

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

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## 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

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.<sup>1</sup>

This paper will explore a major conflict in environmental philosophy: the substance metaphysics origin of ecology versus today's dynamic, process and complexity dependent science of ecology. The concept of Aldo Leopold's "Land Ethic" is expressed and extended through the example of iterated scale and is then offered as support of the conjecture that a process-information type of metaphysics should be explored as a foundation of environmental philosophy; a philosophy that accounts for integrity, stability and beauty in the science of ecology. Process-information philosophy is identified as the key needed to bridge the gap between the environment and metaphysics, bringing the environment back into philosophy.<sup>2</sup>

### Metaphysical Conflict: Ecology and Environmental Management

Ecology is not an old science; the term „ecology“ first appeared in 1886 in a paper by the German disciple of Darwin, Ernst Haeckel.<sup>3</sup> The origin of ecology coincided with the end of the period dominated by the Newtonian paradigm, itself governed by substance metaphysics. It is not surprising that ecology started with a general focus on objects in the management of the environment and only later developed into a study of process relationships. During this same period science was evolving a new paradigm and the rapid progression resulted in a split in ecological

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

<sup>2</sup> Eugene C. Hargrove, *Foundations of Environmental Ethics*, (Denton: Environmental Ethics Books 1994) p. 3

<sup>3</sup> David Worster, *Nature's Economy: A History of Ecological Ideas*, 2<sup>nd</sup> ed. (New York: Cambridge University Press, 1997), p. 192.

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. There is the metaphysical base 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. A process-information philosophy may help overcome dualities and paradoxes. Philosophical justifications based on substance metaphysics are incompatible with process-relational ecology and environmental issues that reject the traditional Aristotelian-Cartesian understanding of object.

In *Nature's Economy: A History of Ecological Ideas*,<sup>4</sup> 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.<sup>5</sup> 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.”<sup>6</sup> Thus, the first paradigm started as a partial rejection of the mechanical model of Descartes and Newton. But ecological thinking still put emphasis on humans as custodian of nature and early ecologists were dogged by the early ideas of animal as machines.

The Imperial paradigm, however, regressed back toward mechanical models and developed an ecology of, or with respect towards, individuals. Early theory was conceived mostly in Newtonian terms, individuals rather than relationships and progressed into an ecology of community and/or organism made up of individuals, concepts more in tune with substance metaphysics. Even holistic thinking ecologists

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<sup>4</sup> Worster, *Nature's Economy*.

<sup>5</sup> *Ibid.*, p. xii.

<sup>6</sup> *Ibid.*, p. 81.

(ecosystems) were nevertheless infatuated with questions of what created the individual entities and how these entities fit within the scheme of other separate entities. But, revolutionary concepts in physics were rapidly developing new paradigms and new ways of looking at the world.

In the last few decades of the 19th century, Darwinism shifted ecological thinking towards process and in the early 20<sup>th</sup> century the demarcation of atomic individuals became blurred as ecology became increasingly reliant on the notion of process to explain how the individuals fit in the bigger picture and soon became focused on the big picture, instead of the individuals. In the 1910s we have Frederic Clement outlining the idea of succession,<sup>7</sup> “a processional change” and in 1927 we have Charles Elton’s food pyramids<sup>8</sup> describing relationships between levels of occupation within a community. Species, let alone individuals, become almost unimportant and sometimes interchangeable with respect to functionality as in Likens et al.’s 1970s model of nutrient budgets.<sup>9</sup>

White and Pickett’s disturbance regimes and patch dynamics in 1985 go all the way and suggest how today’s ecologists think of their science.<sup>10</sup> The concepts of ecosystem and organism are based almost entirely on process relational thinking. Ecologists today most often think of the environment in terms of a “shifting mosaic,”<sup>11</sup> a “non-equilibrium paradigm [that] emphasizes process,”<sup>12</sup> or simply as a

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<sup>7</sup> 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.

<sup>8</sup> Charles S. Elton, *Animal Ecology* (Chicago, Ill., Chicago University Press, 2001). This is a reprint of the original publication by Methuen Publishers in 1927.

<sup>9</sup> Gene E. Likens, F. Herbert Bormann, 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.

<sup>10</sup> P.S. White and S.T.A. Pickett, *The Ecology of Natural Disturbance and Patch Dynamics* (San Diego: Academic Press, 1985), pp. 5-6.

<sup>11</sup> *Ibid.*, pp. 65-89.

dynamic process. Allen and Hoeskra characterize their field in the following manner:

“We define the parts and explanatory principles of ecosystem as pathways of processes and fluxes between organisms and their environment.”<sup>13</sup>

Unfortunately, environmental management and environmental ethics in general do not seem to have followed this development. Recall that the early focus of environmental management was on objects and early laws adhered to the concept of humans as custodians of nature. Management was, and still is, characteristically about population studies of individuals and strongly emulated physics. The physics envied in the theories, and eyes, of ecologists, and corresponded to the overmathematization of ecology and the adoption of an incompatible view: process with substances. Add to this the fact that traditional philosophical training is in substance metaphysics, not process metaphysics.

Thus, environmental philosophers tend to think in terms of substance metaphysics adopting a mostly Aristotelian-Cartesian viewpoint of object and matter. Ecologists increasingly look for a process relational foundation of their ideas. 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.<sup>14</sup>

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

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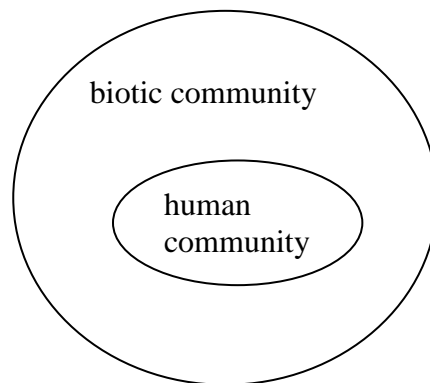
<sup>12</sup> Ibid.

<sup>13</sup> T. F. Allen and T. W. Hoekstra, “The Ecosystem Criterion,” in *Toward a Unified Ecology* (New York: Columbia University Press, 1993), p. 90.

<sup>14</sup> Leopold, “Land Ethic,” p. 262.

community to include soils, waters, plants, and animals, or collectively: the land.”<sup>15</sup>

Thus, we might consider the human ethic and the “land ethic” related as one circle within the other.



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?”<sup>16</sup> We have been led to understand that integrity, stability and beauty are words that seem to apply to things in the biotic community. Hence, we often take the fall back position for justification of an environmental philosophy within traditional Western ethics based on substance metaphysics. We have an ecological understanding of the environment that is in conflict with this tradition.

It is the worse kind of conflict since it justifies an environmental philosophy using a metaphysics that is in conflict with our understanding of reality. It is no wonder that Michael E. Soulé states that environmentalism (conservation biology) is a “crisis discipline.”<sup>17</sup>

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<sup>15</sup> Ibid., p. 239.

<sup>16</sup> Ibid., p. 262.

<sup>17</sup> 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. Soulé is referring to is holocaust extinction and not a crisis in the discipline.

The way out of this endemic conflict must be through development of a foundation compatible with environmental philosophy, ecology and science in general. White and Pickett suggested that we think in terms of a series of forests set in regimes of disturbance, rather than one forest heading toward a single Clementian climax.<sup>18</sup> Forest not as a single organismic entity, but a highly dynamic set of individual trees: the concept of ecosystem turned back onto itself.<sup>19</sup>

### 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 environmentalism is process relational.”<sup>20</sup> And, we have seen how process is important to ecological understanding, as well as the importance of scale. But where is value?

Perhaps 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. We are closely connected process information wise to the biotic community. Gunter has argued that beauty itself is an intrinsic idea, since that which is valued, is valued simply for what it is.<sup>21</sup> The necessity of interrelationships extends intrinsic value to all things. Karen J. Warren maintains that by abusing or damaging the biotic community, we are

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Yet, why do ecologists use this language all the time? I believe this is representative of an overall crisis in the discipline between management thinking and the science of ecology.

<sup>18</sup> White and Pickett, *Patch Dynamics*.

<sup>19</sup> Individual trees, but not treated as entities or things as they are separated from the system and have recognizable subparts.

<sup>20</sup> 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](http://www.alfred.north.whitehead.com/AAPT/discussion_papers/2001_Gunter01.pdf); INTERNET.

<sup>21</sup> Gunter, “Process-Relational Philosophy,” pp. 3-4.

damaging what is part of ourselves, not just what would be effectively worthwhile to us or an instrument to our happiness or survival.<sup>22</sup>

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. For example Birch<sup>23</sup>, Warren<sup>24</sup> and Holmes Rolston are among many who suggest that richness of experience and level of sentience should be considered 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”, claims J. Baird Callicott and he adds quoting Leopold, “a plain member and citizen” of the “land community.”<sup>25</sup> “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.”<sup>26</sup> 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.

If we are to extend human ethics to the land, it requires recognition of the inter-relationship between the human and the biota. It also will require an idea of comprehensive scale.

For example, let us try a definition of natural in terms of occurrences in normal scale of space and time. Forest and species tend, for example, to endure in time scales of millennia. There is the occasional burst of change, but rarely overnight.

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<sup>22</sup> 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*, 2<sup>nd</sup> ed., ed. by Richard G. Botzler and Susan J. Armstrong (New York: McGraw-Hill, 1998), pp. 471-480.

<sup>23</sup> Birch, “Environmental Ethics,” p. 5.

<sup>24</sup> Warren, “Rights of the Nonhuman World,” pp. 91-93.

<sup>25</sup> Callicott, “From the Balance of Nature,” p. 101.

<sup>26</sup> Gunter, “Process-Relational Philosophy,” sec. 5, par. 4.

Even multiple extinction events like volcanoes are one-offs. They do not happen day after day after day. .

Humans change the environment at a rapid rate in either space or time, especially compared to nonhuman beings. Hunting or crowding several species to extinction daily is unnatural since it happens at a faster pace than one would expect in the scale of normal space and time. This is what makes much human activity “feel” unnatural.

Beavers dam up minor rivers taking weeks to build. Humans, on the other hand, can change the course of a large river in an instant with explosives. “Evolutionary changes, however, are usually slow and local. Man’s invention of tools,” states Leopold, “has enabled him to make changes of unprecedented violence, rapidity, and scope.”<sup>27</sup>

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?”<sup>28</sup> The transition going from thing to substance automatically situates an ontological given of human scale of both time and space: to maintain a mesoscale viewpoint is simply incorrect. To say a thing is a substance is to deny basic observations about the world. Relationships often need to be considered over different scales and so a different set of ontological priorities and identities is needed.

#### The Star Fish As A Wolf Pack Hunter

I want you to imagine an ocean with sea stars (aka 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 sea star just manages to achieve a life of almost passive subsistence at best. We would hardly think of a

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<sup>27</sup> Ibid., p. 254.

<sup>28</sup> Callicott, “Flux of Nature,” p. 100.

group of sea stars as a menace and a scientist could study the species for years and be convinced that they lack any resemblance to, say, 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 Woobber's time-lapse films of sea stars [also called "star fish"], Pearse changed his mind. Woobber'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.<sup>29</sup>

Time-lapse films of interacting sea stars provides an incredible vision. A species we usually thought of as lacking apprehension of its environment are now described as exhibiting "wolf pack behavior." The ability of the sea star to communicate, locate and hunt down prey as a pack is obvious once you shift yourself to their time frame.<sup>30</sup> These creatures are so long living that they do not seem to die naturally. This should not surprise us since they live in a different time scale.<sup>31</sup> 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.<sup>32</sup>

"Taking our clue from Holling, we might measure appropriate temporal mesoscales for norms of ecological restoration."<sup>33</sup> Pearse, a lifetime expert, was dead wrong about the basic behavior of star fish because he applied a simplified

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<sup>29</sup> John Pearse and Don Woobber, "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.

<sup>30</sup> Obvious if you film time lapse at around 24 hours for 24 minutes, or 1 hour to 1 minute.

<sup>31</sup> 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.

<sup>32</sup> Pete A. Y. Gunter, personal conversation. Also resembles spatial scales of Callicott.

<sup>33</sup> 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.

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.

This highlights what Callicott has identified as the importance of temporal-spatial scale. It seems so obvious now how scale is somehow essential to environmental philosophy. Callicott calls for a dynamism of Leopold's "land ethic."<sup>34</sup> Process-information metaphysics provides the necessary foundation. We know that the process relational 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.

Another necessary concept seems to be stability. For example, a concept of stability is needed in terms of the ecologists idea of a system. The same concept of stability can be applied to the environmental philosopher's conception of stable biota. Stability to be conserved (or preserved) is the dynamic stability of a biota in a complex but mathematical describable flux. It is possible that the value of a biotic system can be found both in the stability of the system and, as Rolston and Chaitin have suggested, in the information contained in the system. For example, Rolston has suggested there is value in the information or the DNA of species. But I am suggesting more profound type of information relating to interrelationships within the system: a system with integrity stability, integrity and beauty.

### Speculations of Physics and Mathematics

How far can one go with the concept of "process?" Much of process relational thinking owes a debt to Whitehead. He considered philosophy to be an "adventure in ideas" ... speculations that should not be limited except for some

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<sup>34</sup> Callicott, *Flux in nature*, pp. 99-103.

straight thinking. We should also keep in mind the fact that Whitehead's own conceptions of physics and reality are limited at best to the middle stages of Quantum mechanics theories. Whitehead could not have been able to incorporate the second wave, pardon the pun. It would be ridiculous to expect him to have thought in terms of superstring, Supersymmetry, mathematical complexity theory (aka Chaos Theory). The recent stunning claims by Process Physicists such as Reginald Cahil certainly suggest some speculations beyond "process."

Development of thought often seems to have progressed from metaphysical speculations to philosophical ideas to mathematics to reduction transformations in physics to metaphysical speculations, and so on. Physics has gone from pre-Newtonian to Newtonian, Electromagnetism, Thermodynamics, Relativity, Quantum I, Quantum II, Superstring, Supersymmetry and now, Process Physics.

Each step or revolution in physics, as Kuhn has described it, can be associated with a reduction transformation. A mathematical relationship that shows how one can go from a more recent position of physics, more or less, back to the Newtonian. For example, the Lorentz transformation is a classic example which takes the non-linear and non-Cartesian system of Relativity and allows Newton's equations to hold in the mesoscale of regular world physics. The Schwarzschild derivative perhaps a similar example from complexity theory.

Each step or revolution in physics seemed to be preceded by a major shift in philosophical speculations. Perhaps the unification of physics waits for philosophers to adequately pursue speculations in process thought towards a foundation of process theory. Perhaps not, considering Cahil's current work in Process Physics, but I doubt last story in physics has been written. And, I am sure Cahil would suggest that we can only truly start the first chapter of our understanding

of reality. The ultimate irony may be that a process relational approach might lead to physics with a concept of absolute motion!<sup>35</sup>

I have shown previously that process relational thinking somehow automatically 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).<sup>36</sup> The relationship between process philosophy and chaos theory is clear. The dynamic aspect of chaos theory serves as an adequate mathematical language for both ecology and environmental philosophy. But we do not need a mathematical language. Instead, we need a metaphysical tool box and for this chaos theory and any other mathematical language provide us only with hints. Perhaps the idea of process, like the characteristics of chaos theory, is itself only one of many characteristics of reality.

### Conclusion

Why should we change our basic assumptions is now clearer. The classical, medieval, modern, and contemporary metaphysics of substance has been shown to be essentially unsuited to the paradigms of twenty-first century science. We must recognize that our understanding of the world depends on an ecology of process relationships, and this must be supported by an ethics of the environment that shares a similar foundational view. Embracing process thought could be a defining step in the future of philosophy, and particularly, the future of environmental ethics. Ecology and science suggest that process thought, along with other characteristics (possibly those found in chaos theory) provide an alternative foundation for an environmental philosophy that is both dynamic and elastic. More importantly, process relational

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<sup>35</sup> Reginal T. Cahill, "The Speed of Light and the Einstein Legacy: 1905-2005," *Infinite Energy*, 10.60:28-37, Jan 2005

<sup>36</sup> See Marc Corbeil, *Environmental Ethics and Chaos Theory* [Marc Corbeil papers online cited 11 March 2003], <http://www.mcorbeil.com/papers>; INTERNET.

thought may provide a key to developing the foundation of a new type of metaphysics.