility and the cosmological interpretations often cultivated by religious communities sometimes have a constructive role to play in keeping an interdisciplinary adaptive management process self-critical and open.

1. Adaptive Ecological Management as Practical Ethic

How can pluralist cultures develop moral capacities to meet problems unanticipated by their moral inheritances? The field of environmental ethics faces that question anew because, after a generation of proposals for ecocentric worldviews, critics argue that those ethical resources seem remote from the practical problems faced by ecologists and policy-makers, and alien from the mainstream values held by most citizens. A growing school of environmental pragmatists has argued that ethics should focus less on changing worldviews and more on practical problem-solving. "Urgent calls for new environmental worldviews and radically revised ontological schemes, rather than leading to improved environmental solutions and conditions, only lead ethicists' attention away from the resources already present within our shared moral and political traditions."[2]

Bryan Norton thinks that the field's early entanglement with religion explains some of its distraction. Readers of Lynn White's 1967 ecological critique of Christianity, even if they were indifferent to the religious implications, learned that an adequate ethic for environmental problems must rethink cultural worldviews.[3] Pragmatists object that projects for new worldviews do not motivate a broad public or warrant policy, and so stand irrelevant to the social mandate of ecological research. Cosmological theories seem to alienate practical ethics from lived moral culture and from the sciences that address environmental problems. Pragmatists therefore want to develop ethics by working from specific problems with shared moral and political resources. By beginning with real policy dilemmas and practical ecological management problems, ethicists can use moral theories as "tools" to craft resolutions and agreements. Different problems may require different tools. For example, human rights concepts might shape management of toxic

2 Ben Minteer and Robert Manning, "Pragmatism in Environmental Ethics: Democracy, Pluralism, and the Management of Nature," in *Environmental Ethics: An Anthology*, ed. Andrew Light and Holmes Rolston (Malden, MA: Blackwell, 2003), 319.

3 Bryan G. Norton, *Sustainability: A Philosophy of Adaptive Ecosystem Management* (Chicago: University of Chicago Press, 2005), 160-6.

risks, while biological values or place attachments guide management of invasive species.[4]

Not just any useful tool will do, however; pragmatists constrain the pluralism by appealing to those that the relevant civic community already possesses and knows how to use. Ethicists should "work within traditional moral psychologies and ethical theories that people already have," argues Andrew Light. An ethic so crafted can help make public environmental management work by finding ground for a practical consensus. That is how an ethic should be evaluated, claims Light: whether it works to effectively build policy consensus.[5]

By focusing on management, then, a public facing some ecological problem need not share an ecological worldview in order to take practical action Norton's "convergence hypothesis" supposes that adherents of diverse environmental worldviews will, by participating in processes of ecological management converge on similar management policies.[6] Critics of environmental pragmatism have misgivings about the loss of a different kind of practicality in the reorganization of ethics around management. What if available ethical tools are inadequate for confronting the problems? What if a culture's resources, its "traditional moral psychologies and ethical theories," can no longer be trusted? What if a society's moral imaginaries vary so widely as to make any consensus too weak? What if problems arrive into public debate narrowly framed or ideologically distorted? In the worry behind these questions lies the impulse for cosmological revision: a sense that our received moral traditions constrain us from adequately responding to ecological problems, perhaps because those traditions are themselves at the root of the problem. If so, then cosmological revision would seem requisite, and a managerial ethic of problem-solving complicit with catastrophe.

The pragmatists offer a hopeful rejoinder to those questions by claiming; that the exercise of solving problems itself can reform and even generate cultural values. Minteer writes that through the practical experience of confronting problems, communities "learn about their (and others') values and beliefs, and adjust and progressively improve their natural and built environments…[which] suggests that new knowledge and novel values can emerge from reflective and well-planned human activity."[7] Norton argues that the exercise of problem-solving generates the new values and descriptions needed to continue resolving sustainability problems: "the epistemology of adaptive management thus provides for gradual progress and improvement of both our belief system and our preferences and values, by using experience to triangulate between temporarily accepted beliefs and values."[8] Per-

4 See Andrew Light, "The Case for a Practical Pluralism," in *Environmental Ethics: An Anthology*, ed. Andrew Light and Holmes Rolston (Malden, MA: Blackwell, 2003); ———, "Materialists, Ontologists, and Environmental Pragmatists," in *The Ecological Community*, ed. Roger Gottlieb (NY: Routledge, 1997); Andrew Light and Eric Katz, eds., *Environmental Pragmatism* (New York: Routledge,1995).

5 Light, "Case for a Practical Pluralism," 235.

6 Bryan G. Norton, *The Search for Sustainability: Interdisciplinary Essays in the Philosophy of Conservation Biology*. (Cambridge: University of Cambridge Press, 2003).

7 Ben Minteer, *The Landscape of Reform: Civic Pragmatism and Environmental Thought in America* (Cambridge: MIT Press, 2006), 6.

8 Norton, *Sustainability: A Philosophy*, 151.

haps the adaptive process of understanding ecological problems can also generate the ethical reforms needed to resolve them.

Adaptive management (AM) usually refers to an integration of experimental research and management, such that researchers investigate ecological systems in concert with policies to manage them for some social objective. When first proposed in 1978 by ecologist C. S. Holling, incorporating the social dimensions of policy into scientific research practices aimed to let ecologists better describe how complex systems function.[9] In this sense it has often been called "learning by doing."[10] Especially useful in conditions of ecological uncertainty or environmental change, policies may be crafted with controls (e.g., using several management schemes at once) in order to let scientists assess how ecological systems function under different ways of managing them for social goals. Managers can then adapt policies in light of what research shows as the most effective models, allowing science-based policy to move forward even in conditions of scientific uncertainty.

Over time AM has been expanded beyond a research tool into a broad device of civic learning. As Kai Lee explains of processes to manage the Columbia River Watershed, AM makes the political community of an ecosystem into a kind of laboratory, capable of systematically answering questions from imperfectly controlled experiments. In its conjunction of science, culture, and politics AM assumes that policies, economies, and ways of living in a place are experiments from which societies may learn, and in turn adapt. Instead of using sustainability as a slogan to avoid hard questions and difficult social decisions, AM makes the search for sustainability into a science-based process of social learning and cultural reflection.[11] Holling thinks that AM thus rescues the intelligibility of sustainability from its critics by showing how its ideological plurality and openness supports an integrative mode of science connected to a wide sconce of social learning.[12] In order to work as a useful cultural arena of ethical reflection, the idea of sustainability depends on a social practice like AM, which can test the performance of various proposals.

Considering Lee's analysis and reconsidering his own work over several decades, Holling writes that AM opens a view of nature and society at once more integrated and more dynamic than he originally suspected. Because ecological and social systems are both more unpredictable and more reflexive than he imagined in the 1970s, Holling has come to argue for "policies and actions that not only satisfy social objectives but also achieve continually modified understanding of the evolving conditions and provide flexibility for adapting to surprises."[13] Doing

9 C. S. Holling, ed. *Adaptive Environmental Assessment and Management* (New York: International Institute for Applied Systems Analysis, 1978).

10 Carl J. Walters and C. S. Holling, "Large-Scale Management Experiments and Learning by Doing," *Ecology* 71, no. 6 (1990).

11 Kai Lee, *Compass and Gyroscope: Integrating Science and Policy* (Washington, DC: Island Press 1993). 7-13, 69-73.

12 C. S. Holling, Fikret Berkes, and Carl Folke, "Science, Sustainability and Resource Management," in *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, ed. C. S. Holling, Fikret Berkes, and Carl Folke (Cambridge: Cambridge University Press, 1998).

13 C. S. Holling, "What Barriers? What Bridges," in *Barriers and Bridges to the Renewal of Eco-*

so requires rethinking metaphors of nature and theorizing the relation of environmental and cultural change. Such cultural analysis seems alien to scientific method, but AM offers a way for science to acknowledge ethical ambiguity and social conflict as important parts of its research context.[14]

AM is so popular as a framework for responding to complex problems, that some complain that it is "too often used as a euphemism for environmental management plans that admit to the need for learning in the face of ecological uncertainty."[15] Pragmatists invoke AM in a broad sense, but not simply as a euphemism for muddling through uncertainty; they use AM as an intellectual model for introducing social values to ecological science so as to maintain research and management in the face of social and ecological complexity. For Norton, AM functions as a model of practical ethics: it "begins with a problem-oriented approach, focuses on a few illustrative cases, and then works inductively toward a general theory of environmental values." Theory and values come into social reflection as they are generated by successful solutions to science-based descriptions of problems, such that scientific descriptions and ethical arguments are warranted by their capacity to clarify and resolve debate in a wider political community.[16]

That confounds "applied" views of ethics and science, wherein ethicists supply values and scientists supply facts, with policy-makers then using those supplies to resolve dilemmas. Instead, a community of participants revises both ethical guidelines and scientific description as it learns from policy responses to problems. Over time, the community discovers more adequate guidelines and descriptions and comes to adopt beliefs and values that prove themselves reliable for successful management. For Norton, that makes AM not a "pure science" but a "mission-oriented science," producing information relevant to socially important goals while also providing the context to justify or reconsider those goals.[17] Norton's proposal is not to make ethics more ecological, but rather to make the practice of ecology a way of generating the ethical values we need.

Others have less confidence in AM as a process for generating social values. Ecologist Oswald Schmitz agrees that involving political management in the learning process about environmental problems makes social values part of ecological research, but avers that generating and justifying those values happens in a different cultural domain. Management policies written with experimental controls let scientists test solutions to problems, thus making policy part of a science-based form of social learning. However, Schmitz does not think that AM offers a practical philosophy competent to set the broader goals for policy or to host deliberative debate about its guiding values. While "sustainable ecosystem function" names an assumed objective for AM, establishing and justifying that social objective is a different kind of moral task, and one outside the competence of the

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systems and Institutions. , ed. Lance Gunderson, C. S. Holling, and Stephen Light (New York: Columbia University Press, 1995). 14

14 KN Lee, "Appraising Adaptive Management," *Conservation Ecology* 3, no. 2 (1999).

15 R. Gregory, D. Ohlson, and J. Arvai, "Deconstructing Adaptive Management: Criteria for Applications to Environmental Management," *Ecological Applications* 16, no. 6 (2006): 2424.

16 Norton, *Sustainability: A Philosophy,* 149-53.

17 *Ibid.*, 294.

AM process. Aldo Leopold showed us, Schmitz writes, that to fully understand its ecological problems, society must "change its ethical perspective about nature," but that is not something scientists make happen, even as adaptive managers. Schmitz concludes his book on ecological management by endorsing sustainability as an achievable social goal, but says that "getting there requires a realignment of ethical thinking in which market and natural economies are viewed as intertwined and interdependent."[18] For Schmitz, then, successful management depends on cultural reforms that it cannot itself produce.

Norton and Schmitz exhibit contrasting views of adaptive management with contrasting views of what societies can learn by doing practical ecology. For Norton, AM is itself a generative form of practical reasoning that can produce the ethical concepts required to resolve environmental problems, while for Schmitz AM relies on ethical realignments that a science-based process cannot fully achieve itself. Which frame of AM to adopt, and how social ethics relates to the science of ecology, may depend on the kind of problem at issue.

2. Managing Wicked Problems

Consider first the problem of invasive non-native species (INS), which has generated heated exchanges among philosophers and scientists. Philosopher Mark Sagoff claims that undefended cultural values, including xenophobic metaphor driven management of "invasive aliens," which often do not pose the factual threat that society supposes.[19] Biologist David Simberloff retorts with research showing that INS increase extinction risks and degrade ecosystems, thus warranting the social disvalue.[20] Amidst this debate over the relevant values, what can management participants expect to resolve by working through this dispute?

They can at least learn how to better communicate to civic communities about INS by recognizing how cultural values may come to bear on research. Philosopher Kristen Shrader-Frechette and biologist David Lodge argue that, by clearly discriminating descriptive and normative claims, scientists can help communities appreciate that making policy decisions about INS depends on incomplete scientific facts as well as independent cultural values. With moral intuitions and scientific uncertainty acknowledged, a civic community can work to develop risk indicators responsive to accurate research and expressive of values that the community recognizes and accepts.[21] That might be accomplished through an AM process that develops INS policies through broadly inclusive participatory dialogue about ongoing research.[22] Schmitz's view accommodates this kind of social

18 Oswald Schmitz, *Ecology and Ecosystem Conservation* (Washington, D.C.: Island Press, 2007), 126, 38.

19 M. Sagoff, "Do Non-Native Species Threaten the Natural Environment?," *Journal of Agricultural and Environmental Ethics* 18, no. 3 (2005).

20 D. Simberloff, "Non-Native Species Do Threaten the Natural Environment!," *Journal of Agricultural and Environmental Ethics* 18, no. 6 (2005).

21 D. M. Lodge and K. Shrader-Frechette, "Nonindigenous Species: Ecological Explanation, Environmental Ethics, and Public Policy," *Conservation Biology* 17, no. 1 (2003).

22 J. M. Evans, A. C. Wilkie, and J. Burkhardt, "Adaptive Management of Nonnative Species: Moving Beyond the "Either-or" through Experimental Pluralism," *Journal of Agricultural and Environmental Ethics* 21, no. 6 (2008).

involvement for scientists, because it works from clear discrimination of facts and values.

Even without Norton's stronger claims for AM, then, environmental scientists find themselves involved in social ethics and political deliberations. Some have therefore argued that training in ecology should involve training in ethics. Because it often deals with socially significant uncertainty, argue Shrader-Frechette and McCoy, ecology functions more inductively than other sciences, and should reason through its problems casuistically.[23] Shrader-Frechette therefore argues that neither "soft" philosophy nor "hard" science can adequately resolve ecology's ambiguous problems; to reason through them, "we need the practical ecology of case studies."[24] Minteer and Collins have proposed using AM case studies in the professional training of ecological scientists, in order to develop an ethical toolkit that helps scientists address the moral and social dimensions of their work.[25]

But can an ethical toolkit assembled from case studies help resolve social debates over how to respond to climate change or how to manage a watershed? Some environmental problems seem so open to interpretive and normative variety that they are difficult to even describe as a "problem" that could be managed. Climate change involves multiple units and scales of vulnerability, involves a wider controversy of objectives, and may pose basic threats to human societies in ways that INS problems do not. Donald Ludwig, Marc Mangel, and Brent Haddad appeal to the concept of "wicked problems" (from Rittel and Webber) to explain the difficulty of climate change for an AM framework. Environmental problems that have "no definitive formulation, no stopping rule, and no test for a solution," escape the disciplinary competence of ecological science, and thus "involve a host of traditional academic disciplines that cannot be separated from issues of values, equity, and social justice." Ludwig et al. specifically criticize ecological management as an attempt to solve wicked problems from within disciplinary boundaries.[26] It may work for resolving INS dilemmas, but not for generating meaningful responses to climate change.

Wicked problems like climate change or global biodiversity loss would seem to signal the limits of a pragmatic strategy in ethics, inviting ontological and religious approaches to cultural reforms. Norton's view of AM remains optimistic about a pragmatist approach, however, because his concept of "management" refers to culturally inclusive processes of social learning about even wicked problems. It involves a broader scope of disciplines and participants than typical AM frameworks, then, because it begins to reimagine moral culture as itself an adaptive process. Norton thinks that successful societies create ways to learn from the problems created by their patterns of participating in ecological systems. Their management

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23 K. S. Shrader-Frechette and E. D. McCoy, *Method in Ecology: Strategies for Conservation* (New York: Cambridge University Press, 1993), 114-29.

24 Kristen Shrader-Frechette, "Practical Ecology and Foundations for Environmental Ethics," *The Journal of Philosophy* 12, no. 12 (1995): 635.

25 B. A. Minteer and J. P. Collins, "Ecological Ethics: Building a New Tool Kit for Ecologists and Biodiversity Managers," *Conservation Biology* 19, no. 6 (2005).

26 Donald Ludwig, Marc Mangel, and Brent Haddad, "Ecology, Conservation, and Public Policy," *Annual Review of Ecology and Systematics* 32(2001): 482, 98.

will involve experimentation and innovation, as well openness to alternative interpretations of the problem and criticism of social goals pursued in resolving it.

Norton's framework invites ethics to consider sustainability not as a principle or value that can be applied by managers as they solve problems, but as a social capacity that can be nurtured. Managers do not apply ethical values, then, or even deploy ethical tools; they rather facilitate a wide process of cultural change through learning from participation in responses to ecological problems. In order to create those processes, however, managers must find ways to make inchoate, wicked threats into intelligible social problems, and it is not immediately clear how even a broad management framework can accomplish that.

In order to make inchoate issues into practical problems, ecological science must find ways to create initial social goals amidst ecological uncertainty while simultaneously establishing research objectives amidst cultural uncertainty. That double task informed Jane Lubchenco's manifesto for the Ecological Society of America: in an age of massive human impact on planetary systems, "wise management" depends on ecological research conducted on the problems most important and most challenging to the social objective of sustainability.[27] Writing more recently in *Science*, Margaret Palmer et al. argue that doing "ecology for a crowded planet" requires investigating how human agency shapes ecological systems, assessing which ecological services can be lost or technologically replaced, and articulating the policies required for sustainability. Such research exceeds any discipline's competence, and Palmer et al. call for "interdisciplinary frameworks that incorporate multivariate causality, nonlinear feedback, and individual-based decision-making," as well as the impact of corporate and political decisions.[28]

Understanding sustainability problems requires researching the role of human power within ecological systems even while participating in the political and cultural responses to those systems that reform social objectives, realign human power, and thus change conditions for research. The example from Ludwig et al. is climate change, on which they quote two researchers: "the biggest challenges are philosophical and methodological...We have never worked on problems in which the labile and adaptive nature of values, or the number of different actors with different values, is as central as it is in climate change." In light of such a dynamic research environment, Ludwig et al. argue that "the training for those interested in solving environmental problems must be broader and deeper than the training of a disciplinary scholar." While they must retain core disciplinary skills, "the next generation of ecologists" must recognize that "traditional disciplines and training are inadequate for wicked problems involving the interaction of humans with their environment." Understanding and addressing ecological problems, they say, now requires ecologists who can learn from history, economics, philosophy, and religion.[29]

It seems, then, that interdisciplinary capacities of cultural criticism might

27 J. Lubchenco et al., "The Sustainable Biosphere Initiative: An Ecological Research Agenda," *Science* 72(1991).

28 M. Palmer et al., "Ecology for a Crowded Planet," *Science (Washington)* 304, no. 5675 (2004).

29 Ludwig, Mangel, and Haddad, "Ecology, Conservation, and Public Policy," 484, 97.

help generate more productive, more practical approaches to wicked problems. Robert Frodeman, a theorist of interdisciplinary studies, argues that AM can work for problems like climate change only if it includes useful reflection on how multiple disciplinary knowledges of a problem are put to cultural use.[30] Learning from eco-social crises requires doing science and ethics collaboratively so as to make cultural systems capable of learning and doing new things. Understanding how to shape human participation in ecological systems requires understanding how cultural systems can make troublesome participation into real problems. Ecological managers must then know how to engage moral culture in ways that anticipate those cultures can do new things. Ludwig et al. quote Donald Worster: "We are facing a global crisis today not because of how ecosystems function, but because of how our ethical systems function."[31] So how do ethical systems function?

3. Problem-Solving as Cultural Reform

Adequate response to sustainability problems requires cultural agents who can make ethical systems function in new ways. That observation marks a usual point of entry for philosophers and religionists with proposals for reforming worldviews. Leopold himself wrote that "no important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions. The proof that conservation has not yet touched these foundations of conduct lies in the fact that philosophy and religion have not yet heard of it."[32] Now that philosophy and religion have heard of conservation, perhaps they should take the lead in creating ethical change?

Religious ethicists, no surprise, tend to answer affirmatively, and display the robust moral claims that religious systems can make on convictions, affections, loyalties, and beliefs. Environmental pragmatists tend to worry that religious and other cosmological approaches will drift away from specific problems, from broadly motivating civic values, and from ecological sciences. In order to make AM competent to wicked problems such as climate change, however, pragmatists must show that a problem-based approach can accomplish what a religious ethic can: that it can make transformative claims. They must show that ethics can transform the "foundations of conduct" while yet working from available values and concrete problems. In order to prove that, AM approaches may sometimes need to include religious responses to wicked problems (something many pragmatists would rather overlook).

Making ethical systems support innovative approaches to wicked problems requires bringing together problem-solving and cultural reform in such a way that communities learn from their most difficult problems as they adapt to them. Working from specific problems with the moral values resident in a community (the pragmatist counsel) need not rule out transformative cultural reform (the cosmological hope), if societies can invent new practical capacities from their moral

30 R. Frodeman, "Redefining Ecological Ethics: Science, Policy, and Philosophy at Cape Horn," *Science and Engineering Ethics* 14, no. 4 (2008).

31 Ludwig, Mangel, and Haddad, "Ecology, Conservation, and Public Policy," 498.

32 Aldo Leopold, *A Sand County Almanac, with Essays on Conservation from Round River* (New York: Oxford University Press, 1966), 246.

inheritances. The possibility for an adaptive science of sustainability thus lies in making problems stimulate cultural reform. How do communities invent new practical capacities from their cultural inheritances?

Answers to that question depend on assumptions of how values relate to cultural action. Sociologist Ann Swidler argues that culture does not simply supply values toward which action is oriented; rather, culture is more like a "'tool kit' of symbols, stories, rituals, and world-views which people may use in varying configurations to solve different kinds of problems."[33] Cultural reform, then, depends not on substituting new values for old ones, because the meaning of symbols and stories amounts to the strategies of action they are used to sustain. Cultural reform happens as communities redeploy their moral inheritances to solve cultural problems with new strategies of action.

A cultural repertoire always admits a diversity of strategies, and in "unsettled" times, says Swidler, commitment to a new pattern of action may be experienced as "conversion" to a new ideology, a radical break from tradition or common sense. Swidler's analysis suggests, however, that redeployment of cultural symbols can permit what might appear as radical change, especially if the practical strategy of action they support is modeled by some moral community or social movement. New patterns of action in turn allow agents to develop conceptual capacities to recognize new problems, and thus anticipate further possibilities for cultural change. That is how ethical systems function: not by supplying values to guide social objectives, but by creating capacities for patterns of cultural action.

In order to create cultural conditions for better understanding difficult ecological problems, managers and ethicists must understand how moral symbols function to sustain broader patterns of cultural action, and anticipate how they might function differently. Practical solutions may require Light's "practical anthropology;" as problem-solvers explore a culture's range of action involving humanity and nature, they can interpret what new forms of social agency those relations might support. Roger King goes a step further, claiming that effective environmental action depends on agents with contextual imagination, capable of making problems matter within a particular community's background beliefs in such a way that the problems begin to unsettle, challenge and change those beliefs.[34]

Effective AM thus requires managers who know how to help make cultural values do new things within the communities that hold them. That scientists and ecological managers must become adept participants in moral culture has become a familiar claim, especially for climate scientists. "Adept participation" here, however, includes more than the usual argument that scientists should understand what citizens believe and communicate their facts more clearly and forcefully to correct those beliefs. Helping societies revise their inherited values in response to environmental problems requires doing better: not just acknowledging the values

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33 Ann Swidler, "Culture in Action: Symbols and Strategies," *American Sociological Review* 51(1986): 273.

34 Roger J. H. King, "Narrative, Imagination, and the Search for Intelligibility in Environmental Ethics," *Ethics and the Environment* 4, no. 1 (1999).

held by citizens, but understanding how moral communities use science-based understanding of problems to create new cultural capacities.

Like anthropologists, scientists and ethicists should seek to understand how symbols and worldviews function within lived moral worlds. Like activists, they should agitate those communities to make their toolkit support new responsibilities. Ecological managers need not contest the core values and beliefs of that community – need not seek to change their worldview – but rather to draw communities into a process wherein they might invent new capacities of action from their beliefs in order to interpret difficult problems. This view of the ethical task suggests the possibility of more productive interdisciplinary engagement with religious communities.

However, the theorists of AM rarely recognize religious communities as part of the moral culture participating in ecological management. Religious interpretations and faith commitments are absent in Norton and Minteer, which raises doubts about the scope of their cultural inclusion and the reliability of their convergence notions. Light does mention religious communities, but his hitherto creative notion of the ethical task suddenly appears flat: to articulate the values of "the environmental community" to some (apparently different) religious community.[35] The environmental community relevant to the ecological management of wicked problems, however, means an entire society – certainly not just those self-identifying as environmentalists (which would include many religious citizens anyway). The religious lacuna here represents more than a failure to recognize the motivating values and commitments of some segments of the population; it misses a significant site of moral creativity. In regard to problems that flummox even "the environmental community," the cultural engagement may sometimes flow the other way, with religious communities demonstrating capacities of social learning and cultural reform.

I cannot here defend a theory of religious reform and social change, but let me sketch a view and offer an example. Informed by Swidler's view of culture, suppose that cultural change becomes possible as reform communities invent new possibilities of action from a received cultural repertory. In the face of unprecedented ecological problems, the ethical task, then, is to make a cultural repertory do new things. "Our task," writes pragmatist philosopher of religion Jeffrey Stout, "like Thomas Aquinas's, Thomas Jefferson's, and Martin Luther King's, is to take the many parts of a complicated social and conceptual inheritance and stitch them together into a pattern that meets the needs of the moment."[36] That taking and stitching into a new pattern of action becomes compelling when some group models its possibility. So the ethical task may be most effective when working with projects, communities, or associations that enact patterns of life that adequately meet the needs of difficult new problems.

Religious communities sometimes have internal reasons to enact creative

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35 Andrew Light, "Taking Environmental Ethics Public," in *Environmental Ethics: What Really Matters, What Really Works*, edited by D. Schmidtz and E. Willott (New York: Oxford, 2002).

36 Jeffrey Stout, *Ethics after Babel : The Languages of Morals and Their Discontents* (Boston: Beacon Press, 1988), 292.

reform strategies. Reform projects may undertake religious responses to society's most difficult problems in order to demonstrate the capacity of a religious tradition to meet and transform social crises. Religious creativity often uses new social problems to confirm their most important beliefs, and revise their function by making those beliefs support new capacities of action. Theologian Kathryn Tanner argues that the Christian sense of life before a creator God drives an ongoing cultural bricolage, in an attempt to open possibilities of responsibility before God.[37] When religious communities direct such creativity in response to wicked ecological problems, they may make useful contributions to AM processes – not because they possess a better worldview, but because they demonstrate how to make received cultural values support new strategies of action.

Consider as an example Susan Drake Emmerich's approach to political conflict over a management plan for sustainable fisheries in the Chesapeake Bay. What appeared as a typical impasse between environmentalist and livelihood worldviews had more potential, she discovered, with closer attention to the dynamics of moral change. Living with watermen families on Tangier Island, she came to think that their "biblical environmental ethic," which had thus far funded opposition to new management proposals, might function differently. Arriving to the island community with exposure to other evangelical theologies of "missionary earthkeeping," Emmerich thought that the island's biblical ethic could support participation in the management plan.

Observing that social change in this community was driven by women and the church, Emmerich initiated reflective conversations among the women and then encouraged the local church to develop its own biblical ethic for managing the Bay. Her recounting of the response is dramatic: at a community church service, "fifty-eight watermen bowed down in tears and asked God to forgive them."[38] Or in Swidler's terms, they deployed the interpretive symbol of repentance to authorize a new pattern of cultural action that would allow them to resolve a cultural problem. Their stewardship metaphor offered ground for environmental, regulatory, and watermen groups to develop shared management objectives. Their "conversion" broke with common sense about possibilities of change, because it occurred without changing their worldview but rather using it in a new way, to make an intractable dilemma into a negotiable management problem, responsible to scientific feedback.

The example illustrates more than an odd moral community finding its own peculiar vocabulary for participating in a management scheme. By interpreting scientific feedback about the state of the Chesapeake Bay within their ethic of obedient stewardship, the watermen let science-based ecological feedback fuel an internal logic of moral reform. As they do, they authorize other moral communities with suspicions about "the environmental community," to create similar forms of responsibility that integrate environmental science and ethical reflection with-

37 Kathryn Tanner, *Theories of Culture: A New Agenda for Theology* (Minneapolis: Augsburg Fortress, 1997).

38 Susan Drake Emmerich, "The Declaration in Practice: Missionary Earthkeeping," in *The Care of Creation*, ed. R. J. Berry (Downers Grove, IL: Inter-Varsity Press, 2000), 151.

out compromising their core beliefs. They may also begin to reinterpret the task of managing the Bay by reimagining how humanity participates in its systems, and a wider society may glimpse in their enactments of responsible stewardship, alternative patterns of living in the Chesapeake.

Moreover, the watermen's use of a stewardship metaphor begins to enrich and perhaps contest the framing "management" metaphor. Perhaps AM is a poor concept for integrating scientific feedback and cultural response. As ecological feedback about the Bay shapes reflection on the adequacy of cultural response, the watermen may eventually come to think that management represents a pattern of action that prevents the wider watershed from adequately interpreting the problem or undertaking responsibility for it. In that case, they could propose to a wider public that their own model of stewardship, with its notions of human sin and perverse political powers, better interprets the complexity of the challenge and illustrates the scope of society's responsibility for it.

The redeployment of cultural inheritances enacted by the religious watermen can thus illustrate to a wider moral culture unrealized possibilities of interpretation and action in its own inheritances. Mainstream moral culture need not adopt the religious worldview to appreciate what its symbol of repentance accomplishes: an enactment of responsibility that connects personal integrity with ecological health. Other moral communities in the watershed may find compelling the watermen's personal self-examination and political critique, and may look for analogous ways to make their lived beliefs support actions accountable to ecological feedback from the Bay. Or they may just use the religious interpretation of Chesapeake sustainability to pause in consideration of deeper moral questions possibly at stake and alternative metaphorical constructions of their cultural task.

Reconsidering metaphors and proposing revisionary frames can sometimes help remodel ecological problems.[39] Norton's inclusive sense of ecological management appreciates this function, offering something like a cosmological proviso for pragmatic approaches to wicked problems. When facing "messy problems, often involving conflicts among conflicting goods," says Norton, there are "varied complaints and varied explanations of what the problem is, often associated with varied value positions and perspectives…But it is in this messy dialogue about goals and aspirations that metaphors and similes allow the reconstruction of a problem." A process open to imaginative reframing, he writes, "encourages 'social learning' at the deepest, metaphorical level – the kind of social learning that can 're-model' complex and wicked problems and improve communication by disentangling messes into addressable problems."[40] An AM process open to alternative metaphors might lead to questioning "management" precisely in order to sustain adaptive social learning.

Norton's interest in the metaphorical reframing that pluralist dialogue might accomplish suggests that, when facing messy problems, skilled cultural negotiators

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39 See Willis Jenkins, "Assessing Metaphors of Agency: Intervention, Perfection, and Care as Models of Environmental Practice," *Environmental Ethics* 27, no. 2 (2005).

40 B. G. Norton, "Beyond Positivist Ecology: Toward an Integrated Ecological Ethics," *Science and engineering ethics* 14, no. 4 (2008): 590-1.

should avoid trying to collapse a culture's moral pluralism into a policy consensus. In regard of wicked problems that frustrate mainstream cultural competencies, scientists and ethicists might in fact look away from the moral mainstream to pay special attention to reform strategies from peculiar edges and minority niches, for there may reside alternative ways of conceptualizing the problem and promising ways of reorganizing cultural action. Christian ethicist Larry Rasmussen notes this implicit openness in broad AM frameworks: "this sustainable adaptability ethic assumes, even centers, what many others do not, namely religious impulses as a substantive contribution."[41] For responsible management of ecological problems with planetary scales and unprecedented human power seem finally incomprehensible apart from questions about how to understand humanity's place on earth. Interpretations of humanity's role in the story of earth offer a cultural tool for reckoning with wicked problems by surfacing and hosting the unavoidable background question. Those tools are especially effective when their use is modeled in creative enactments of responsibility, which demonstrate possibilities of response to inchoate ecological threats.

Sarah McFarland Taylor has illustrated something like this in her study of "green sisters," a network of Catholic religious communities revising their forms of common life. Taylor shows that many of these communities draw on Thomas Berry's cosmology in order to "reinhabit" their Roman Catholic tradition as well as their lands and liturgies. As Taylor describes it, many of these communities use the new cosmology self-consciously to provide a general framework for making sense of ecological issues and for conceptualizing cultural and religious reform. They do not, by Taylor's account, seem to adopt and apply the cosmology in the principlist way to which pragmatists object, but rather use it as an important imaginative instrument in what Minteer and Swidler would call their "toolkit." Taylor's metaphors of practical reason are, however, more horticultural: the sisters *graft* cosmological ideas into received traditions in order that their communities might *yield* and *sustain* new practices of life. As they do, Taylor sees them developing a model of "reinhabitation" with broader implications for how cultures might understand their own responses to ecological predicaments.[42]

Other communities thinking about different problems use Berry's cosmological ideas differently. Some scientists, seeking a narrative structure in which to make sense of humanity as an ecological force and planetary manager, have found new cosmologies helpful for conceptualizing what must be so about the world for humans to simultaneously learn from it humbly, take responsibility for it, and acknowledge themselves threatened by it. For example, Gunderson, Holling, and Light wrote a book of AM case studies with an epigraph from Teilhard de Chardin's *Hymn of the Universe*, suggesting that a culture of AM needs visionary priests as well as interdisciplinary managers.[43] Does sustainable ecological management

41 Larry L. Rasmussen, "Ecology and Morality: The Challenge to and from Christian Ethics," in *Religion and the New Ecology*, ed. David Lodge and Christopher Hamlin (South Bend, IN: University of Notre Dame Press, 2006), 266.

42 Sarah McFarland Taylor, *Green Sisters* (Cambridge, MA: Harvard University Press, 2007).

43 Lance Gunderson, C. S. Holling, and Stephen Light, *Barriers and Bridges to the Renewal of Ecosystems and Institutions* (New York: Columbia Univ Press, 1995).

need as background a cosmic hymn in order to function as deeply as it must?

The point here is that ecological management toolkits need not be threatened by revisionary cosmological ideas, but should include them as heuristic tools available for making sense of an unprecedented research situation. Researchers and policy-makers facing a problem like climate change may then have reason to not only acknowledge but seek out communities with reformist eco-social imaginations. Note that both the watermen and the green sisters come from minority moral communities; one from a culturally unique island and a threatened way of life, the other from a reformist network among a rare way of life. Yet their ideas might be especially important for stimulating broader cultural reform and reframing difficult problems.

As a way of participating in AM, religious and cosmological interpretations do not necessarily abstract from problems or from live cultural resources. On the contrary, I argue, religious creativity can support a problem-based approach to ecological management, especially when it is struggling to make a crisis into a practical problem. Complex sustainability problems like managing the Chesapeake watershed cannot be adequately understood without appreciating the basic questions they pose to humanity's capacity of adaptation. As they research anthropogenic climate change or human alteration of nitrogen cycles, ecologists now investigate unplanned planetary experiments. Some management proposals envision intentional earth systems management or geo-engineering as a response. In order to interpret the moral dimensions of planned and unplanned earth-scale experiments, AM needs imaginative structures in which one can make sense of proposals for responsibility that involve humanity as an ecological force and planetary manager.

Making a problem like climate change even plausible as an AM problem involves the cultural processes through which societies reimagine and invent roles of human responsibility. Investigating worldviews and social change need not abstract from this problem, if it makes climate change more intelligible by disclosing how practical policy proposals use cultural tools to interpret the problem and by anticipating what changes in cultural action may be possible. Climate scientist Mike Hulme argues that moral culture has been too focused on rallying values to support climate action in general and less attentive to how specific action proposals use the idea of climate change to generate diverse models of cultural action. Religious communities, he notes, exemplify the problem; they have offered an impressive range of moral support for doing something, but in supposing that is their task, have generally failed to question whether cultures should think of climate change as a problem with a solution. Maybe the complexity of climate change begs for more imaginative response, more diverse cultural invention, suggests Hulme.[44] Religious communities should be able to enact new cultural possibilities; their failure seems part of the global failure to make climate change into a site of adaptive learning and cultural change.

Here by negative example I again argue that religious communities can

44 Mike Hulme, *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity* (Cambridge University Press, 2009).

make useful contributions to adaptive management processes, not because they hold inherent moral authority or because they possess better worldviews, but because they can demonstrate capacities to make cultural inheritances support new strategies of action. Successful initiatives within religious communities sometimes exhibit a native fluency with grammars of change in major cultural traditions. When they do, these communities can function as crucibles of cultural reform, inviting wider society to confront the questions raised by ecological management, and showing some of the possibilities resident in their cultural inheritances. Creative change within religious communities can model how ethical systems might function in new ways.

Ecological management need not, then, make changing worldviews or value structures their priority in order to let cultural reform processes generate adaptive responses to problems. The important tool that religion offers to AM, is not an exotic set of ethical ideas to add to the available stock of values and principles provided by social ethics, but rather a dispositional openness to the moral creativity of communities that know how to redeploy cultural tools. Those communities may enrich inquiry and may help stimulate broader cultural reforms that make climate science socially valued and politically transformative.

4. Prophetic Pragmatism

Religious strategies may, of course, themselves prove inadequate, irrelevant, or perverse in regard to ecological problems. Religion can function for destruction, as it seems to do in mountain-top removal country, as it can function for creative resistance, as it sometimes does in environmental justice movements. It may be complicit in cultural avoidance strategies, as it seems in regard of climate change. My argument only proposes that religious communities can sometimes help ethical systems function in better ways, and that when struggling in the face of wicked problems, ecological management frameworks should develop the cultural literacy and pluralist sensibility to accommodate religious creativity. Responding to complex ecological problems depends on stimulating capacities of cultural reform; pragmatists have no reason to exclude generative sites of those capacities on principle.

A broad pragmatism, of the sort sketched by Norton and here animated by reform energies, must face wicked problems with restlessness for cultural reform and an attentiveness to promising adaptive strategies. It stands near to what Cornel West calls "prophetic pragmatism": a "quest for wisdom that puts forth new interpretations of the world based on past traditions in order to promote existential sustenance and political relevance."[45] Ecological sustenance is different from what West has in mind, but his view of tradition and change works toward a similar goal: skilled cultural actors ("organic intellectuals" in West) help create new capacities from moral inheritances, inventing possibilities for practical cultural reforms that in turn enable communities to take responsibility for society's deepest

45 Cornel West, *The American Evasion of Philosophy : A Genealogy of Pragmatism* (Madison, Wis.: University of Wisconsin Press, 1989), 230.

and most difficult problems.

A prophetic pragmatism remains disciplined to specific problems and committed to working with the reform strategies generated by communities facing those problems. It seeks reform through participation in responses to problems like climate change or the Chesapeake Watershed's decline. I argue that when faced with such challenges, participants in problem-solving should solicit multiple iterations of the problem, attending especially to those communities consciously shaped around a thick moral tradition and apt to know how to invent reforms from them. In regard of climate change, involvement from prophetic pragmatists seems especially important as research and policy consortiums communicate dramatic findings with only implicit moral arguments. Ruling out the messiness of cosmological or marginal approaches may prevent or delay cultures from recognizing how responding to climate change requires deploying ethical toolkits to support new patterns of cultural action. Adaptive responses must know how to admit comprehensive questions that reconsider our moral culture without fearing that the questions will close down practical, science-based adaptation. When questions of cultural transformation are raised from within specific processes of confronting problems, they can stimulate the deliberative public on which such a process depends. It may be that, in a time when social vernaculars need openness to change or even "cultural conversion" (in Swidler's sense), cosmological and theological discourses have a role to play in holding those questions and enacting inventive, practical responses.

Successful ecological management requires skilled collaborators, as capable of producing cultural reforms as they are of pursuing innovative research. Understanding and responding to unprecedented ecological problems like climate change requires an accompanying cultural climate change. Cultural reform happens as creative moral agents make cultural inheritances capable of supporting new patterns of action. Ecological management should seek to use and test such reform wherever it is produced. For resolving wicked problems depends on inventions of cultural hope.