

**ENVIRONMENTALISM:
FROM THE CONTROL OF NATURE TO PARTNERSHIP**

By Carolyn Merchant*

Abstract

In the Scientific Revolution of the 17th century, when environmental awareness over loss of forests and depletion of soils was in its infancy, the long term goal of the betterment of humankind through the control of nature was a significant advancement. The experimental vision put forward by Francis Bacon and others enabled humanity to understand science and manage nature. For the 21st century, however, the ethic of control is giving way to one of partnership with the natural world. A partnership ethic entails a viable, sustainable relationship in which connections to the global world are recognized through science, technology, and ecological exchanges. It is an ethic in which humans act to fulfill both humanity's vital needs and nature's needs while restraining human hubris.

For an online audio lecture on this topic go to, <http://nature.berkeley.edu/merchant> and click on Recent Publications.

The seventeenth century Scientific Revolution spanned the period between the Renaissance and the Enlightenment during the expansion of pre-industrial capitalism. All over Europe a flurry of new activities that transformed nature through machines and inventions was taking place. Tunneling into the earth for coal and metals, building forges for refining ores and hammering metals, constructing mills for wind and water power, and erecting machines for lifting and boring provided humanity with a new sense of power over nature. The development of the coal and iron industries, the enclosure of the commons for wool production for the textile industry, the cutting of enormous tracts of timber for shipbuilding, and the expansion of trade changed the natural landscape. Knowledge of the crafts, mechanics, inventions, and the properties of matter was

essential to creating a storehouse of reliable, replicable information about the practical arts that would be available not just to the few, but to the many.¹

Nature as Female

Nature for nearly everyone in the Renaissance and Scientific Revolution was female. More than a metaphor, Nature was the servant of God in the mundane world—the bringer and reproducer of life as well as the meter of rewards and punishments. Accepted as both reality and metaphor by the lower, as well as the upper classes, Nature represented a fusion of ancient, Renaissance, and Christian symbols. Depicted as female by a host of artists, writers, philosophers, and ordinary people, Nature was a personification of the cosmos, the earth, and the human writ-large.²

Like the human and the cosmos, nature, as a living being, had a body, soul, and spirit. Nature personified had breasts, a bosom, and a womb, as well as circulatory,



reproductive, and elimination systems. For neoplatonists, nature was the lower part of the world soul; for alchemists and natural magicians, matter was to be manipulated and transformed into higher metals, cures, potions, and pharmacopoeia.³

From: Athanasius Kircher,
Mundus Subterraneus, 1665

For Christians, Nature was the dispenser of God's displeasure at mankind's disobedience—retribution for human sins. Failed harvests, drought, storms, disease, and plagues resulted from human failure to obey the strictures of moral life. Nature was the substance of the body—a fusion of the elements, the base instincts, and human bodily and

moral weaknesses. All aspects of the body were symbolized by the female—the weaker and more vulnerable sex. Matter, too, as female represented the lower order of nature. Matter, like the female, was inconstant, changing, and corruptible. Matter, the body, and the reproductive organs were sites of corruption by the devil. To deny this reality of daily and moral life is to discount history itself.⁴

For most of human history, nature had the upper hand over human beings, and humans fatalistically accepted the hand that nature dealt. People lived at the mercy of nature's storms, droughts, frosts, and famines. They accepted fate while propitiating nature with gifts, sacrifices, and prayer (often within hierarchical human relationships). Failed harvests, famines, and droughts were considered God's, or the Great Spirit's, way of blaming human beings for acting in an unethical way.

Only in the last few centuries have technologies and attitudes of domination stemming from the Scientific Revolution turned the tables, enabling humans to threaten nature with deforestation and desertification, chemical pollution, destruction of habitats and species, nuclear fallout, and ozone depletion. Through mechanistic science, technology, capitalism, and the Baconian hubris that the human race should have dominion over the entire universe, humanity has gained an increasing ability to destroy *nature as we know it today*. Some groups of people have gained great power over nature and other human groups using the interlinked forces of science, politics, and religion.

Francis Bacon and Dominion Over Nature

In the early seventeenth century, Francis Bacon (1561-1626) forcefully proclaimed a secular program for the domination of nature and a pathway to recovering

the paradise lost by Adam and Eve. Due to the Fall from the Garden of Eden, Bacon believed, the human race had lost its "dominion over creation." Bacon saw science and technology as the way to control nature and thereby to recover the right to the original



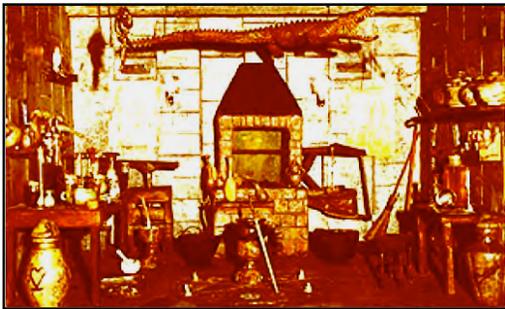
garden given to the first parents: "Man by the Fall, fell at the same time from his state of innocency and from his dominion over creation. Both of these losses can in this life be in some part repaired; the former by religion and faith, the latter by arts and science." Humans, he asserted, could "recover that right over nature which belongs to it by divine bequest. . . ." Bacon's narrative plot was thus a reversal from decline to progress—from the tragedy of the Fall to the comedy of survival and recovery.⁵

Bacon used the language of nature as female to articulate an experimental philosophy that would extract nature's secrets. He stated that not only were the secrets of nature hidden "in certain deep mines and caves," but they could be wrested from nature's grasp by miners and smiths, "the one searching into the bowels of nature, the other shaping nature as on an anvil." The technologies of gunpowder, printing, and the magnet could "help us to reveal the secrets still locked in 'nature's bosom.'"⁶

Francis Bacon and the Origins of Experimentation

Three early modern settings illustrate the methods of extracting nature's secrets through the idea of the controlled experiment (toward which Bacon was tending)—the courtroom, the anatomy theater, and the laboratory. The first example is the courtroom, a setting with which Bacon was intimately familiar. He was an experienced practitioner of the law, rising to ever higher offices during the reigns of Queen Elizabeth I and James I,

over her and pointing to the secrets of her womb. The active mastery of the standing, gesticulating male voyeurs contrasts with the passivity of the supine female object at center stage. The only other clearly identifiable woman in Vesalius's title page stands between two pillars in the background peering from beneath a veil. She may be the midwife who would have examined the condemned woman for evidence of pregnancy before her execution. She exemplifies woman's knowledge of woman's secrets now exposed to the vulgarity of the raucous crowd.⁸



The laboratory, as a third example of the emerging idea of the contained, controlled experiment, replicates the features of the courtroom and the anatomy theater. It is an enclosed space in which environmental variables such as temperature, air pressure, dust, and moisture can be controlled. A question is posed by the experimenter. She or he designs an apparatus that will answer the questions around which the laboratory is itself organized (equipment, assistants, recordation). The apparatus is subjected to a sequence of forces, impulses, or tests that will elicit answers. The data are recorded by witnesses and explained in ways that will reveal the secrets (truths) of nature. If reliable results are found, they can be repeated at a future time and place by other experimenters and viewed by other witnesses.⁹

The alchemist's laboratory, from which Bacon drew inspiration, typically comprised an array of furnaces, bellows, cauldrons, crucibles, presses, alembics, stills (distillation equipment), jars, flasks, and mortars and pestles, along with animal skeletons, herbs, powders, metals, and a variety of symbols, books, and recipes. In it, the

alchemist searched for transmutations that would produce cures, potions, gold, and the philosopher's stone. Bacon's ultimate goal was to transform the individualistic efforts of the alchemist and the magus into a method of obtaining knowledge that would serve all of humanity. Although Bacon did not use the term laboratory, his vision for workshops with furnaces, distillation equipment, and various types of instruments and vessels drew inspiration from the alchemist's workhouse.

Bacon's *New Atlantis* (written in 1624 and published posthumously in 1627) epitomized Bacon's most mature conception of the laboratory experiment. Here, in the visionary experiments conducted in Salomon's House, the workers all contributed to setting up "trials" and recording data. Separate "laboratories" (termed "preparations and instruments," including "perspective houses," "engine houses," "furnaces," "sound houses," "mathematical houses," "parks and inclosures," "chambers," and "orchards and gardens") existed for the study, speeding up, and modification of the activities of plants and animals, aquatic life, the metals, and the weather—all for the benefit of humankind.



The parks, gardens, caves, deep mines, wells, pools, streams, and fountains were strategically sited to facilitate the investigations; likewise, "laboratories" were specifically organized for dissections and surgeries, experiments with medicines and poisons, and the creation of new species of plants and animals. The research and recording of the results were undertaken by apprentices, novices, and scientists. The end of our "foundation," Bacon stated, is the "knowledge of

causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible."¹⁰

The idea of the controlled experiment toward which Bacon was tending is exemplified by Robert Boyle's air pump in the 1660s. In *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, Steven Shapin and Simon Schaffer analyze Boyle's experiments with the air-pump, in which living



things were subjected to the vacuum produced by the evacuation of air from a bell jar, as viewed by witnesses. In the illustration, *Scientia* (depicted as female) points to Boyle with her right elbow and to his air pump (epitome of the new experimental science) with her left hand. Here Nature (the living things under experimentation in the bulb of the air pump) is in bonds. In Bacon's terms, "she is put in constraint, moulded, and made as it were new by art and the hand of man; as in things artificial." The new method was needed, stated Boyle (echoing Bacon), because "some men care only to know nature, others to command her." The resulting truths were replicable in other times and places. A reliable form of knowledge resulted, one that helped to reestablish the social and political order left in disarray by the English Civil War.¹¹

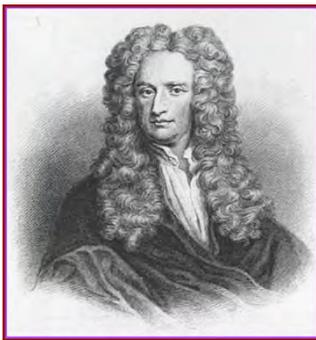


In 1768, Joseph Wright of Derby painted the "Experiment on a Bird in the Air Pump." In Wright's painting a pet cockatoo is removed from a cage (shown in the upper right corner), placed in a bell jar, and the air evacuated. The experimenter's

hand is placed near the stop cock and he holds the power to halt the evacuation and return air to the jar to revive the bird. A old man stares at a human skull contemplating death. A young girl covers her eyes to avoid viewing the impending horror, while a second girl stares anxiously upwards, and a woman, unable to watch, gazes at the face of another man who views the experiment directly. As Yaakov Garb has pointed out, the men and women have different responses. The women are stereotypically emotional looking in horror at the bell jar, hiding their eyes, or looking at the men, thereby experiencing the results vicariously. The men, on the other hand, control the outcome via the stopcock, stare directly at the experiment with open curiosity, or contemplate the larger philosophical meaning of death. The men "witness" a scientific truth, the women "experience" a dying bird. The painter has forced social norms about male and female scientific responses to nature onto the audience. The experiment reflects the goals of Francis Bacon's method. A question is asked of nature, a controlled experiment is devised, and the results are witnessed and evaluated for their truth content.¹²

The Mechanistic Worldview

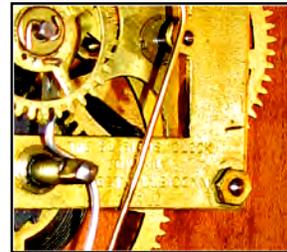
By the end of the seventeenth century, the synthesis of the experimental and mathematical methods had given humanity the optimism that the control of nature and



the secular recovery of the Garden of Eden were both possible. Francis Bacon's vision of dominion over creation and Descartes's revival of the mathematical method for knowing nature set up modernity's mechanistic view of nature. God was re-envisioned as an engineer and

mathematician, nature as a machine to be manipulated by human ingenuity. Isaac Newton's laws of mechanics and the principle of gravitation, put forward in his 1687 *Mathematical Principles of Natural Philosophy*, described the actions of the world-machine—the Enlightenment's ordered garden of nature. Newton's mechanical worldview restored "law and order" to a society in chaos from the wars of religion, the English civil war, and the collapse of Ptolemy's earth-centered cosmos. The view of nature as a living organism with the female earth mother at its center had become a machine to be constructed and reconstructed by the human engineer.

For mechanistic science, the changing imperfect world of everyday life partakes of Plato's ideal world, hence it can be described, predicted, and controlled, just as the physical machine can be controlled by its human operator. Science depends on a structural reality that allows for the possibility of control whenever phenomena are predictable, regular, and subject to rules and laws. The assumption of the order of nature is fundamental to the concept of power over nature, and both are integral parts of the modern scientific worldview. Such a worldview is completely consistent with a master narrative of remaking the world in the image of the Garden of Eden.

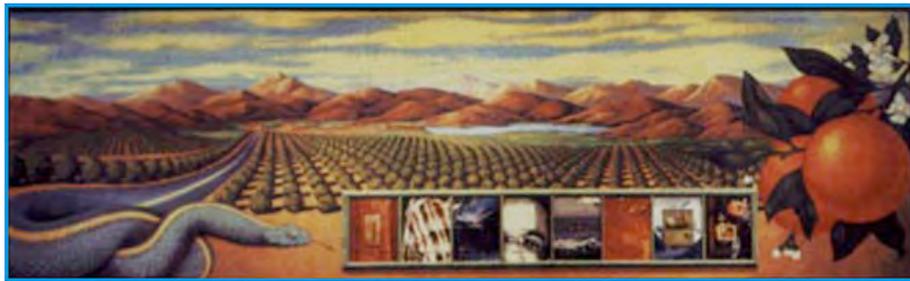


As E.J. Dijksterhuis characterized it in the mid-twentieth century:

That the adoption of the mechanistic view has had profound and far reaching consequences for the whole of society is an historical fact which gives rise to the most divergent opinions. Some commend it as a symptom of the gradual clarification of human thought, of the growing application of the only method that is capable of producing reliable results in every sphere of knowledge. . . . Others,

though recognizing the outstanding importance it has had for the progress of our theoretical understanding and our practical control of nature, regard it as nothing short of disastrous in its general influence on philosophical and scientific thought as well as on society.

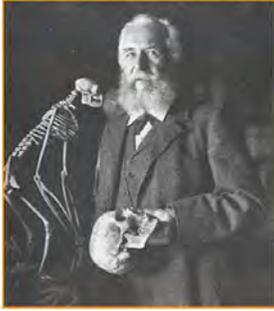
Since the scientific revolution of the seventeenth century, the mainstream narrative of Western culture has been to recreate the entire earth in the image of the Garden of Eden.



The story is one of transforming wilderness and deserts into gardens. The Earth becomes a garden planet. Forests and deserts as wilderness are transformed into farms. Lands are cleared, deserts are irrigated to become garden farms.

Challenges to Mechanism

The optimism generated by the Enlightenment and the synthesis of the sciences of mechanics, hydrology, thermodynamics, and electricity and magnetism by the late nineteenth century were challenged in the twentieth century. The first challenge to the mechanistic world view began with the science of ecology. Ecology deals not with mechanism's closed systems, isolated from the environment, but with open systems in which matter and energy are transferred across boundaries.



In 1866, German scientist Ernst Haeckel coined the term *Oekologie* from the Greek word, *oikos*, or house. He suggested a new science dedicated to the study of organisms in their environments. The word *oikos* gives rise to both ecology and economy. Ecology is the study of the household; economics is

the management of the household. Ecology in the United States has been attributed to men such as Frederic Clements, Aldo Leopold, and Eugene Odum, but it was actually introduced to the U.S. by a woman, Ellen Swallow Richards (1842-1911) in 1892.

Ellen Swallow began her career at Vassar College in 1871. She graduated in chemistry, and then went on to MIT where she was admitted as a special student. In 1910



she received an honorary doctorate from Smith College.

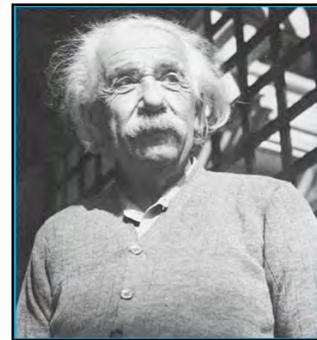
At the time that Swallow entered MIT, women could not receive higher degrees in the United States. Those who wanted to go into science primarily went to Germany, where German universities were granting doctorates to women. Margaret Rossiter's book, *Women Scientists in*

America (vol. I) relates the development of women's education in science at boarding schools and colleges in the mid to late 19th century, women's work in attempting to obtain doctorates, and their efforts to obtain positions in U.S. universities. If they received a Ph.D. overseas and returned, they might be able to get a teaching position, but upon marriage, they were released.¹³

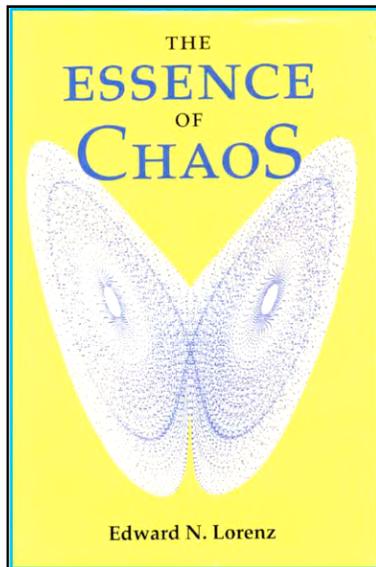
At Vassar, Swallow majored in chemistry and went on to MIT as a special student, where she incorporated the ideas of Frank Storer, a professor studying the

atmosphere and the idea of earth from her future husband, Robert Richards. In 1892, in a lecture to the Boston Boot and Shoe club, she introduced the term *oekology*. The headlines in the newspaper the next day read, "New Science, Mrs. Richards Names it *Oekology*." To Ellen Swallow Richards, ecology was the study of the human home, a point in a larger framework of the community. Water flowed into it and out of it, air surrounded it, and fertile soils produced nutritious food.¹⁴

The second challenge to the mechanistic world view came from the sciences of relativity and quantum mechanics, in the early twentieth century. Einstein's relativity theory postulated that fields with varying strengths spread out in space. Strong, stable areas, much like whirlpools in a flowing stream, represented particles. They interacted with and modified each other, but were still considered external to and separate from each other. Quantum mechanics mounted a greater challenge. Motion was not continuous, as in mechanistic science, but occurred in leaps. Particles, such as electrons, behaved like waves, while waves, such as light waves, behaved like particles, depending on the experimental context. Context dependence, which was antithetical to mechanism and part of the organic worldview, was a fundamental characteristic of matter.¹⁵



A third challenge to mechanism came in the 1970s and 1980s from the sciences of chaos and complexity theory. Edward Lorenz's work on chaos theory, for which he won the 1983 Crafoord Prize of the Royal Swedish Academy of Sciences, led him to question the possibility of finding suitable linear prediction formulas for weather forecasting and instead to develop models based on nonlinear equations. Lorenz's 1972 paper was



entitled, “Predictability: Does the Flap of a Butterfly’s Wings in Brazil Set Off a Tornado in Texas.” He argued that irregularity is a fundamental property of the atmosphere and that the rapid doubling of errors from the effects of physical features precludes great accuracy in real-world forecasting. Most environmental and biological systems, such as changing weather, population, noise, aperiodic heart fibrillations, and ecological patterns, may in fact be governed by non-linear chaotic relationships.¹⁶

We must therefore relinquish the mechanistic worldview's idea that we can predict everything in the natural world and hence humanity's ability to dominate and control nature. Classical physics and mechanistic science hold well in many dimensions of the world in which we live, but that world is nevertheless a limited domain of human experience. The unusual situations are in fact the closed systems of classical mechanics where prediction works well. However, the usual situation, rather than this very narrow domain, is that nature is fundamentally unpredictable. In the open systems of ecology, chaos, and complexity theory, prediction is far more difficult. Hence there is a need for a new ethic, based not on the prediction and control of nature, but instead on a human partnership with nature.

The Need for a New Ethic—A Partnership Ethic

For the twenty-first century, I propose a new kind of environmental ethic—a partnership ethic. It is based on the idea that people and nature are equally important. If

both people and nature are acknowledged to have rights, we have the possibility of a mutually beneficial situation.

*A partnership ethic holds that the greatest good for the human and nonhuman communities is in their mutual living interdependence.*¹⁷

Like the Native American idea of a sacred bundle of relationships and obligations, a partnership ethic is grounded in the ideas of relation and of mutual obligation.

Partnership is a word that is experiencing a renaissance in the discourse of the business and environmental communities. Successful environmental partnerships, focused on resolving policy conflicts surrounding local issues, are forming among corporations, local communities, government agencies, and environmental organizations. Trees, rivers, endangered species, tribal groups, minority coalitions, and citizen activists all find representation along with business at the negotiating table. The partnership process offers a new approach to collaboration.¹⁸

Equally innovative is the idea that the term "partners" refers not only to societal entities and institutions, but to individuals and even natural entities. Domestic partners with legal status may include not only married couples but stable relationships between men and women, women and women, and men and men. A partnership ethic may offer guidelines for moving beyond the rhetoric of environmental conflict and toward a discourse of cooperation. But the term "partner" can also be used to represent gnatcatchers, coho salmon, grizzly bears, and checkerspot butterflies. Indeed, nonhuman nature itself can be our partner.¹⁹

A human community in a sustainable relationship with a nonhuman community is based on the following precepts:

- Equity between the human and nonhuman communities.
- Moral consideration for both humans and other species.
- Respect for both cultural diversity and biodiversity.
- Inclusion of women, minorities, and nonhuman nature in the code of ethical accountability.
- An ecologically sound management that is consistent with the continued health of both the human and the nonhuman communities.²⁰

A partnership ethic entails a viable, sustainable relationship between a human community and a nonhuman community in a particular place, a place in which connections to the larger world are recognized through economic and ecological exchanges. It is an ethic in which humans act to fulfill both humanity's vital needs and nature's needs by restraining human hubris. It draws on the 1992 Rio Declaration's "global partnership to conserve, protect, and restore the health of the earth's ecosystems." It incorporates the 1991 Global Assembly of Women and the Environment's concept of "partner's in life" and it reinforces the principle of the 1991 National People of Color Environmental Leadership Summit that "environmental justice demands the right to participate as equal partners at every level of decision-making." Guided by a partnership ethic, people will select technologies that sustain the natural environment by becoming co-workers and partners with nonhuman nature, not dominators over it.²¹

A partnership ethic recognizes both continuities and differences between humans and nonhuman nature. It admits that humans are part of and dependent on nature and that nonhuman nature has preceded and will postdate human nature. But also it recognizes that humans now have the power, knowledge, and technology to destroy *life as we know*

it today. A partnership ethic therefore goes beyond egocentric and homocentric ethics in which the good of the human community wins out over the good of the biotic community to a new ethic which entails the good of both the human and the more-than-human communities. In some cases the needs of the more-than-human community will take precedence, as in preservation of wild areas, while in others, the needs of the human community will be paramount, as in sustainable agriculture and sustainable cities.²²

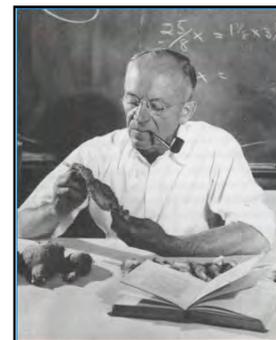
Roots of a Partnership Ethic



In a partnership ethic, both humans and nature are active agents. Both the needs of nature to continue to exist and the basic needs of human beings must be considered. As George Perkins Marsh put it in 1864, humanity should "become a co-worker with nature in the reconstruction of the damaged fabric," by restoring the waters, forests, and bogs "laid waste by human improvidence or malice."

While thunderstorms, tornados, volcanos, and earthquakes represented nature's power over humanity to rearrange elementary matter, humans had the power "irreparably to derange the combinations of inorganic matter and of organic life, which through the night of aeons she [nature] had been proportioning and balancing. . . ." ²³

Ecologist Aldo Leopold (1887-1948) formulated a land ethic in which farmland could be thought of in terms of partnership. In a 1939 essay on "The Farmer as a Conservationist," he wrote: "When land does well for its owner, and the owner does well by his land; when both end up better by



reason of their partnership, we have conservation." Leopold advocated a range of human partnerships with the land that could result in protection of wild areas, farmland restoration, and sustainable agricultural practices.²⁴

Women have also contributed to the idea of partnership. Riane Eisler, in *The Chalice and the Blade* (1988), argued that an original partnership society in prehistory took a 5000 year detour into a dominator society. In the dominator model, symbolized by the blade, one sex is ranked higher than the other. The partnership model, symbolized by the chalice, is based on male-female linking, rather than ranking, and its recovery offers hope for an egalitarian political and economic society in the future. In *Sacred Pleasure*, Eisler proposed a new "politics of partnership" based on nurturing and caring forms of socialization for both sexes and a grassroots politics of social equity. "Much in Western prehistory seems to prefigure the more partnership-oriented world view [that is] today struggling to emerge. . . . New beliefs, images, and stories more congruent with a partnership than dominator social organization [are] beginning to enter our consciousness. . . ." The future would thus be the product of new Eves and new Adams who would work together, making the "realities and myths of our future . . . very different from what they are now."²⁵

In *Feminism and the Mastery of Nature* (1993), Australian philosopher Val Plumwood argues that relation must be the basis for a new ethic, one that is rooted in continuity and difference, rather than mastery and colonization. "The relational self delineates the general structure of a relationship of respect, friendship, or care for the other." Plumwood draws on feminist ideals for non-dominating interactions among persons and the natural world, such as care, benevolence, and solidarity, that would allow

the earth community to flourish. Such qualities avoid the intense separation of self from world characteristic of the mechanistic, instrumental approach that masters nature as a slave. She argues: "The reason/nature story has been the master story of western culture. It is a story which has spoken mainly of conquest and control, of capture and use,



of destruction and incorporation. . . . Much inspiration for new, less destructive stories can be drawn from sources other than the master, from subordinated and ignored parts of western culture, such as women's stories of care."²⁶

To achieve a partnership with nature, we need to hear nature's voice. Nature speaks to us through senses other than the written and spoken word. Philosopher David Abram invites us into a more-than-human world that through the semi-permeable membranes of our bodies allows us to communicate with nature through sensuous experience. Oral cultures maintain that contact better than those influenced by the written word, but such consciousness can be reclaimed by listening to the voice of nature: "The rustling of leaves in an oak tree or an aspen grove," Abram writes, "is itself a kind of voice." With the use of the alphabet, however, a barrier develops between the human as self and nature as other. Nevertheless the writer's task is to release "the budded, earthly intelligence of our words, freeing them to respond to the speech of the things themselves—to the green uttering-forth of leaves from the spring branches." As we use narrative to recreate the human place in the more-than-human world, we can learn to reconnect with nature as an equal partner. For Abram that reconnection occurs through,

"the practice of spinning stories that have the rhythm and lilt of the local soundscape, tales for the tongue, tales that want to be told, again and again." The nature writer, philosopher, and poet can help us hear nature's voice by "finding phrases that place us in contact with the trembling neck-muscles of a deer holding its antlers high as it swims toward the mainland, or with the ant dragging a scavenged rice-grain through the grasses. . . letting language take root, once again, in the earthen silence of shadow and bone and leaf."²⁷

Putting Partnership Ethics into Practice

How can a partnership ethic be put into practice? What are some living examples of human partnerships with nature? One way is through designing new landscapes and

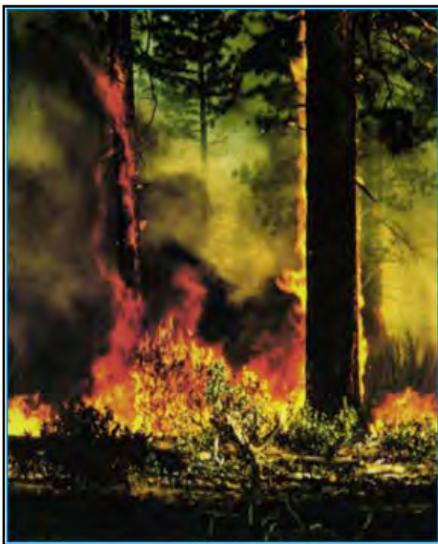


communities. In working with nature, planners and designers work cooperatively, not only with nature and local communities, but also with each other to achieve their goals. Men and women are both well-represented. Behind the partnership ethic lies an implicit assumption.

Teams of men and women, women and women, men and men are equals. Moreover, Nature, traditionally represented as mother, virgin, or witch, is not gendered as female to be managed, controlled, or exploited, but instead is accepted as a partner with humanity. Such cooperation, revealed in the resultant landscape designs, presents exciting new opportunities for working with nature. How have the precepts of partnership ethics helped to shape design?²⁸

Partnership ethics makes visible the connections between people and the environment in an effort to find new cultural and economic forms that fulfill vital needs, provide security, and enhance the quality of life without degrading the local or global environment. It creates both a structure and a set of goals that can enable decision-making, consensus, and mediation to be achieved without contentious litigation. It relates work in the sciences of ecology, chaos, and complexity theory to new possibilities for non-dominating relationships between humans and nonhuman nature.

While hydrological forces and turbulent water flows exemplify one type of chaos, fire represents another. Fire can strike suddenly, roar into violent action, and in minutes completely envelop a natural area that has emerged slowly over time through ecological



processes. How can humans be partners with a phenomenon so deadly and potentially destructive as wildfire? One way is to practice wise restraint by not building structures with fire-prone materials such as shake roofs or allowing dry vegetation to accumulate near residences. This is especially important in urban areas and in suburbs near arid grasslands and chaparral. Another way to work with fire is to learn from the history of past fire policies such as the hundred-year fire-suppression regime adhered to in Yellowstone National Park between its creation in 1872 and its reassessment in 1972. David Kovacic constructed animations of fires in Yellowstone. His simulation models were useful tools in understanding how local ecologies respond to fire. Frequent, cool, ground fires enhance ecological diversity by

opening up understories to forage, increasing varieties of plants and wildlife, and rejuvenating old growth. Wisely used, fire can become a tool in a new human partnership with nature.²⁹

In Bladensburg, Maryland, the Anacostia River had been confined to a concrete channel built many years ago by the Army Corps of Engineers, the flow managed by



pumps and flood gates on the premise that nature was controllable through engineering. Joseph Kevin Eades redesigned the landscape, allowing Nature's older meander to be revealed by allowing the river to assume its former course through the center of town. The new channels were lined with native riparian vegetation and wetlands were reestablished to aid in removing pollutants. Restoring the river's ecological

integrity allowed nature to become a partner with the town residents. By permitting the river to act freely, it removed stormwater runoff, provided habitat for riparian bird and animal life, and offered possibilities for river walkways that linked people to nature.³⁰

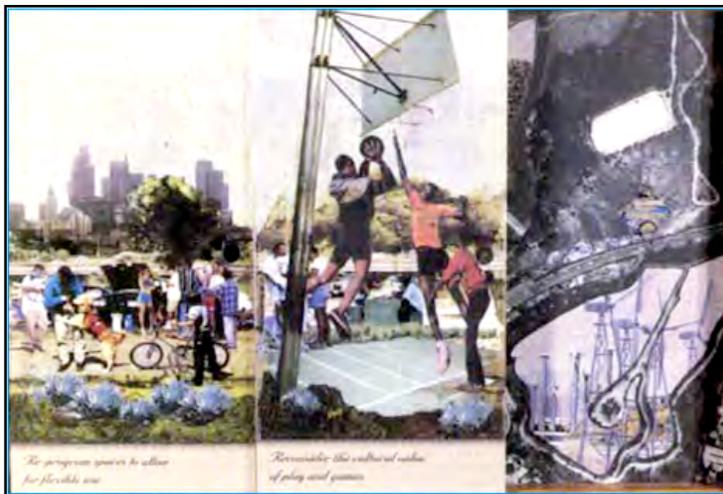
A partnership ethic respects both cultural diversity and biodiversity. In the hills above Oakland, California, a culturally diverse middle-class neighborhood consisting of a

majority of African Americans along with many European, Asian, and Latin Americans worked in partnership with each other and with landscape architect Louise Mozingo of the University



of California, Berkeley. The goal was to restore biodiversity to the oak groves from which the city derived its name and ecological heritage.³¹

Ecological and human health can also be restored to abandoned urban industrial sites through a "windows of opportunity" program such as that devised by Achva Benzinberg Stein and Norman Millar in Los Angeles, California. Here, former industrial areas, asphalt parking lots, freeway residual areas, and vacant urban lots are turned into opportunities for growing non-food crops with treated gray water, recreation sites for



underprivileged children, community gardens, and solar farms atop parking structures. In this case, ethnically and culturally diverse communities entered into partnerships with each other and with sunshine,

rainwater, fragile soils, and native plants to reclaim green open spaces that benefit both human and nonhuman health.³²

Conclusion

The above examples show that humanity can indeed learn to listen to Nature's voice as revealed through ecological principles, ethics, poetry, and a reverence for our nonhuman partner. Although, as partner, Nature's language differs from our own, we still have the possibility of working cooperatively with it. The result is a healthier, more aesthetically pleasing environment for our own and future generations.³³

 Notes

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For access to Carolyn Merchant's webpage, a link to the online Moses lecture, and downloadable pdf copies of the articles cited below go to:

<http://nature.berkeley.edu/merchant>

¹ Carolyn Merchant, "The Violence of Impediments: Francis Bacon and the Origins of Experimentation," *Isis*, 99 (2008): 731-760, see p. 735.

² Merchant, "Violence of Impediments," p. 739.

³ Merchant, "Violence of Impediments," p. 739.

⁴ Merchant, "Violence of Impediments," p. 739.

⁵ Merchant, *Reinventing Eden: The Fate of Nature in Western Culture* (New York: Routledge, 2003), p. 75.

⁶ Merchant, "Violence of Impediments," p. 753.

⁷ Merchant, "Violence of Impediments," pp. 754-5.

⁸ Merchant, "Secrets of Nature: The Bacon Debates Revisited," *Journal of the History of Ideas*, 69, no. 1 (January 2008): 147-162, see pp. 156-157.

⁹ Merchant, "Violence of Impediments," p. 756.

¹⁰ Merchant, "Violence of Impediments," p. 758.

¹¹ Merchant, "Violence of Impediments," p. 759.

¹² Merchant, "The Scientific Revolution and the Death of Nature," *Isis*, 97, no. 3 (September 2006): 513-533, see p. 532.

¹³ Margaret W. Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore: John Hopkins University Press, 1982); Rossiter, *Women Scientists in America: Before Affirmative Action, 1940-1972* (Baltimore: John Hopkins University Press, 1995).

¹⁴ Robert Clarke, *Ellen Swallow: The Woman Who Founded Ecology* (New York: Follett, 1973), pp. 26-54, 99-120; Carolyn Merchant, *American Environmental History: An Introduction* (New York: Columbia University Press, 2007), pp. 253-254.

¹⁵ Merchant, *Reinventing Eden*, pp. 109-110; David Bohm, *Wholeness and the Implicate Order* (New York: Routledge, 1980), p. 195.

¹⁶ Merchant, *Reinventing Eden*, pp. 212-213; Edward Lorenz, "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas," in Lorenz, *The Essence of Chaos* (Seattle: University of Washington Press, 1993), pp. 181-184, originally

presented to the annual meeting of the American Association for the Advancement of Science, December 29, 1972.

¹⁷ Merchant, *Reinventing Eden*, p. 223.

¹⁸ Merchant, *Reinventing Eden*, p. 223-224.

¹⁹ Merchant, *Reinventing Eden*, p. 224.

²⁰ Merchant, *Reinventing Eden*, p. 224.

²¹ Merchant, *Reinventing Eden*, pp. 224-225.

²² Merchant, *Reinventing Eden*, p. 229.

²³ Merchant, *Reinventing Eden*, p. 231.

²⁴ Merchant, *Reinventing Eden*, p. 231.

²⁵ Merchant, *Reinventing Eden*, p. 232.

²⁶ Merchant, *Reinventing Eden*, p. 232; Val Plumwood, *Feminism and the Mastery of Nature* (New York: Routledge, 1993, quotations on pp. 155, 196.

²⁷ Merchant, *Reinventing Eden*, p. 227; David Abram, *The Spell of the Sensuous: Perception and Language in a More-Than-Human World* (New York: Vintage, 1996), pp. 256, 273, 274.

²⁸ Merchant, *Reinventing Eden*, p. 233.

²⁹ Merchant, *Reinventing Eden*, pp. 237-238.

³⁰ Merchant, *Reinventing Eden*, p. 237.

³¹ Merchant, *Reinventing Eden*, p. 238.

³² Merchant, *Reinventing Eden*, p. 239.

³³ Merchant, *Reinventing Eden*, p. 239.