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*Brief Communication*

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## **There is No Mother Nature—There is No Balance of Nature: Culture, Ecology and Conservation**

**Dennis E. Jelinski**<sup>1,2,3</sup>

### **INTRODUCTION**

Postmodern philosophy asserts there are only socially constructed narratives and “situated knowledge” that serve for all forms of explanation (Smith, 1989). Narratives, by definition, have a narrator who picks and chooses the constraints: essentially the who, what, when, where and why in a story. Narrators as storytellers then employ these constraints as the structural entities, the so-called “facts” (Allen *et al.*, 2001), to make events into static things. In other words, the narrative is meant to “transform the real into an object of desire through formal coherence and moral order that the real (otherwise) lacks” (Ettema and Glasser, 1989, p. 258). A newspaper article, for example, exclaiming that Mother Nature is responsible for inclement weather is an example of a narrative. According to Latour and Strum (1986, p. 171), narrators “are at best inferring, at worst inventing, since they are always creating fictive or speculative accounts.”

Narratives often make extensive use of metaphors such as “the web of life.” According to Boyd ((1993), and see Wilson, 1998), metaphors in science are either pedagogical or theory-constitutive. That is, metaphors are either used to explain the connection between objects and qualities, or they are used to express theoretical claims for which there is, as yet, no non-metaphorical formulation. From a semantic point of view, metaphor is defined as a mapping from source to target domain (Lakoff and

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Johnson, 1980); for instance “balance of nature” consists of a source domain (balance), and a target domain (nature). Thus selection of one metaphor instead of others means, for example, metaphorising nature as becoming “balanced” instead of “imbalanced.” “Balance” highlights nature as a beneficent, stable and holistic force whereas “imbalance” emphasizes notions of disequilibria, chaos and hence unpredictability.

Journalists frequently use metaphors to popularize, dramatize and condense complex processes such as the “greenhouse effect” and the “war on terror” (Hellsten, 2000). The media tend to select metaphors that are consistent with commonsensical images especially those that resonate with wider cultural narratives and myths. However, journalistic metaphors are more than rhetorical devices used to communicate to the public. Metaphors may mask other perspectives for which there can be social and political implications (Hellsten, 2002). For example, the “balance of nature” metaphor expresses an ancient cultural concept, not a conception derived from empirical evidence, though the metaphor implies that nature is an essentially static, *orderly system* being integral to the economy of nature.

The evolutionary biologist Stephen Jay Gould (1996, p. 57) stated “The most erroneous stories are the ones we think we know best—and therefore never scrutinize or question.” This essay is about two intertwining narratives that demand close scrutiny—Mother Nature and the Balance of Nature. Both are common in environmental discourse and generally accepted without question. For example, consider how western popular culture often refers to the workings of “Mother Nature” in affecting the “balance of nature.” Wood (1999) suggested in an article entitled “It isn’t nice to fool with Mother Nature” and that, with respect to genetically modified foods, “Consumer concerns about tampering with the balance of nature are legitimate. . . .” Similarly, an organic gardening newsletter instructs “By mimicking Mother Nature and taking cues from her natural cycle, organic gardeners . . . enhance the balance of nature” (Anonymous, VillageOrganics.com). This essay has three objectives: first, to examine Mother Nature and the evolution of the metaphor from deity through the dualistic human-nature paradigm; second, to trace the development of Balance of Nature as a cultural and scientific concept, and third, to weave together the notions of Mother Nature and Balance of Nature insofar as the implications for environmental conservation.

## MOTHER NATURE

Using the internet search engine *Google*<sup>TM</sup> the phrase “Mother Nature” throws up some 1,670,000 listings! Pop culture makes frequent reference to Mother Nature including a number of rock songs such as the

Beatle's song written by McCartney and Lennon *Mother Nature's Son*, Sting's ballad *Rock Steady*, and The Guess Who's *No Sugar Tonight/New Mother Nature*. A television ad advocating the virtues of margarine over butter mockingly warns "It isn't nice to fool Mother Nature." A TV commercial for Nissan's Pathfinder™ shows the SUV speeding through torrential rains, hot desert, and howling winds. The voice-over cautions that Mother Nature will try to drown and scorch you. In the print media, a recent article in the *Buffalo News* (Elliot, 2002) stated that "Mother Nature also brought some big fishery surprises" when speaking about the invasion of non-native zebra mussels and fishes. The article encourages "Be nice when fooling with Mother Nature." On matters of economy, the United States Department of Agriculture, Economic Research Service reported that "Mother Nature stir(ed) up the wheat market," when commenting on sharply rising wheat prices (USDA, 1997).

Mother Nature is sometimes credited, but frequently blamed, for poor weather. Following the deaths of seven Calgary, Alberta, high school students in an avalanche while back-country skiing a *Globe and Mail* (February 4, 2002) reporter interviewed a local resident who said the accident was "[A]n act of Mother Nature." Writing in CNN Money, Geary (2002) spoke about disaster insurance in an article subtitled "How to protect your home when Mother Nature kicks in the door."

It is not just the media and public that invokes Mother Nature as being responsible for calamity. Scientists too are taken by the notion of Mother Nature. In a Purdue University Agricultural Bulletin Siggurdson (1998) wrote "Indiana's winter wheat crop dodged the bullet Mother Nature fired in early March." Herring (2000) in a NASA Earth Observatory online article entitled "Second guessing Mother Nature: forecasting the snow of January, 2000," asked the question "So why didn't meteorologists foresee the winter bomb Mother Nature was preparing to drop on most of the eastern United States?" Similarly, the scientist James Lovelock (1988, p. 212) wrote "Gaia [Mother Nature] . . . always keep[s] the world warm and comfortable for those who obey the rules, but [is] ruthless in her destruction of those who transgress."

These media headlines and articles, which reflect a wider western societal belief, variously characterize Mother Nature in causing inclement weather, adversely affecting commodities markets and crops, as connected to invasive species and killing people on our roads and backcountry. So, on one hand we think she is "good" for supplying us with bountiful natural resources, great wines, abundant harvests, forests teeming with wildlife, majestic mountains, and inspiring sunsets. Mother Nature is fickle or even "bad," however, when there is some natural calamity in nature especially insofar as it affects human agency. And "she" is apparently arbitrary or capricious in terms of occasional exercise of powers. Mother Nature as an

idealized organism has individuality, and with individuality comes a personality, and thus, clearly, value-laden idiosyncrasies.

### Mother Nature as Deity and Metaphor

So who is she, this Mother Nature? Etymologically, *nature* derives the Latin *natura* meaning “to be born from.” Hence Nature began as an adjective describing “the essential quality and character of something” and evolved into (i) a force that directs either the world and (or) humans, and (ii) the material world, which may or may not include humans (Williams, 1976). Nature early on and persisting through millennia became personified in the form of “nature gods” (this is still true, particularly in animism, which still exists as a dominant religion or at least strong undercurrent in many rural areas of developing nations where people’s lives and livelihoods depend on the vagaries of natural forces) and in particular “Mother Nature.” In one sense she was a literal goddess—the Nature Goddess as Supreme Being directing power—and in others, an amorphous but still all-powerful creative and shaping force. Goddess worship is evident among the first human images including Venus figures, dating back to the Cro-Magnons of the Upper Paleolithic period between 35,000 and 10,000 BC (Ucko, 1962). In the Proto-Neolithic period of ca. 9000–7000 BC, archeological depictions of the Great Goddess appeared from what is now Ireland to Siberia, through the Mediterranean area, Near East and Northern Africa (Davis, 1971). Isis (ca. 7000–6000 BC), the principle goddess of ancient Egypt, was known as the giver of life and responsible for cycles such as breathing, the alteration of day and night, the flooding of the Nile, the yearly passage of the stars across the heavens (Englesman, 1979). Later yet, Gaia, or Ge, the Greek goddess of the sacred Earth, was addressed by Homer (ca 850 BC) as the mother of all, who feeds all creatures that are in the world (Rose, 1957). In 50 BC, Lucretius wrote, “the Earth deserves her name of Mother,” because “the Earth would furnish to the children food; warmth was their swaddling cloth, the grass their bed abounding in soft down.” These “organic views” describe Mother Nature as a typically loving mother who cares for environments, plants, and animals. The notion of Nature as Mother was carried forward to the so-called Gnostics (to about 2000 BC) who held Sophia as the Godhead of Wisdom and Nature (Schäfer, 2002). The beginning of Hebrew religion with its God Yahweh is considered to have marked the end of the Goddess worship (between 1800 and 1500 BC) (Livingston, 2000) with consequences for the then commonly held view towards nature.

Throughout the Middle Ages there was relatively little discussion of nature beyond that nature was conceived as the handiwork of God, created and ordered according to the Holy Scriptures (Egerton, 1973). By the

Enlightenment, however, intellectual developments were such that biblical explanations of the cosmos and nature were being challenged (Byrne, 1997). In the 17th century, René Descartes, the leader of rationalist philosophers, promoted a mathematical description of nature and the use of analytic thought—the Cartesian Coordinate System. Descartes' vision was to give a precise and complete account of all natural phenomena with absolute mathematical certainty. The Cartesian view was nature as machines, constructed from separate parts, and the whole is no more than the sum of its parts. Cartesian dualism contains a basic dichotomy between *nature* and *culture*. The Cartesian dichotomy is founded on Aristotelean logic that everything must be classifiable as one thing *or* another (“law of the excluded middle”) and a thing cannot be both one thing and another (“law of contradiction”). Embedded in the dualism were *mind* (man) and *matter* (nature), or *self* and *other*. Humans by virtue of being endowed with a soul, reason, culture, and self-awareness rose above the primitive, irrational, instinct-driven animal world (Serpell, 1996).

To Descartes it was indeed mind *over* matter. The dichotomization of nature and culture gave license to mastery over the natural world (Merchant, 1980; O'Brien, 2002) (the etymological meaning of *culture* refers to the process of cultivating the natural: to subordinate it to human control). As Descartes stated, the separation of humans from nature was to “render ourselves as lords and possessors of nature” (Descartes, 1960 [1637, 1641], p. 45). Similarly, consider the 17th century scientist, Francis Bacon on the conquest of Nature (from Keller, (1985), P. 36)

I am come in very truth leading you to Nature with all her children to bind her to your service and make her your slave. For you have but to follow and as it were hound Nature in her wanderings, and you will be able, when you like, to lead and drive her afterwards to the same place again.

Some ecofeminist literature draws parallels between Cartesian dualism and male/female dichotomies and equalities (Merchant, 1980; Emel, 1995). According to this thesis, the Cartesian dualism has gendered dimensions placing men with culture, rationality, and spirit over women who were characterized by nature, emotion, and matter. Merchant (1980) maintains the newer, machine-like notions were critical in cementing the end of a living female earth and heralding the “death of nature.” Indeed, even George Perkins Marsh, the influential 19th century conservationist supported Biblical and Enlightenment premises that humankind’s mission was to subdue and domesticate nature (Lowenthal, 2000), believing that “man” must subjugate nature, for “wherever he fails to make himself her master, he can but be her slave” (Lowenthal, 2000).

In summary, the concept of Mother Nature began as deification, typically benign and organic. It gradually evolved into a more metaphor-like meaning such that by the Victorian era *she* was seen as often being capricious, vengeful and ruthless. The Industrial Revolution led to structural changes in how society was organized and how humanity related to nature. Nature could now be modified on a large-scale. In fact, nature and the “wild” were often seen as an obstacle to human survival, progress, and civilization. Nature was forced into the Western dualistic model with notions of wild-domestic, human-animal, nature-culture, good-evil, wilderness-civilization (O’Rourke, 2000). The Cartesian-Baconian-Newtonian separation of nature-culture and other dualisms associated with a patriarchal worldview, its concepts of power structures and “otherness” has been used to justify widespread destruction and exploitation of nature, and a holocaust of species extinctions. How to conceive of nature’s agency in ways that are not anthropomorphic (or sexist) seems to be a central problem for the dismantling of discourses that define nature.

### **Balance of Nature**

You cannot step into the same river twice, for fresh waters are ever flowing in upon you.

Heraclitus, ca 544–483BC

The myth that there is balance in nature is part of most cosmologies and central to natural history (Egerton, 1973). By myth I mean, in the words of *Merriam-Webster Dictionary*, “a usually traditional story of ostensibly historical events that serves to unfold part of the world view of a people or explain a practice, belief, or natural phenomenon.” In the Orient, the Chinese philosophy of yin (Earth/Female) and yang (Heaven/Male) enclosed in a hermetically sealed circle implies that the universe is in harmony as a result of the balance of forces. In western thought, the concept can be traced to the time of the ancient Greeks. The Greeks had several deities with the power to generate and order the universe including Tethys, Gaia, Themis, and Metis. All things were believed to be interconnected, to preserve order, predictability and resilience in nature. Harmony in nature expressed the wisdom and benevolence of the Creator (Egerton, 1973). The Greek philosopher Herodotus understood balance in nature as natural laws that kept predators from driving prey populations to extinction (e.g., Herodotus suggested that the mechanism limiting lion reproduction was that the cub, having sharp claws, must rip out its mother’s womb while being born). Herodotus also noted the symbiotic relationship between Nile

crocodiles and a species of plover and in the mid 400s BC wrote:

This bird is of service to the crocodile and lives in consequence, in the greatest amity with him; for when the crocodile comes ashore and lies with his mouth open . . . the bird hops in and swallows the leeches. The crocodile enjoys this, and never, in consequence, hurts the bird.

The conception of balance of nature has likewise deeply permeated modern western philosophy and science, especially ecology. In the early 13th century, St. Thomas Aquinas, in his famous “5 Ways” argued that there are order and goals discernible in nature, the production of “God.” Commenting on species diversity and stability (balance) Aquinas stated “It is better to have a multiplicity of species than a multiplicity of individuals of one species” (McIntosh, 1985). However, the corpus of religious doctrine propounded some 200 years ago by the English philosopher and theologian William Paley has, arguably, had the most profound influence on a balance of nature. In *Natural Theology* Paley (1802) advocated that God must be ensuring a balance of nature. According to Paley, a watch’s adaptation of means to ends (that is, the adaptation of its parts to reporting of time) ensures that it is the product of an intelligence, and not simply the output of undirected natural processes. Paley extended the argument of adaptations of means to ends in organisms. He maintained that since the existence of something as complex as a watch implied the existence of a watchmaker, the infinitely greater complexity of nature had necessarily to imply the existence of a creator, in his mind the God of Christianity. Furthermore, Paley and his followers held that God displays his existence, benevolence and omniscience in the optimal design of organic form and the maximal harmony of local ecosystems (Gould, 1996), as seen for example in the exquisite “balance” of the food chain. Natural laws were set in place by God as part of the harmonious relationships between natural objects and as such, the divinely ordained order did not, in general, acknowledge the possibility of randomness and extinction (Glacken, 1967; Egerton, 1973). Throughout the 19th century students at Cambridge were required to read Paley’s book, including Darwin (1887). Moreover, many amateur naturalists were also theologians and readers of Paley’s work, and thus religion and science were entwined (Worster, 1994).

The ecological notion of balance in nature also permeated the early conservation movement. The geographer and leading conservationist, George Perkins Marsh (1864), wrote in *Man and Nature* “But she has left it within the power of man irreparably to derange the combinations of inorganic matter and of organic life, which through the night of eons she had been proportioning and *balancing* (my italics). . . .” Similarly, “Nature, left undisturbed, so fashions her territory to give it almost unchanging



permanence of form, outline and proportion” (Marsh, 1864, p. 29). Marsh’s ecological admonitions that humans disrupted equilibrium in nature were revolutionary. The concept of nature as essentially stable, or balanced, to form an integrative unit also affected Darwin who suggested the existence of a “balance” in complex natural systems when he (1859, pp. 72–73) wrote:

... and so onwards in ever-increasing circles of complexity. Not that under nature the relations [between organisms] will ever be as simple as this. Battle within battle must be continually recurring with varying success; and yet in the long-run the forces are so nicely balanced, that the face of nature remains for long periods of time uniform, though assuredly the merest trifle would give the victory to one organic being over another.

The view then, and one which still prevails today in much public discourse, is one where, for example, predators and prey are some odd collection of allies, graciously helping each other to prosper, to ultimately help or serve humans (e.g., by controlling pest outbreaks), and to preserve a mystical, divinely-ordained harmonious condition.

### **Balance of Nature and Ecology**

The Balance of Nature paradigm had similar appeal to scientists, especially in biology and ecology (Pimm, 1991; Botkin, 1990) and writers of science. The link between post-Renaissance conceptions of nature and ecological theory was clear to Glacken (1967, p. 243) who wrote

I am convinced that modern ecological theory, so important in our attitudes towards nature and man’s interference with it, owes its origin to the design argument. The wisdom of the creator is self-evident, everything in the creation is interrelated, no living thing is useless, and all are related one to the other.

Glacken (1967, p. 706) has suggested

It is not accident that ecological theory . . . has become the basic concept for a holistic view of nature [and] has behind it a long preoccupation in Western civilization with interpreting the nature of earthly environments, trying to see them as wholes, as manifestations of order.

For most of the 20th century, biogeographers and ecologists believed in a balance of nature. The paradigm has at its core properties whereby ecosystems have a strategy of self-regulation replete with an integrated and homeostatic system, governed by their own organic laws and able to respond to positive feedbacks in accordance with the mechanistic principles of cause and effect (Pimm, 1991; Wu and Loucks, 1995); all directed toward achieving equilibrium or *balance*. Homeostasis is one of the pillars of

the theory, which derives from two Greek words for “same” and “steady” and is a term we use to describe a state of balance or self-regulation in a system. For instance, when we get cold, our heart beats faster, respiration increases and we shiver, all in an effort to maintain an internal equilibrium or balance. The notions of balance in nature can be witnessed at two levels of ecological organization, communities and ecosystems, as is discussed next.

### ECOLOGICAL COMMUNITIES

The case of holism in ecological communities can be traced to the American plant ecologist Frederic Clements (1916, 1936). In the Clementsian model plant communities were characterized as super-organisms which, analogous to real organisms, have a certain physiological integrity and which come into existence, and grow from a juvenile stages to a well-defined stable “mature” stage, which Clements called the “climax” equilibrium state. This trajectory was intended to explain the phenomenon known in ecology as succession. To Clements, vegetation was a “formation” much like a complex organism that proceeded towards a “climatic climax” (Clements, 1916). That the climax state was entirely predictable meant that it conformed to an equilibrium condition. The deterministic aspects of succession were a product of Newtonian thinking. Disturbance, in this balance of nature paradigm, was considered unnatural, usually the result of human agency, and its effects would diminish over time as the community became increasingly more stable or balanced.

The work of Gleason (1926, 1939) challenged the holistic, super-organismic view. Gleason’s individualistic concept predicted that each species is distributed independently of other species, and therefore a community has no natural boundaries, but rather is defined by the types of species that happen to co-occur in a particular area, and that the assemblages that appear to be balanced only because of our snapshot “view.” Gleason, however, was branded a heretic and his views were largely ignored until the 1950s and later (McIntosh, 1985). Clementsian ideas on succession and organismic plant communities (i.e., ‘vegetation types’) were adopted by major textbooks on animal populations and animal ecology (e.g., Allee *et al.*, 1949) because its holism, homeostasis and orderly neatness made it pedagogically attractive (McIntosh, 1985). For example, Shelford (1913) described animal communities as “systems of co-related working parts” where equilibrium was principally owing to a balance between food supply and reciprocal fluctuations in predators and prey. Not all animal ecologists were

of like mind, however. Charles Elton (1930) attacked the ubiquitous clockwork simile used by ecologists:

The balance of nature does not exist, and perhaps, never has existed. The numbers of wild animals are constantly varying to a greater or less extent, and the variations are usually irregular in period and always irregular in amplitude.

## ECOSYSTEMS

Tansley (1935) argued against the Clementsian ideas that aggregations (formations) of plants had the properties of organisms. He suggested that succession involved complex interactions of vegetation with soils, physiography, human agency, and climate which leads to a range of successional trajectories as a product of different conditions. This view formed the basis of much of Tansley's view of the concept of the "ecosystem." However, in time this concept too, came to be understood as a balanced system with equilibrational conditions arising through negative feedback.

Notwithstanding Elton's view on population regulation and Tansley's conception ecosystem, E. P. Odum, the doyen of American ecology in the mid-to-late 20th century had an enormous impact on the holistic approach to ecosystems beginning in the early 1960s (McIntosh, 1985). In Odum's view (1959, 1983) homeostasis is a general trait of biological systems, ranging from cells to ecosystems, and significant changes in numbers of each species and the number of species only occur when something upsets the norm of the system "balance." Odum (1959) wrote,

Homeostasis at the organism level is a well known concept in physiology . . . We find that equilibrium between organisms and environment may also be maintained by factors which resist change in the system as a whole. Much has been written about this "balance of nature" but only with recent development of good methods for measuring rates of function of whole systems has a beginning been made in the understanding of the mechanisms involved.

A characteristic of the holistic systems approach was that ecosystems have a "strategy" and in fact the balance is rarely upset as "stability" would be achieved and maintained through various feedback mechanisms and cybernetic-like information networks in the form of food webs and nutrient cycling, which integrate and coordinate the workings of their components (e.g., populations, species). This systems approach relied heavily on understanding energy flows as the principal structuring agent in ecosystems. The system thus had clearly defined boundaries and natural order preordained by the laws of thermodynamics. This emphasis on interdependences and relationships, and the associated ideas about stability and self-regulation, form the core of radical or "deep" ecology.

Moreover, ecologists believed ecosystems were quite resilient and even when significantly perturbed, the system's rhythm would return to some equilibrational point or steady state (particularly given non-anthropocentric disturbance), much like an elastic after being stretched. Taken together, the ideas of stability and equilibrium supported a balance of nature paradigm. In other words, modern ecological science and culture were in agreement with respect to views of structure and function in nature.

This begs the question: to what degree did the cultural construct influence the science of ecology? Science attempts to understand the world through objective evaluation. Philosophers, and most scientists, will quickly point out there can be no such thing as an observer-free observation. Moreover, the conduct of science is often affected by larger societal and sociological context (Wilson, 1998). The world outside science can determine what counts as useful research and what sorts of answers are acceptable. Thus the cultural myth and metaphorical idea of "balance of nature" may have predisposed scientists to accept the equilibrium paradigm. They were seeking to explain the "web of life," the "laws of nature" and the "grand cycle of decay and rebirth." Students of ecology were likely influenced by the homeostasis that one witnesses in everyday life. Societies also have degrees of homeostasis in achieving stability despite competing political, economic and cultural factors (change is generally welcome where it is imperceptibly slow and gradual). In fact, prey being controlled by predators has the same essential intuitive appeal as the law of supply and demand in economics, whereby the interaction of supply and demand keeps market prices reasonably stable—in balance. Ghiselin (1981) suggested that the organismic concept of balance of nature persists in ecology because it has aspects of romanticism and indeed mysticism, and that ecologists possessing these beliefs "share an unwillingness to see natural occurrences, and especially biotic communities, as they are rather than as the observer wishes."

### THE PARADIGM SHIFT

In 1962 Thomas Kuhn argued in the *Structure of Scientific Revolutions* that scientists construct paradigms which define the rules and problems for investigating a science, and that later paradigms can define new rules and problems. Over the last two decades, ecologists have radically altered their view (paradigm) of ecological systems and their operation. Beginning in the second part of the 20th century, it became increasingly obvious that equilibrium conditions are rare, and that disturbance events are so common that most ecological systems never reach a dynamically stable climax stage (White, 1979) even in large landscapes. For example, Romme and Despain (1989) concluded that Yellowstone National Park is a landscape

characterized by non-steady state dynamics wherein the landscape fluctuates markedly (though not predictably) in structure and function over periods of 300 years. Baker (1989) found a similar condition for the 400,000 ha Boundary Waters region of Minnesota. The pattern of recovery following disturbance depends on the features of the species themselves, the nature of interactions among species, plus many unpredictable factors (Baker, 1992). Thus ecosystems and landscapes are dynamic environments of interacting biotic and abiotic components, even over large space-time scales. They do not have a single equilibrium of species (e.g., populations and distributions) and habitats but instead, are characterized by multiple equilibria, stochastic and well as deterministic processes, destabilizing forces, and sometimes an absence of any equilibria (Holling and Meffe, 1996 and references therein). O'Neill (2001) characterizes ecosystems as having metastability, constantly changing yet perfectly reproducing. Furthermore, ecological processes are not linear among different spatial and temporal scales; they shift from one range of scale to another (Holling and Meffe, 1996). Thus there is no particular system state or "natural state" to return to if a perturbation occurs.

This is not to declare that equilibrium states are never achieved; rather equilibrium conditions exist only at certain spatio-temporal scales (Pickett *et al.*, 1994). More generally, there is *flux* in nature (Wu and Loucks, 1995). This new paradigm asserts that landscapes and ecosystems often exhibit emergent phenomena with relatively sudden reconfigurations beyond prediction, as the component parts mix, meld, separate, or randomly combine. In other words, ecologists discovered and acknowledged (with some pockets of resistance) that natural systems are inherently dynamic, heterogeneous and "open" to a range of outside influences including those from adjacent ecosystems and human activities. As Odum (1992) came to realize, ecosystems are "thermodynamically open, far from equilibrium."

Although the paradigm shift in ecology largely took place in the 1980s, profound change in a world view is hard to accept among scientists, as it is in society as a whole. Hull *et al.* (2002) recently interviewed 44 people professionally involved in the science, policy, and management of forests in southwestern Virginia. Hull *et al.* found and reported that

More than half of the respondents (23 of 44) employed, at some point during their interview, a "balance of nature" argument. They suggested that nature was "balanced" or in "harmony" or that there exists an "equilibrium" in nature due to "forces" that "heal," "improve," or otherwise guide nature towards some balanced or healthy state . . . An ecosystem, it was suggested, functioned like an organism with "self-perpetuating," "self-maintaining" processes that allow it to "heal itself."

In high schools it is still taught that predators and prey need each other to keep their populations in balance. For example, the high school text book *Biology: The Dynamics of Life* (Merrill Publishing Company) published in

1991 writes: "Birds have many roles in the environments in which they are found. Birds help to maintain balance in the environment. Some birds eat insects that would otherwise increase in number so much that they would overwhelm natural habitats. Predatory birds feed on rats and mice and keep them in check."

### **BALANCE OF NATURE AND MOTHER NATURE IN CONSERVATION**

The Mother Nature/Balance of Nature paradigms have considerable modern-day appeal in the conservation movement. Conservationists rightly deplore the wholesale despoliation of the Earth. Many in the conservation movement with non-anthropocentric sympathies have adopted Aldo Leopold's Land Ethic, which has at its core a holistic view towards ecosystem protection whereby humans are "plain members and citizens" of the "land community." Leopold (1949, p. 262) held that "[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." Thus conservation efforts are often aimed at considering the seductive notions of natural balance and stability. It is a powerful guiding ethic for conservation, but penned when nature was seen as tending towards a relatively stable dynamic equilibrium. The general ethic remains valid though it needs revision to acknowledge the primacy of disturbance in ecological systems, the asymptotic return afterwards, and hence the normalcy of change, much of which is unpredictable. In other words, the balance of nature and steady-state theories support the view among some conservationists that the best way to conserve nature is to seek out discrete ecosystems, remove human influence such as domestic grazing and fire, and reestablish natural biodiversity by stabilizing ecological processes. Such an approach largely fails. Ecosystems are dynamic (change is the real only constant) and spatially heterogeneous.

From a non-science viewpoint, there are also problems for the conservation movement, especially so-called deep ecologists and New Age adherents who have embraced James Lovelock's Gaia hypothesis. This hypothesis states metaphorically,

The entire range of living matter on Earth, from whales to viruses, from oaks to algae, could be regarded as constituting a single living entity, capable of manipulating the Earth's atmosphere to suit its overall needs and endowed with faculties and powers far beyond those of its constituent parts.

Here Lovelock describes global feedback in metaphysical terms. In naming the phenomenon "Gaia," the overtones have led some to deify Gaia as an object of reverence and providence. Gaia comes close to fulfilling the

desire of many New Age advocates for a conservation science that subsumes religious belief. Paradoxically, such new age thinking and the re-appropriation of the term “Gaia” to represent the Earth (Mother Nature), replicates the language of dominance, reinforces patriarchal dualisms and hierarchical traditions which continue to objectify women and nature (in Greek Mythology Gaia becomes subservient to her son–husband Uranus). Furthermore, personalizing this relationship with Mother Nature at the helm is very dangerous because the Gaia idea could work against conservation if the Earth is truly believed to be self-regulating. One could assume the planet would take care of itself, regardless of what perturbations take place, such as that created by human-caused global climate change and large-scale deforestation. Therefore, as humanity drives millions of species to extinction and alters ecosystem functions in unparalleled ways, some feel we can sit back, relax and “Let Mother Nature run her course” because “Mother Nature knows best” or “She’ll adjust and we’ll ultimately do well by her.” Such orthodoxy will fail. Moreover, the danger in denying the ascendancy of non-equilibrium theory, and clinging to the notion of steady-state, will preclude from our narratives all but a limited fraction of the phenomena that constitute our daily world. Indeed, it may be difficult to accept that the Earth system is so remarkably complicated that we can never completely understand it.

### CONCLUSION

It is legitimate to ask at this point: What harm can come of continuing to believe in a world as seen through these metaphors? In an effort for us to know, the Mother Nature and Balance of Nature metaphors have produced cultural, social and scientific misconceptions about the structure and function of nature. *In toto*, we tend to ignore the true forces of nature, which are firmly grounded in physics, Earth systems science, chemistry and biology, none of which are capable of conspiring to ruin our weekends, create famine, and kill off wildlife, or, alternatively, produce bumper crops, great wines and weather ideal for picnics. Instead, we let age-old myths, metaphors and contorted science make for misguided perceptions of the natural world notwithstanding that the general notions of order, permanence, harmony, symmetry, and regularity are desirable attributes more generally (i.e., beyond nature and ecology). Myths cannot be used to construct theory *per se*, but do often inspire its construction. Moreover, the difficulty is that myths cannot be destroyed by facts. They can only be abandoned when people realize that while the myth may claim to explain everything, it can never be subjected to critical testing and verifiability. Some psychologists who study consciousness say we cope with such impossibilities by making up simplified models or stories, which include myths (e.g., Leeming,

1990). However, Earth systems are in many ways *terra incognita*, fundamentally unknowable or not objectifiable. Despite our Promethean tendencies we should accept that many of nature's algorithms are decidedly beyond full human comprehension, and indeed marvel at such mystery.

Wilson (1998) believes people are innate romantics and desperately need myth and dogma. Sadly, however, the myth and dogma associated with Mother Nature represents a deification of Earth and gendered images of a capricious being. The metaphor reinforces many of the dualistic assumptions that underlie the Cartesian worldview, especially man versus nature. In reality there is no larger power that is orchestrating ecological calamity and otherwise wreaking havoc, or being beneficent and nurturing. Similarly, the balance of nature conception is a misguided effort to match ecological science with the theological and scientific visions of a perfect universe, a single parsimonious system like that Einstein sought. There is no harmony in nature; rather, as Botkin (1990) asserts there are *discordant* harmonies of nature. Botkin (1990, p. 12) maintains that ecosystems cannot be analyzed "as if there were 19th-century machines, full of gears and wheels, for which our managerial goal, like that of any traditional engineer, is a steady-state operation."

As ecology has undergone a profound shift from the notion that nature is a well-behaved, deterministic system, conservationists must no longer conceive of nature as balanced and integrated. Nature is dynamic and highly variable with open-ended trajectories contingent upon preceding events. There are not equilibrium forms of ecosystems nor ways nature *should be*, and there is no Mother Nature. Our understanding of science and conservation efforts need to reflect this reality and not age-old ill-founded myths and a scientific belief that is demonstrably false.

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