

Abstract

Process philosophy is explored as a basis for an environmental philosophy that is dynamic and elastic, with particular emphasis on value, beauty, integrity and stability supporting Aldo Leopold's environmental vision. In this paper I identify a conflict within ecological thinking - the duality of ecological science based on dynamic processes and justification of ethics of the environment based on issues of balance, stability, and integrity, concepts from traditional substance metaphysics. The concept of Leopold's idea of a biotic community is extended via the concept of iterated scale. The result is a basis for value in the biotic community clearly reliant on the process-relational approach. I will end with an overview of the type of metaphysics that is necessary to support ethical value in general.

**PROCESS RELATIONAL METAPHYSICS AS A NECESSARY
FOUNDATION FOR ENVIRONMENTAL PHILOSOPHY**

Abstract and paper accepted, "Process Relational Metaphysics As A Necessary
Foundation For Environmental Philosophy," 6th International Whitehead Conference,
Salzburg, Austria, 3-6 July, 2006.

Marc J.V. Corbeil
MA Philosophy University of North Texas
MTM Concordia University, Montreal

Higher College of Technology
PO box 17258
Al Ain, Abu Dhabi
United Arab Emirates
marc@mcorbiel.com

PROCESS RELATIONAL METAPHYSICS AS A NECESSARY FOUNDATION FOR ENVIRONMENTAL PHILOSOPHY

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. ¹

PARADIGMS OF ECOLOGY

Ecology is not an old science; the term 'oecology' first appeared in 1886 in a paper by the German disciple of Darwin, Ernst Haeckel. ² The origin of ecology coincided with the end of the period dominated by the Newtonian paradigm, itself governed by substance metaphysics. This is ironic since revolutionary concepts in physics were rapidly developing a new paradigm. Even though ecology did not lag behind very long, it is not surprising that ecology started with a general focus on objects in the management of the environment and then quickly developed into a study of relationships of processes. The rapid progression has resulted in a duality in ecological thinking: ecological science based on dynamic processes and justification of ethics of the environment dependent on issues of balance, stability, and integrity, concepts from traditional substance metaphysics.

More evidence of duality in the structure of ecology is at hand. There is a metaphysics that wants to handle objects or things in the environment, serene, climax or ecosystem. Conversely, there is an understanding of nature as a study of relationships or dynamic processes. Philosophical justifications based on substance metaphysics are incompatible with process-relational ecology and environmental issues. Process-

¹ Aldo Leopold, "The Land Ethic," in *A Sand County Almanac: With Essays on Conservation From Round River* (New York: Ballantine Books, 1966), p. 246.

² David Worster, *Nature's Economy: A History of Ecological Ideas*, 2nd ed. (New York: Cambridge University Press, 1997), p. 192.

information philosophy may help overcome dualities and paradoxes. In this chapter, I extend process-information philosophy to bridge the gap between the environment and metaphysics, bringing the environment back into philosophy. In addition, support for the dynamism of Leopold's vision will be offered.

In *Nature's Economy: A History of Ecological Ideas*,³ David Worster considers the three major paradigms that he believes ecology has followed from the eighteenth through late nineteenth century: the Arcadian, the Imperial and the Darwinian.⁴ The Arcadian or naturalist paradigm of ecology, represented by Worster using the words of Henry David Thoreau (nineteenth century quasi romantic), is one in which "the world was no mere system of mechanical order but a flux of energy capable of welding all things into an animated kosmos."⁵ Thus, the first paradigm started as a rejection of the mechanical model of Descartes and Newton. The Imperial paradigm, however, regressed toward mechanical models and developed an ecology of individuals. This viewpoint progressed into an ecology of community and/or organism, concepts more in tune with substance metaphysics. Although Imperial ecologists were either reductive (individualistic) or holistic (ecosystems), they were nevertheless focused on entities.

Early theory was conceived mostly in Newtonian terms, individuals rather than relationships. In addition, since this theory attended to the question of what created the individual entities and how they fit within the scheme of other separate entities rather than with interrelational issues, it relies mostly on substance metaphysics. In the last few decades, Darwinism shifted towards process and demarcation of atomic individuals became blurred.

³ Worster, *Nature's Economy*.

⁴ *Ibid.*, p. xii.

⁵ *Ibid.*, p. 81.

In the early twentieth century, ecology became increasingly reliant on the notion of process. For example, in the 1910s Frederic Clement brought out the idea of succession,⁶ “a processional change.” In 1927 we have Charles Elton’s food pyramids,⁷ in 1970 Likens et al.’s nutrient budgets,⁸ and finally White and Pickett’s disturbance regimes and patch dynamics in 1985.⁹ The concepts of ecosystem and organism are also related to process relational thinking. As ecological theories change and paradigms shift, successive movement towards a process-relational position is evident. Ecologists today most often think of the environment in terms of a “shifting mosaic,”¹⁰ a “non-equilibrium paradigm [that] emphasizes process,”¹¹ or simply as a dynamic process. “We define the parts and explanatory principles of ecosystem as pathways of processes and fluxes between organisms and their environment.”¹² Environmental management does not seem to have followed this development.

The early focus of environmental management was on objects. The Clementian successions or Eltonian food pyramids, especially as they apply to populations, are about processes relating directly to objects. In addition, management was characteristically population studies of individuals and strongly emulated physics. The physics envy gleamed in the theories, and eyes, of ecologists, and corresponded to the over-mathematization of ecology and the adoption of a dualistic view: process

⁶ Frederic E. Clements, “Nature and Structure of the Climax,” *The Journal of Ecology* 24:252-84 in *Foundations of Ecology: Classic Papers with Commentaries*, ed. by L.A. Real and J.H. Brown (Chicago: University of Chicago Press, 1991), pp. 59-97.

⁷ Charles S. Elton, *Animal Ecology* (Chicago, Ill., Chicago University Press, 2001). This is a reprint of the original publication by Methuen Publishers in 1927.

⁸ Gene E. Likens, F. Herbert Borman, Noye M. Johnson, D.W. Fisher, and Robert S. Pierce, “Effects of Forest Cutting and Herbicide Treatment on Nutrient Budgets in the Hubbard Brook Watershed-Ecosystem,” *Ecological Monographs* 40 (1970): 23-47, in *Foundations of Ecology: Classic Papers with Commentaries*, edited by L.A. Real and J.H. Brown (Chicago: University of Chicago Press, 1991), pp. 880-904.

⁹ P.S. White and S.T.A. Pickett, *The Ecology of Natural Disturbance and Patch Dynamics* (San Diego: Academic Press, 1985), pp. 5-6.

¹⁰ *Ibid.*, pp. 65-89.

¹¹ *Ibid.*

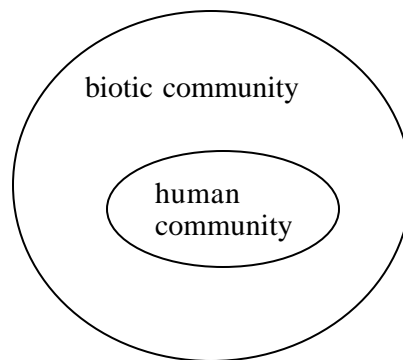
¹² T.F. Allen and T.W. Hækstra, “The Ecosystem Criterion,” in *Toward a Unified Ecology* (New York: Columbia University Press, 1993), p. 90.

with substances. Add to this the fact that traditional philosophical training is in substance metaphysics, not process metaphysics. Thus, today, environmental philosophers tend to think in terms of substance metaphysics while ecologists tend to think in terms of process-relational thought. What, then, is good for the environment?

In a *Sand County Almanac*, Aldo Leopold (1887-1948) offers an assessment of what serves as good for the environment.

A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.¹³

Further, Leopold tenders this evaluation as a supplemental ethic to be amended to human ethics: meaning that environmental philosophy does not replace human ethics but is a supplement to it. “The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.”¹⁴ Thus, we might consider the human ethic and the “land ethic” related as one circle within the other.



If we are to extend human ethics to the land, it requires recognition of both the inter-relationship between the human and the biota, along with an idea of scale.

Natural can be defined in terms of occurrences in normal scale of space-time. Forest

¹³ Leopold, “Land Ethic,” p. 262.

¹⁴ *Ibid.*, p. 239.

and species tend, for example, to endure in time scales of millennia. Hunting a species to extinction in a relatively short time period is unnatural since it happens at a faster pace than expected in the scale of normal space-time. In fact, this is what makes much human activity unnatural. “Evolutionary changes, however, are usually slow and local. Man’s invention of tools has enabled him to make changes of unprecedented violence, rapidity, and scope.”¹⁵ Humans can change the environment at a rapid rate in either space or time, especially compared to nonhuman beings. For example, the extinction of a species can be natural if it occurs within a relatively normal scale of space-time. But, rapid and multiple extinctions occurring in one season cannot be natural.

If ecology is process-relational and not about things at all, then what ever can be meant by an environmental philosophy that holds that human action “is right when it tends to preserve the integrity, stability, and beauty of the biotic community?”¹⁶ We have been led to understand that integrity, stability and beauty are words that seem to apply to things in the biotic community. The fall back position for justification of an environmental philosophy is what is being supplemented, and this is an ethics that has evolved from the Western tradition, i.e., substance metaphysics. We have an ecological understanding of the environment that is in conflict with this tradition, an understanding of dynamic processes, hence, the claim of dualism. Moreover, it is the worse kind of dualism, since it justifies an environmental philosophy using a metaphysics that is in conflict with our understanding.

¹⁵ Ibid., p. 254.

¹⁶ Ibid., p. 262.

It is no wonder that Michael E. Soulé states that environmentalism (conservation biology) is a “crisis discipline.”¹⁷ Although the crisis Soulé is referring to is holocaust extinction and not a crisis in the discipline of metaphysics, I believe this is representative of an overall crisis in the discipline. A crisis that is the result of a mismatch between environmental philosophy and the underlying metaphysics.

Leopold makes it clear in “Thinking like a Mountain” that a personal transition had to take place to get him to “see” the environment from a different time scale, in this case that of a mountain.¹⁸ Perhaps this is an endemic conflict between management practitioners and their philosophical beliefs. The way out is perhaps thinking of, for example, a series of forests set in regimes of disturbance, rather than one forest heading toward a Clementian climax. As suggested by White and Pickett,¹⁹ each forest itself is not really a single organismic entity, but a highly dynamic set of individual trees.²⁰ A basis for a metaphysics should be compatible with ecology and contemporary science.

The ontological question is, “How can we conserve a biota that is dynamic, ever changing, when the very words “conserve” and “preserve” ... connote arresting change?”²¹ The transition going from thing to substance automatically situates an ontological given of human scale of both time and space: to assume a mesoscale viewpoint is simply to commit the fallacy of division. To say a thing is a substance is to assume an understanding in one single space-time scale only. A relationship to itself, but over different scales leads to different ontological priorities and identities.

¹⁷ Michael E. Soulé, “What is Conservation Biology: A new synthetic discipline addresses the dynamics and problems of perturbed species, communities, and ecosystems,” *Bioscience* 35, no. 11 (December 1985): 727-34.

¹⁸ Aldo Leopold, “Thinking like a Mountain,” *A Sand County Almanac: With Essays on Conservation From Round River* (New York: Balentine Books, 1966), pp. 137-41.

¹⁹ White and Pickett, *Patch Dynamics*.

²⁰ Individual trees, but not treated as entities or things as they are separated from the system and have recognizable subparts.

²¹ Callicott, “Flux of Nature,” p. 100.

A table is a thing that seems solid in the mesoscale, but in the microscale it is a multitude of things with parts that are fuzzy. What holds for the table in one scale does not hold for table in another scale. The division of the whole into parts leads to a failure of understanding and ontology if we take substance metaphysics as a starting point. Perhaps the relationship of things can be expanded through scale of space-time. The effect of an alternative foundation can make the difference.

THE STAR FISH AS A WOLF PACK HUNTER

I want you to imagine a sea-scape of star fish meandering on the bottom living their slow and solitary lives along the edge of a living reef. Track one along the sea floor for hours, or days and it seems that the star fish just manages to achieve a life of almost passive subsistence at best. We would hardly think of a group of star fish as a menace. A scientist could study the species for years and be convinced that the star fish lack any resemblance to a wolf pack. Of course this perception is false.

Biologist John Pearse has been studying echinoderms along the rugged coast of northern California for forty years. He long believed echinoderms were capable of basic behavior, but he didn't think they were capable of complex social interactions. They don't possess seemingly necessary hardware, like a brain. But after seeing underwater photographer Don Wobber's time-lapse films of sea stars [also called "star fish"], Pearse changed his mind. Wobber's footage showed sea stars wrestling with one another to dominate their food supplies on the ocean floor. These animals were certainly leading active lives.²²

The time-lapse films of interacting star fish is an incredible vision of what Wobber describes as "wolf pack behavior." The ability of the star fish to communicate, locate prey, and hunt down prey as a pack is obvious once you shift yourself to their time frame.²³ These creatures are so long living that they do not seem to die naturally. This

²² John Pearse and Don Wobber, "Ultimate Animal - Digesting Mussels in the Shell: Documenting Echinoderm Behavior," in *The Shape of Life* (Monterrey, Calif.: Sea Studio Foundation for National Geographic Television and Film Sea Studio, 2002). Series aired on PBS April 2, 2002.

²³ Obvious if you film time lapse at around 24 hours for 24 minutes, or 1 hour to 1 minute.

should not surprise us since they live in a different time scale.²⁴ I use this example to demonstrate the weakness and fallibility of conclusions about our reality made at a certain limited level of perception; the perception of every day sized and timed objects in the mesocosm.²⁵

“Taking our clue from Holling , we might measure appropriate temporal mesoscales for norms of ecological restoration.”²⁶ Pearse, a lifetime expert, was dead wrong about the basic behavior of star fish because he applied a simplified mesocosmic viewpoint to his early study, i.e., he chose an inappropriate time scale. We see simple benign behavior, but the wolf pack is in full hunt.

The Star fish as a wolf pack highlights what Callicott has identified as the importance of temporal-spatial scale in determination of what constitutes an ecosystem. Callicott calls for a dynamism of Leopold’s “land ethic.”²⁷ Process-information metaphysics provides the necessary foundation. We now know that the process-information dynamics of ecology is complex enough to suggest an emergence of order; a worthwhile task of analysis. Since the ecology paradigm shift is toward dynamics, why not make a corresponding shift in ethics? “The land ethic” can be dynamized, without loss of its essential claims.

VALUE THROUGH INTERRELATED SCALE

The most difficult and most important issue of environmental philosophy is value. What is it that environmentalists value? Pete Gunter points out that “the philosophy which best fits the conceptual needs and the long-term telos of

²⁴ Consider that many of the extant Galapagos turtles, hundreds of years old, are personal witnesses to the first time humans ever set foot on the islands. If only they could talk.

²⁵ Pete A.Y. Gunter, personal conversation. Also resembles spatial scales of Callicott.

²⁶ J. Baird Callicott, “Choosing appropriate temporal and spatial scales for ecological restoration,” *Journal of Bioscience* 27, no. 4, Suppl. 2 (July 2002): 409-420, p. 414.

²⁷ Callicott, *Flux in nature*, pp. 99-103.

environmentalism is process-relational.”²⁸ And, we have seen how process is important to ecological understanding, as well as the importance of scale. But where is value?

Environmental value can either be intrinsic (innate) or instrumental value (granted). Some organisms can feel, are sentient, and have value such that we ought not cause them pain and harm.²⁹ Value in this case is intrinsic to these organisms. Valuing trees for the potential wood products or simply the warmth they provide us when burned are examples of instrumental value.

The prehensive quality of relationships extends value to all objects of the world. In this way, the value of a biotic community is intrinsic to us (and also to the biotic community), rather than simply instrumental to us, since we are so closely connected process-information-wise to the biotic community. Beauty can be argued to be intrinsic, since that which is valued, is valued simply for what it is.³⁰ The necessity of interrelationships extends intrinsic value to all things. By abusing or damaging the biotic community, we are damaging what is part of ourselves, not just what would be effectively worthwhile to us or an instrument to our happiness or survival.³¹ I do not mean to ascribe (as does the “deep ecologist”) equal value to all species and to all things. A gradation of value is necessary and hard to avoid. Birch³² and Warren³³ have both suggested that richness of experience and level of sentience should be considered

²⁸ Pete A. Y. Gunter, “Process-Relational Philosophy and Environmentalism A Case of Pre-established Harmony,” Open Discussion Paper from the 2001 Conference of *Concrescence: The Australasian Journal of Process Thought* [online cited 1 March 2003], http://www.alfred.north.whitehead.com/AAPT/discussion_papers/2001_Gunter01.pdf; INTERNET.

²⁹ Mary Anne Warren, “The Rights of the Nonhuman World,” in *The Animal Rights/Environmental Ethics Debate: The Environmental Perspective*, ed. Eugene C. Hargrove (Albany, New York: SUNY Press, 1992).

³⁰ Gunter, “Process-Relational Philosophy,” pp. 3-4.

³¹ Karen J. Warren’s Eco-feminism seems to be similar in that we become one with the environment as the climber is more effective when she is one with the rock. I did not have space to expand on this here. See Warren, “The Power and Promise of Ecological Feminism,” in *Environmental Ethics: Divergence and Convergence*, 2nd ed., ed. by Richard G. Botzler and Susan J. Armstrong (New York: McGraw-Hill, 1998), pp. 471-480.

³² Birch, “Environmental Ethics,” p. 5.

³³ Warren, “Rights of the Nonhuman World,” pp. 91-93.

in comparing value and rights between humans and various levels of nonhuman, but sentient beings.

Prehension implies community. A community of values of which humans and nonhumans take part. "Homo Sapiens is a part of nature, "a plain member and citizen" of the "land community.""³⁴ "It is easy to show that in the long run sustaining the integrity of these communities [the land community, the swamp, forest, prairie, and farm] is good for man."³⁵ From the vantage point of process relational philosophy, it is also possible to show that each of the organisms sustained in natural communities has life, an experience, and a value of its own.

The relationship between process philosophy and chaos theory is clear. Process-information inherits the characteristics of dynamical systems: iterations, complexity, sensitivity to initial conditions, perturbations, self-similarity, and mathematical predictability (stability) including attractors (and basins of attraction).³⁶ The dynamic aspect of process-information serves as an adequate mathematical model for both ecology and environmental philosophy.

For example, a concept of stability is needed in terms of the ecologist's idea of a system; it is describable by the concepts of attractors or basins of attraction. The same concept of stability can be applied to the environmental philosophers conception of stable biota. Stability to be conserved (or preserved) is the dynamic stability of a biota in a complex but mathematical describable flux. The value of a biotic system can be found both in the stability of the system and, as Rolston suggested, in the information contained in the system. This information is not only the DNA, but, also the process-information relating to interrelationships within the system.

³⁴ Callicott, "From the Balance of Nature," p. 101.

³⁵ Gunter, "Process-Relational Philosophy," sec. 5, par. 4.

³⁶ See Marc Corbeil, *Environmental Ethics and Chaos Theory* [Marc Corbeil papers online cited 11 March 2003], <http://www.mcorbeil.com/papers>; INTERNET. Basins of attraction are higher dimensional versions of attractors

Scale is also important to both the ecologist and the environmental philosopher. The concept of self-similarity is one of scale. Look back at our Sierpinski Triangle. Notice the detail in any third of the triangle. You can find a miniature of the entire triangle within any sub part of the object. This is self-similarity over scale. Just as the triangle really has no definition of spatial criteria, neither does an ecosystem.³⁷ But, some features absolutely require reference to scale, just like the notion of natural. It is no surprise that scale has been called for as an essential characteristic of ethical theory.³⁸

CONCLUSION

Why should we change our basic assumptions is now clearer. We use our understanding of the world via an ecology of process-information to examine the world, to determine an ethics of the environment. The classical, medieval, modern, and contemporary metaphysics of substance has been shown to be essentially unsuited to the paradigms of twenty-first century science. Process thought has been shown advantageous in solving a number of paradoxes and is potentially a foundation of environmental philosophy. An interesting relationship of process philosophy and mathematics has been demonstrated and should be explored further. For example, for evolution to even be possible, randomness must be a feature of nature's structure, not a feature of the mathematical theory of numbers, not a feature of the search for a halting program but a feature of information. Embracing process thought could be a defining step in the future of philosophy and particularly applied environmental ethics. Ecology and science suggest that characteristic dynamics is needed, and process thought provides an alternative for an environmental philosophy that is both dynamic and elastic.

³⁷ Callicott, "From the Balance of Nature," p. 101.

³⁸ Ibid. Also see Callicott, "Choosing Appropriate Scales."

