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"As it was the intuitive foresight of [Isabella of Spain] which brought the light of civilization to a great continent, so in great measure, will it fall to woman in her power to educate public sentiment to save from rapacious waste and complete exhaustion the resources upon which depend the welfare of the home, the children, and the children's children." So wrote Lydia Adams-Williams, self-styled feminist conservation writer, in 1908. Her compatriot Mrs. Lovell White of California argued that reversing the destruction of the earth brought about by "men whose souls are gang-saws" was a project that required the best efforts of women. These women of the Progressive conservation crusade of the early twentieth century exemplify an overtly feminist perspective on the environment.¹

Donald Worster's "Transformations of the Earth," while a rich and provocative approach to the field of environmental history, lacks a gender analysis. His conceptual levels of ecology (natural history), production (technology and its socioeconomic relations), and cognition (the mental realm of ideas, ethics, myths, and so on) are a significant framework for research and writing in this emerging field. His use of the mode-of-production concept in differing ecological and cultural contexts and his account of the changing history of ecological ideas in his major books have propelled environmental history to new levels of sophistication.

A gender perspective can add to his conceptual framework in two important ways. First, each of his three categories can be further illuminated through a gender analysis; second, in my view, environmental history needs a fourth analytical level, that of reproduction, which interacts with the other three levels.² What could such a perspective contribute to the framework Worster has outlined?

Women and men have historically had different roles in production relative to the environment. In subsistence modes of production such as those of native peoples, women's impact on nature is immediate and direct. In gathering-hunting-fishing economies, women collect and process plants, small animals, bird eggs, and shellfish and fabricate tools, baskets, mats, slings, and clothing, while men hunt

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¹ Carolyn Merchant, "Women of the Progressive Conservation Movement, 1900-1916," *Environmental Review*, 8 (Spring 1984), 57-85, esp. 65, 59.

² For a more detailed discussion, see Carolyn Merchant, "The Theoretical Structure of Ecological Revolutions," *ibid.*, 11 (Winter 1987), 251-74. For a discussion of theoretical frameworks for environmental history, see Barbara Leibhardt, "Interpretation and Causal Analysis: Theories in Environmental History," *ibid.*, 12 (Spring 1988), 23-36.

larger animals, fish, construct weirs and hut frames, and burn forests and brush. Because water and fuelwood availability affect cooking and food preservation, decisions over environmental degradation that dictate when to move camp and village sites may lie in the hands of women. In horticultural communities, women are often the primary producers of crops and fabricators of hoes, planters, and digging sticks, but when such economies are transformed by markets, the cash economies and environmental impacts that ensue are often controlled by men. Women's access to resources to fulfill basic needs may come into direct conflict with male roles in the market economy, as in Seneca women's loss of control over horticulture to male agriculture and male access to cash through greater mobility in nineteenth-century America or in India's chipco (tree-hugging) movement of the past decade, wherein women literally hugged trees to protest declining access to fuelwood for cooking as male-dominated lumbering expanded.³

In the agrarian economy of colonial and frontier America, women's outdoor production, like men's, had immediate impact on the environment. While men's work in cutting forests, planting and fertilizing fields, and hunting or fishing affected the larger homestead environment, women's dairying activities, free-ranging barnyard fowl, and vegetable, flower, and herbal gardens all affected the quality of the nearby soils and waters and the level of insect pests, altering the effects of the microenvironment on human health. In the nineteenth century, however, as agriculture became more specialized and oriented toward market production, men took over dairying, poultry-raising, and truck farming, resulting in a decline in women's outdoor production. Although the traditional contributions of women to the farm economy continued in many rural areas and some women assisted in farm as well as home management, the general trend toward capitalist agribusiness increasingly turned chickens, cows, and vegetables into efficient components of factories within fields managed for profits by male farmers.⁴

In the industrial era, as middle-class women turned more of their energies to deliberate child rearing and domesticity, they defined a new but still distinctly female relation to the natural world. In their socially constructed roles as moral mothers, they often taught children about nature and science at home and in the elementary schools. By the Progressive era, women's focus on maintaining a home for husbands and children led many women such as those quoted above to spearhead a nationwide conservation movement to save forest and waters and to create national and local parks. Although the gains of the movement have been attributed by historians to men such as President Theodore Roosevelt, forester Gifford Pinchot,

³ Sandra Marburg, "Women and Environment: Subsistence Paradigms, 1850-1950," *ibid.*, 8 (Spring 1984), 7-22; Diane Rothenberg, "Erosion of Power: An Economic Basis for the Selective Conservatism of Seneca Women in the Nineteenth Century," *Western Canadian Journal of Anthropology*, 6 (1976), 106-22; Vandana Shiva, *Staying Alive: Women, Ecology, and Development* (London, 1988); Mona Etienne and Eleanor Leacock, eds., *Women and Colonization: Anthropological Perspectives* (New York, 1980).

⁴ Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill, 1989); Corlann Gee Bush, "The Barn Is His, the House Is Mine," in *Energy and Transport*, ed. George Daniels and Mark Rose (Beverly Hills, 1982), 235-59; Carolyn E. Sachs, *The Invisible Farmers: Women in Agricultural Production* (Totowa, 1983).

and preservationist John Muir, the efforts of thousands of women were directly responsible for many of the country's most significant conservation achievements. Women writers on nature such as Isabella Bird, Mary Austin, and Rachel Carson have been among the most influential commentators on the American response to nature.⁵

Worster's conceptual framework for environmental history can thus be made more complete by including a gender analysis of the differential effects of women and men on ecology and their differential roles in production. At the level of cognition as well, a sensitivity to gender enriches environmental history. Native Americans, for example, construed the natural world as animated and created by spirits and gods. Origin myths included tales of mother earth and father sky, grandmother woodchucks and coyote tricksters, corn mothers and tree spirits. Such deities mediated between nature and humans, inspiring rituals and behaviors that helped to regulate environmental use and exploitation. Similar myths focused planting, harvesting, and first fruit rituals among native Americans and in such Old World cultures as those in ancient Mesopotamia, Egypt, and Greece, which symbolized nature as a mother goddess. In Renaissance Europe the earth was conceptualized as a nurturing mother (God's vice-regent in the mundane world) and the cosmos as an organism having a body, soul, and spirit. An animate earth and an I/thou relationship between humans and the world does not prevent the exploitation of resources for human use, but it entails an ethic of restraint and propitiation by setting up religious rituals to be followed before mining ores, damming brooks, or planting and harvesting crops. The human relationship to the land is intimately connected to daily survival.⁶

When mercantile capitalism, industrialization, and urbanization began to distance increasing numbers of male elites from the land in seventeenth-century England and in nineteenth-century America, the mechanistic framework created by the "fathers" of modern science legitimated the use of nature for human profit making. The conception that nature was dead, made up of inert atoms moved by external forces, that God was an engineer and mathematician, and that human perception was the result of particles of light bouncing off objects and conveyed to the brain as discrete sensations meant that nature responded to human interventions, not as active participant, but as passive instrument. Thus the way in which world views, myths, and perceptions are constructed by gender at the cognitive level can be made an integral part of environmental history.⁷

⁵ Merchant, "Women of the Progressive Conservation Movement"; Vera Norwood, "Heroines of Nature: Four Women Respond to the American Landscape," *Environmental Review*, 8 (Spring 1984), 34–56.

⁶ Paula Gunn Allen, *The Sacred Hoop: Recovering the Feminine in American Indian Traditions* (Boston, 1984); Riane Eisler, *The Chalice and the Blade* (San Francisco, 1988); Pamela Berger, *The Goddess Obscured: Transformation of the Grain Protectress from Goddess to Saint* (Boston, 1985); Janet Bord and Colin Bord, *Earth Rites: Fertility Practices in Pre-Industrial Britain* (London, 1982); Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco, 1980).

⁷ Merchant, *Death of Nature*. See also Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven, 1985), 33–65. On gender in American perceptions of nature, see Annette Kolodny, *The Lay of the Land: Metaphor as Experience and History in American Life and Letters* (Chapel Hill, 1975); and Annette Kolodny, *The Land before Her: Fantasy and Experience of the American Frontier, 1630–1860* (Chapel Hill, 1984).

While Worster's analytical levels of ecology, production, and cognition may be made more sophisticated by including a gender analysis, ideas drawn from feminist theory suggest the usefulness of a fourth level of analysis—reproduction—that is dialectically related to the other three. First, all species reproduce themselves generationally and their population levels have impacts on the local ecology. But for humans, the numbers that can be sustained are related to the mode of production: More people can occupy a given ecosystem under a horticultural than a gathering-hunting-fishing mode, and still more under an industrial mode. Humans reproduce themselves biologically in accordance with the social and ethical norms of the culture into which they are born. Native peoples adopted an array of benign and malign population control techniques such as long lactation, abstention, coitus interruptus, the use of native plants to induce abortion, infanticide, and senilicide. Carrying capacity, nutritional factors, and tribally accepted customs dictated the numbers of infants that survived to adulthood in order to reproduce the tribal whole. Colonial Americans, by contrast, encouraged high numbers of births owing to the scarcity of labor in the new lands. With the onset of industrialization in the nineteenth century, a demographic transition resulted in fewer births per female. Intergenerational reproduction, therefore, mediated through production, has impact on the local ecology.⁸

Second, people (as well as other living things) must reproduce their own energy on a daily basis through food and must conserve that energy through clothing (skins, furs, or other methods of bodily temperature control) and shelter. Gathering or planting food crops, fabricating clothing, and constructing houses are directed toward the reproduction of daily life.

In addition to these biological aspects of reproduction, human communities reproduce themselves socially in two additional ways. People pass on skills and behavioral norms to the next generation of producers, and that allows a culture to reproduce itself over time. They also structure systems of governance and laws that maintain the social order of the tribe, town, or nation. Many such laws and policies deal with the allocation and regulation of natural resources, land, and property rights. They are passed by legislative bodies and administered through government agencies and a system of justice. Law in this interpretation is a means of maintaining and modifying a particular social order. These four aspects of reproduction (two biological and two social) interact with ecology as mediated by a particular mode of production.⁹

Such an analysis of production and reproduction in relation to ecology helps to delineate changes in forms of patriarchy in different societies. Although in most so-

⁸ Ester Boserup, *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure* (Chicago, 1965); Ester Boserup, *Women's Role in Economic Development* (New York, 1970); Marvin Harris, *Cultural Materialism: The Struggle for a Science of Culture* (New York, 1979); Carolyn Merchant, "The Realm of Social Relations: Production, Reproduction, and Gender in Environmental Transformations," in *The Earth as Transformed by Human Action*, ed. B. L. Turner II (New York, forthcoming); Robert Wells, *Uncle Sam's Family: Issues and Perspectives in American Demographic History* (Albany, 1985), 28–56.

⁹ For a more detailed elaboration of reproduction as an organizing category see Merchant, *Ecological Revolutions*.

cieties governance may have been vested in the hands of men (hence patriarchy), the balance of power between the sexes differed. In gatherer-hunter and horticultural communities, extraction and production of food may have been either equally shared by or dominated by women, so that male (or female) power in tribal reproduction (chiefs and shamans) was balanced by female power in production. In subsistence-oriented communities in colonial and frontier America, men and women shared power in production, although men played dominant roles in legal-political reproduction of the social whole. Under industrial capitalism in the nineteenth century, women's loss of power in outdoor farm production was compensated by a gain of power in the reproduction of daily life (domesticity) and in the socialization of children and husbands (the moral mother) in the sphere of reproduction. Thus the shifts of power that Worster argues occurs in different environments are not only those between indigenous and invading cultures but also those between men and women.¹⁰

A gender perspective on environmental history therefore both offers a more balanced and complete picture of past human interactions with nature and advances its theoretical frameworks. The ways in which female and male contributions to production, reproduction, and cognition are actually played out in relation to ecology depends on the particular stage and the actors involved. Yet within the various acts of what Timothy Weiskel has called the global ecodrama should be included scenes in which men's and women's roles come to center stage and scenes in which nature "herself" is an actress. In this way gender in environmental history can contribute to a more holistic history of various regions and eras.¹¹

¹⁰ *Ibid.*, Nancy F. Cott, *The Bonds of Womanhood: "Woman's Sphere" in New England, 1780-1835* (New Haven, 1977); Barbara Leslie Epstein, *The Politics of Domesticity: Women, Evangelism, and Temperance in Nineteenth Century America* (Middletown, 1981); Ruth Bloch, "American Feminine Ideals in Transition: The Rise of the Moral Mother, 1785-1815," *Feminist Studies*, 4 (June 1978), 101-26; Barbara Welter, "The Cult of True Womanhood, 1820-1860," *American Quarterly*, 18 (Summer 1966), 151-74.

¹¹ On environmental history as an ecodrama, see Timothy Weiskel, "Agents of Empire: Steps toward an Ecology of Imperialism," *Environmental Review*, 11 (Winter 1987), 275-88.