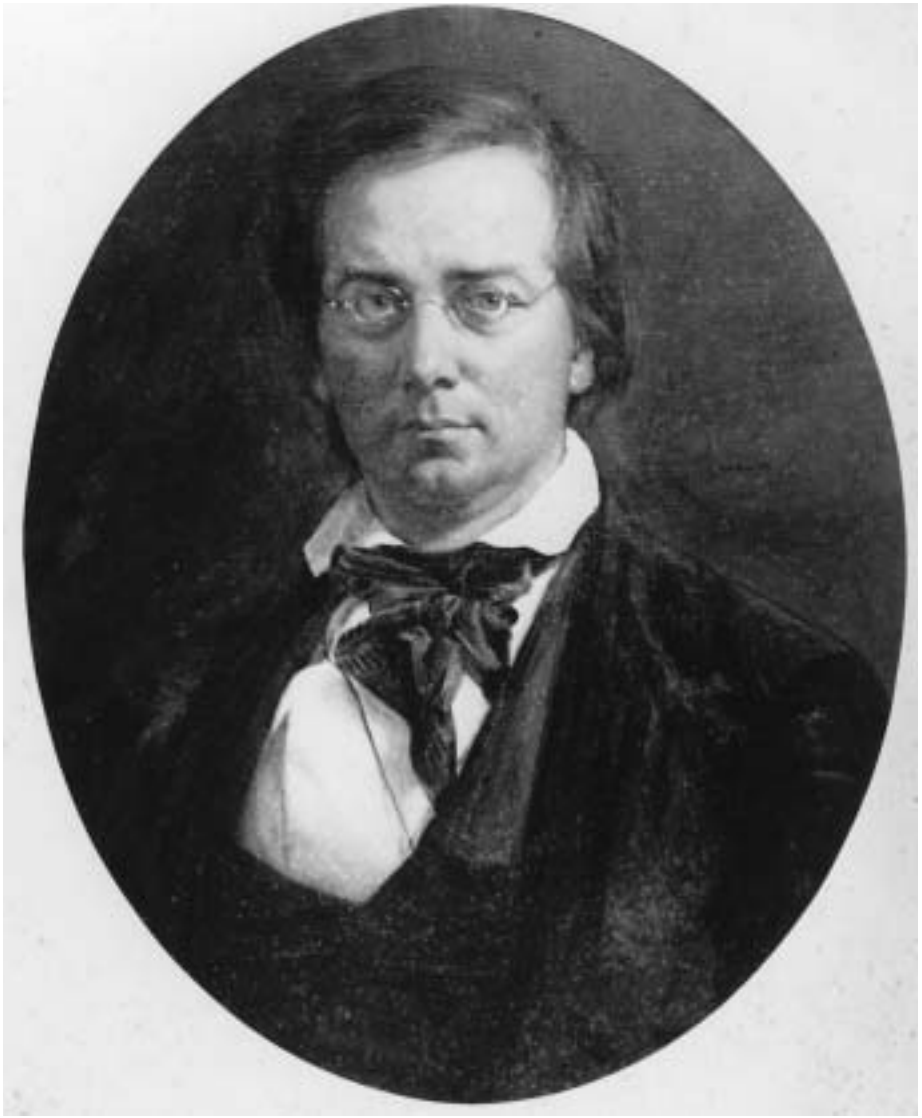
This paper was the banquet presentation at the conference Making Environmental History Relevant in the 21st Century, a joint meeting of the Forest History Society and the American Society for Environmental History in March 2001. The author's George Perkins Marsh, Prophet of Conservation, *was published in the University of Washington Press's Weyerhaeuser Environmental series in 2000.*

MARSH'S *MAN AND NATURE* IN THE 21ST CENTURY

BY DAVID LOWENTHAL

Man and Nature is a title that crosses time: Marsh's 1864 classic speaks to our own environmental angst. Forests engrossed Marsh first and last; "forest-born," he held that few people had "as good a claim to personality as a respectable oak."[1] *Man and Nature*'s key chapter is "The Woods," whose loss had triggered far-reaching global impacts. "The too general felling of the woods," he sums up, is "the most destructive among the many causes of the physical deterioration of the earth."[2] Rapid runoff and soil loss from forest clearance were for Marsh man's worst wound to nature, forest renewal the prime remedy.

Yet his title proved troublesome. It was a problem at the outset because Marsh's publishers feared "Man and Nature" too vague to make its point; the phrase seemed metaphysical, not material. Hence the second edition reversed title and subtitle. Less memorably crisp, "The Earth as Modified by Human Action" was candidly down-to-earth. All through life Marsh stressed his "earthy, material" "mudpile" bent.[3]



BILLINGS FAMILY ARCHIVES, WOODSTOCK, VERMONT

George Perkins Marsh, conservationist and author of the 1864 Man and Nature, or, Physical Geography as Modified by Human Action. *An acclaimed linguist, lawyer, congressman, and diplomat, he served 25 years as U.S. envoy to Turkey and then to Italy. He helped found and guide the Smithsonian Institution.*

"Man and Nature" today poses a different problem, one unseen even when Harvard reissued the book in 1965. But soon afterwards, feminism began to proscribe the inclusive use of "man"; "human" or "humankind" became de rigueur. Environmental like other history today bends to the vogue for salving our forebears' linguistic sins. It was hard for the publisher of my new biography to allow "man" in the generic sense Marsh meant. Harder still to leave nature as "her": despite Marsh's deference to nature's needs, he saw man as being "above" and "conquering" "her."

The modern vogue for regendering man and nature barely scratches the surface of awkward lexical change. The long century since Marsh has seen nature not only neutered and idolized but nationalized, politicized, economized, not to forget poisoned, purified, and cloned. The myriad meanings of nature explicated by Raymond Williams[4] continue to metastasize. And if like Marsh's publishers we seek a down-to-earth proxy, we fare no better with "environment" or "landscape," both of which today are as messily multiform as "nature".

MARSH'S PIONEERING ENVIRONMENTAL HISTORY

Our convenors' aim—an environmental history to inform public policy—was also Marsh's: he termed it "important to the interests of the American people to show the evils resulting from too much clearing and cultivation, and often so-called improvements."[5] His method was historical: chronicling Old World environmental follies and nascent reforms, he cited past events to explain present conditions. *Man and Nature* was the first historical glimpse of human global impact.

Before Marsh, human agency was muffled by biblical prophecy or dominated by terrain and climate. Man's link to nature was foreordained: for certain doom, as 17th century divines said; or for predestined progress, as 18th century philosophes held. Marsh scrapped airy prejudgment for attested fact: he showed that human impress had differed with locale, intensified over time, reflected myriad diverse causes and choices. *Man and Nature* chronicles manifold effects—beneficial *and* harmful, intended *and* unsought, deliberate *and* heedless, immediate *and* remote, foreseeable *and* incalculable, varying with time-scale, technology, and social condition. Human agency was also morally imbued. Free-willed men *ought* to steward nature: they were answerable for any damage they did, whether from ignorant zeal or insensate greed.

Thus began environmental history as now seen. Well-informed on tree growth and riparian regimes, soil absorption and erosion, Marsh deployed natural science to explain plant and animal history, resource use, and land cover change. He reviewed dune control and watershed management, irrigation and empolderment, domestication and desertification, from the Alps to Appalachia, the Sahara to the Great Salt Lake, the Roman Campagna to the Mississippi, Midwestern prairies to the Po plain.

His chronicles blend data from things and from words— mountains and manuscripts, topography and toponymy. Why had Old-Norse no name for sand dunes? Because "only since the comparatively recent destruction of the forests of Jutland [had] the shifting coast-downs excited any interest as a source of danger to the cultivated soil."[6] Like Darwin, Marsh devised an archaeology of knowledge long before Foucault coined the phrase. But where Darwin built evolution from fossil beings and reproductive processes, Marsh derived ecology from fossil language, artifacts, and landforms. Darwin rewrote biological history as life science; Marsh fused environmental with human events in a history combining man and nature.

For instance, ancient brickwork in Rome pointed to fuel scarcity owing to deforestation:

> *The oldest bricks are very thin, and very thoroughly burnt. A few generations later the bricks were thicker and less well burnt. In the [late Empire] the bricks were still thicker, and generally soft-burnt. This is due to the abundance and cheapness of fuel in earlier, and its growing scarceness and dearness in later, ages. When wood cost little, constructors could afford to burn their brick thoroughly; but as the price of fire-wood advanced, they were able to consume less wood in brick-kilns, and the quality and quantity of brick used in building were gradually reversed in proportion.*

Linguistic history confirmed deforestation: many ancient Italian towns bore tree-names like *abete*, *àcero*, *càrpino*, *castagno*, *fàggio*, *fràssina*, *noce*, *pino*, *quèrcia*. But by Marsh's time these towns were devoid of forest—and also of their former prosperity. Owing in part to geological causes, but largely to "man's ignorant disregard of the laws of nature" and attendant "tyranny and misrule, . . . the fairest and fruitfulest provinces of the Roman Empire" were now exhausted, decrepit, infertile, barren.[7]

THE PREHISTORY OF ENVIRONMENTAL HISTORY

Marsh's precursors were of course not blind to man's links with nature. Indeed, natural history mirrored human history, the book of nature echoed the annals of mankind. The earth gave food and shelter, sanctuary and spirit. The reciprocal effects of locale and life had long intrigued historians, who invoked landscape and terrain, climate and soils, to explain why peoples differed. In Western thought, dominion over nature was divinely decreed and spurred by Enlightenment science. To environmental determinists nature was mankind's master, to apostles of progress mankind's servant. But both stressed the two realms' disparities and scanted their parallels. Nature was mundane and mindless, humans alone fashioned in God's sublime image. This chasm made it clear to most, with Cambridge Regius professor Charles Kingsley, that "history is the history of men and women, and of nothing else."[8]

Later seers tried to tailor human history to supposed laws of nature. Marx and Hegel likened social progress to the growth of living organisms. Toynbee and Eliade equated the rise and fall of social orders to fixed planetary orbits; economists ascribed fluctuations of boom and bust, even war and peace, to sunspot cycles.[9] But such analogies are too simplistic to explain complex and contingent history. Historians rightly dismiss metanarratives that account for the cosmos but collapse at every aberrant event. They also mistrust environmentalism, both the old determinism that makes society a pawn of all-powerful nature, and the new primitivism that fears to upset nature's fragile harmony. Environmental history has pretty well outgrown such shibboleths.

Human history is still unique within the vast saga of nature. The changes and stases of mankind's brief annals conform little with the longer-range shifts and rhythms of global and stellar time-spans. Consciousness, imagery, and communications unexampled in the biosphere make human history singular and human impact formidable. Memory and intent, awareness of death and of former and future lives, uniquely enrich our annals with hindsight and foresight. In sum, brief recency, transcendent awareness, and archival cumulation set human history apart.[10]

GROWING CONVERGENCE OF SCIENCE AND HISTORY

This caveat aside, the current melting-pot of environmental history and earth science promises a feast of novel insights. While historians learn to grapple with environmental science, biologists and geologists perforce turn historical. Gone are yesterday's equilibria and enduring climaxes, Frederic Clements's and Howard Odum's stable states deranged only by remote and rare events or by human interference. In their stead is a nature buffeted by episodic uncertainties, whose dating and outcomes demand historical appraisal in ways familiar to human annalists. In tracing what has happened on earth, even in galactic space, scientists study vestiges of historical events—volcanic eruptions, meteor impacts, earthquakes, tsunami, fire, shifts of climate and ocean currents—much as prehistorians and archaeologists do.

The more we learn of natural and human histories, the more evident their fusion becomes. No history of forests or fire can ignore human impact; a merely natural saga of domestication or of epidemics would be a contradiction in terms. A true overview of any locale requires integrated chronicles of rocks and soils, plants and animals, early tribal and later national peoples—histories not segmented by separate disciplines, as before, but synthesized in commingled narratives.

Also being bridged is the traditional temporal chasm between natural and human history. To be sure, farming and industry vastly magnified human impact, but it is now common knowledge that hunters and gatherers were no strangers to ecological debacle. Prehistory grades with little break into history proper. Processes operating over many millennia—like the conversion of Australian forest into grassland and desert by Aboriginal fire—are seen to act in tandem with far swifter disruptions—such as the extirpation of major fauna by precolumbian North American hunters. Meanwhile, cosmic aberrations beyond mankind's present control episodically impact both natural and human history.

The refutation of Clements's ecological paradigm, Mart Stewart's "splendid consensus" of the 1960s and 1970s, deprives us of what seemed a sure model of nature.[11] But the collapse of old certitudes is, in my view, not dismaying but liberating. The unknown is no longer shunned but embraced. For example, consider attitudes toward irreversibility. Conservation dogma once enjoined doing nothing that could not be undone. This stultifying mandate applied alike to nature, to buildings, and to works of art. But now we realize that reversibility is a chimera: nothing can ever be wholly undone, both culture and nature run in the one-way stream of time. To come to terms with time's arrow is more fruitful, as well as wiser, than to yearn for untenable reversion. Landscapes are better relished as living ephemera than as dioramas fixed in amber.[12]

MODERN RELEVANCE OF *MAN AND NATURE*

Marsh's *Man and Nature* presages many modern insights in environmental history. Here I discuss three: ecological ignorance always outpaces knowledge; small is potent; human might forever alters the earth.

Ignorance

What made the everyday world so bizarrely baffling? The issue piqued Marsh in an 1847 lecture at Harvard, even as he urged Congress to secure science in the new Smithsonian Institution.[13] Some quirk revealed the remote in nature while obscuring the near; scholars could "decompose the sunbeam" but were unable "to weigh a scruple":

> *The astronomer can predict with unerring precision the courses of the stars in all past and all coming time, yet no seer can tell whether favorable or adverse breezes will impel the ship that this day ventures forth upon the uncertain deep. . . . We know the place, the dimensions, the specific gravity of the remotest planets, but the observations of six thousand years have added nothing to our knowledge of the irregularities of our own seasons.*

Science had dispelled fears of planetary collision, but left earthquakes and volcanic eruptions in fearsome limbo.

In short, the closer one peered, the less constant nature looked. "Disturbing causes, infinite in number, and various in operation," undermined every presumed regularity and subverted general laws. "Led to expect uniformity, we are embarrassed and confounded with variety."[14] So too with the interplay of slope and sediment, water and soils, predator and prey, in every spot on earth. "The equation of animal and vegetable life is too complicated a problem for human intelligence to solve," he added in *Man and Nature*. Hence the environmental future could never be foretold.[15]

Least knowable was the effect of human agency. "We can never know how wide a circle of disturbance we produce in nature when we throw the smallest pebble into the ocean of organic life."16 And as we are ever able to hurl more and bigger pebbles we keep outstripping our calculus of their impact. This insight has even greater resonance today, notes William Meyer, now that "the secondary, distant, and surprising effects of which Marsh spoke have become commonplace." More alert to the invisible and the unexpected, we are less bemused than Marsh by nature's inconstancy.[17] But we have not adopted his resultant ecological humility. Marsh came to terms with nature's "baffling complexity, its inherent unpredictability, its daily turbulence";[18] many who followed forgot his humbling cautions.

Small is potent

All levels of being, from tiny to huge, shape ecological outcomes. Undue heed to what is big or prominent blinds men to causal links and nuances. Darwin saw how incremental deviations over millions of years transformed living forms beyond recognition; Marsh stressed the cumulative impact of myriad tiny beings, the aggregate weight of the least of human agencies. "We habitually regard the whale and the elephant as essentially large and therefore important creatures," but rock layers owe little to their bones, whereas diatoms and other microscopic creatures

make up strata thousands of feet thick over much of the earth. *De minimis non curat lex*, "the law does not concern itself with trifles," was a good legal maxim but a poor guide to environmental history.[19]

Like accretions of organic decay, human impacts multiply step by step to staggering effect. Thus erosion escalated by clearing and cultivating might at length thicken the earth's crust beneath deltas and estuaries, and so shift the global center of gravity. Such a process might be unquantifiable, its end result obscure. But "we are never justified in assuming a force to be insignificant because its measure is unknown, or even because no physical effect can now be traced to it."[20]

This point is amplified in *Man and Nature*'s last (1884) edition. "Cosmic forces of little comparative energy may, by long continued or often repeated action, produce sensible effects of great magnitude . . . as the sum of an almost infinite number of infinitesimal impulses." Ordnance discharge might "accelerate or retard the rotation of the earth, or even . . . deviate the earth itself from her orbit." Every deed may leave a physical imprint that science could in time reveal, and future mathematics might "calculate even these small cosmical results of human action."[21] Such a calculus could be crucial to mankind's welfare; carefully harnessed technologies might shape a well-husbanded, reforested world. Plainly salient in the context of global warming, Marsh's prevision "is still ahead of its time."[22]

Man's powers for good and ill

The dark menace, yet also the bright promise, of culture's impress on nature was Marsh's most profound insight. Conventional Western wisdom had rated human influence either benign or negligible. Nature was designed by an omnipotent Creator who gave mankind dominion and bade him subdue and cultivate an earth thus rendered ever more fruitful. Marsh exposed this saga of certain progress as delusive. Mankind had fouled as well as fructified the earth. *Man and Nature* limned enrichment less than ruin—ruin made worse by every technologic gain. If undisturbed by man, terrain and soils, flora and fauna were in the short term nearly "constant and immutable." But man's "self-conscious and intelligent will aiming as often at secondary and remote as at immediate objects" shattered nature's quasi-balance. Humans were unique among predators in the magnitude and purpose of their impact. "Wild animals have [n]ever destroyed the smallest forest, extirpated any organic species, or [caused] any permanent terrestrial change." By contrast, "man pursues his victims [un]limited by the cravings of appetite, [and] unsparingly persecutes, even to extirpation, thousands of organic forms which he cannot consume."

Human damage was swift, pervasive, and enduring; "the wounds . . . are not healed until he withdraws the arm that gave the blow." And often not for years to come, perhaps forever. On land cleared fifty years before in Marsh's native Vermont, springs still dried up, rivulets dwindled, as unchecked runoff depleted aquifers; fire-charred Mount Tom might need centuries to form "a stratum of soil thick enough to support a full-grown forest." Against such assaults nature is largely helpless. Species wiped out are never reborn. Woodlands cleared may never recover. "When the forest is gone, the great reservoir of moisture stored up in its vegetable mould is evaporated, and returns only in deluges of rain to wash away the parched dust."[23]

Here and there men replant forests, stem inundations, drain swamps, vegetate dunes; but stewardship is rare. Instead, neglect and greed lay waste the world.

> *[In] parts of Asia Minor, of Northern Africa, of Greece, and even of Alpine Europe, . . . the operation of causes set in action by man has brought the face of the earth to a desolation almost as complete as that of the moon . . . The earth is fast becoming an unfit home for its noblest inhabitant, and another era of equal human crime and human improvidence . . . would reduce it to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the depravation, barbarism, and perhaps even extinction of the species.*[24]

Even more than Marsh we now see how malign and enduring our impingement often is. Aghast at the havoc, some idealize nature free of human sway. The dream is futile. We can amend our impact but cannot curtail its intensity. Our impress on nature will be ever greater—and graver.

To Marsh, giving up dominion over nature would have meant regression from science's clear benefits to primeval hunger, fear, and superstition. Reform entailed not ceasing to impact nature but taking care in doing so. Growing human might demanded not relaxing but ordering a more intense manipulation. Damage wrought by human agency might be repaired only by human agency. No less than Marsh, we inhabit a world indelibly marked by being managed.

FUTURE OF ENVIRONMENTAL HISTORY

Whether bettered or botched, man and nature in the 21st century will become more entwined. So will their histories: new ecological dilemmas will make it imperative to know how man and nature shaped one another in the past. Not only resource managers but the concerned public will need awareness of environmental history. Let us hope our numbers and training meet the need.

Barring global catastrophe, growing technical nous portends a nature ever more manmade, both for good and for ill. How far the earth becomes garden or dunghill depends partly on attitude, partly on action; but the imprint of human agency will be ever more manifest, persistent, and inescapable. Of course no locale is ever solely manmade—or wholly wild. But human impress will augment even where we most closely copy nature. As in restoration forestry, we will refashion the earth neither as it was nor as it would have been but for us, but as a creative mix of natural *and* human rhythms *and* disturbance regimes.

How will we gauge our hybrid scenes? "Sight is a faculty, seeing, an art," wrote Marsh; "in general the eye sees only what it seeks." To see nature in full was, he felt, "the power most important to cultivate [yet] hardest to acquire."[25] We as his heirs are both more and less alert. Eagerness to see has surged in America since the 1960s. This reflects public concern in issues from NIMBY to nuclear, stoked by media-hyped alarm, by rising personal wealth, and, as Sam Hays has shown, by a shift from valuing land as provider not only of material goods—timber, food, fuel—but also of intangibles—health, recreation, beauty, sense of place.[26] The spread of tourism presages a similar global shift. As in forestry, "sustained yield" and "multiple

use" will cease to denote extractive drain and come to encode ecological sense.

New visual habits at once enlarge and cramp environmental awareness. Some schooled by the screen then learn to look around. In the 1960s, the dominance of print culture atrophied my landscape architect students' vision. They knew how to design specific sites, but could not relate their gardenesque jewels to a broader milieu. Today not only designers but anthropologists and litterateurs exalt "landscape" as a visual metaphor for in-depth discernment.

The downside is that visual media diffuse worldwide images ever more alike. As difference and variety dwindle, local and regional settings become more similar, less worthy of note. And the spread of pictures demeans the felt milieu; when surfing the Internet is so easy, why endure actual waves? Copies, duplicates, and cults of the virtual devalue the tangibly unique. Artifact and scene are sundered from locale, experience confined to displays of simulacra. No longer within a place, subject to vagaries of climate and terrain, the interactive viewer becomes a topological gamester. Digital artifice deletes environment.

MARSH AS MODERN MENTOR?

I am often asked what Marsh would do today. How would he judge our environmental views and acts? The query is highly American—it never comes up in the Old World. In one sense it is naively ahistorical: how could a 19th-century mind fathom our modern plight? In another it is devoutly hopeful: might musing on a forebear's ideas enhance our own? Noting how recall of Abraham Lincoln has changed, Barry Schwartz shows that such questions—often posed to Lincoln buffs—transcend the issue at hand: seeking wisdom from a past mentor helps to free us from the our own immediate mental confines.[27]

But another era's lessons, however salutary, cannot simply be recycled. Marsh's views stem from a world whose memories and mind-set, habits and hopes were profoundly unlike ours. They made sense in terms of their own time, not our time. But in reviewing his concerns we may see better how we relate to our own world and begin to bridge the gulf between the landscapes we have and those we need. So I end with Marsh's take on stewardship, in his day an ideal seldom preached, in ours more preached than practiced.

STEWARDSHIP THEN AND NOW

The root concern of Man and Nature was the welfare of future generations. "Man has too long forgotten," thundered Marsh, "that the world was given to him for usufruct alone, not for consumption, still less for profligate waste." Not for our own but for our offspring's sake we need to mend our prodigal and thriftless ways, "thus fulfilling the command of religion and of practical wisdom, to use this world as not abusing it."[28] Above all this required restoring forested terrain. "The preservation of existing woods, and the far more costly extension of them where they have been unduly reduced, are among the most obvious of the duties which this age owes to those that are to come." Such action Marsh felt "especially incumbent upon Americans" deeply indebted to pioneer forebears' "toils and sacrifices"—a debt repayable only "by a like self-forgetting care for the moral and material interests of our own posterity."[29]

But could Americans who heeded the past so little learn to steward the future? A restless mobility severed them from home, from forebears, and from tradition. "It is rare that a middle-aged American dies in the house where he was born, or an old man even in that which he has built," lamented Marsh. "This life of incessant flitting is unfavorable for the execution of permanent improvements." Because "the longest life [of any individual owner] hardly embraces the seedtime and the harvest of a forest, the value of its timber will not return the capital expended and the interest accrued" for many generations. "It requires a very generous spirit in a landholder to plant a wood on a farm he expects to sell, or which he knows will pass out of the hands of his descendants."

So "the planter of a wood must be actuated by higher motives than those of an investment"—the future wellbeing of the wider community. And aiding the future would benefit the present too; securing "an approximately fixed ratio" among woodland, pasture, and arable would reduce the "restlessness" and "instability" Marsh saw as major defects of American life. For "the very fact of having begun a plantation would attach the proprietor more strongly to the soil for which he had made such a sacrifice."[30]

Marsh initially trusted "enlightened self interest, for which [Americans] are remarkable, [to] introduce the reforms, check the abuses, and preserve us from an increase of [the] evils" of gutting the woods.[31] Unlike Old World serfs, American yeomen owned the land they tilled and could hope to profit from their own improvements. But the growth of unprincipled corporate monopoly dimmed Marsh's faith in both enlightened self-interest and "the diffusion of general intelligence," and he deleted this hopeful line from later editions of *Man and Nature*. Abuse of nature could be curbed, resources protected, the common weal served, only by public ownership or control. Over-government also risked abuse by officials. "But the corruption thus engendered, foul as it is, does not strike so deep as the rottenness of private corporations." Unless "the sacred right of every man to do what he will with his own" were rescinded, disaster loomed.[32]

As with woods,[33] so with waters; Marsh insisted on public ownership in a 1874 irrigation report to Congress. Private control led to "vested rights and monopolies liable to great abuse." The huge capital outlay needed for irrigation squeezed out small landholders, leaving only hired laborers lacking any "proprietary interest in the land they till." In Italy, where Marsh was then American envoy, irrigation had long since eliminated the rural middle class. The moral as well as the physical future of America meant not just protecting but actively favoring smallholders. Social and economic equity in the arid West required declaring "all lakes, rivers, and natural water-courses the inalienable property of the State." Long-term water-rights concessions must also be prohibited, lest changing environments or needs render such concessions injurious to future public interests.[34]

"The sacred right of every man to do what he will with his own" has scarcely abated since Marsh's day. Land-use constraints have made marginal gains where environmental health is at risk, but private property in general remains sacrosanct. Economists preach intergenerational equity but seldom apply it. Legislators pay ritual deference to their grandchildren but act like the senator of a century ago, when implored to consider posterity: "Posterity? What's posterity done for me?"

Some deny any need to forgo immediate benefits for the sake of a probably more competent and fortunate future. One renowned economist scorns "the imposition of any burdens on people alive today . . . in order to add a few percentage points to the incomes of their far richer descendants" a century on.[35] Solutions to shortages and environmental perils that now menace may indeed emerge. But this misses Marsh's further point: concern for future welfare is vital to present interests. Acts of communal care that bind present to past and future enrich us by extending meaning and enlarging purpose beyond our shallow single lifespan.[36]

Stewardship is not innate; it must be induced and cherished. In postindustrial society, recurrent imminent crises, corporate avarice, frayed community ties, the democratic process itself impose a tyranny of the present inimical to future concern. The short-term immediacy that bedevils us today atrophies collective vision. Like the far-sighted builders of medieval cathedrals, American Founding Fathers had a lively sense of their enduring importance. They were "painting for eternity," so they had to be sure to get things right.[37] To instill a like sense of purpose we need our own transcendent projects. We might tackle long-term threats like the byproducts of nuclear decay, lethal for maybe a million years. Indeed, dealing with these remote risks is vital if future generations are to inherit a viable planet.[38]

Environmental reform cannot, Marsh argued, be left to the experts. Unless wanted by society at large stewardship will be spurned as imposed tyranny. Hence he addressed Man and Nature "to the general intelligence of educated, observing, and thinking men." It made "no scientific pretensions and will have no value for scientific men"; he sought only to "interest some people who are willing to look upon nature with unlearned eyes."[39] He aimed to breach not just the bounds between the sciences but the walls that segregated academe from active life. He wanted "the world of the mind, like the world of politics," to become "a democratic republic."[40]

Populist breadth was a frontier American trait. Early American needs made "every man a dabbler in every knowledge," omnicompetent in all realms.[41] "The American scholar [was] not a recluse devoted to literary research, but one who lives and acts in the busy whirl of the great world, shares the anxieties and the hazards of commerce, the toils and the rivalries of the learned professions, or the fierce strife of contending political factions, or who is engaged perhaps in some industrial pursuit, and is oftener stunned with the clang of the forge and the hum of machinery, than refreshed by the voice of the Muses."[42]

Marsh himself was the supreme model. Lauding "this eminent man, who studied languages while he practiced law, who divided his time between business and politics, who wrote books and delivered lectures on literary subjects, and who investigated geographical problems while he elevated diplomacy," the Harvard geographer William Morris Davis a century ago strongly doubted that "advice on . . . national scientific problems can be as well given by intensive specialists of the modern school as by men of a wider experience, of whom Marsh was so admirable an example."[43]

In our yet more specialized present the need for generalists is greater still. Nowhere is the tyranny of expertise more obnoxious than in environmental affairs. When even lethal impacts can be detected only by arcane machines, it is the more urgent that ordinary citizens become broadly familiar with the forces that make and shape us. Only so armed can we responsibly use those forces and curb their risks. Rightly wary of flawed and fallible experts, amateurs must cope as best we can with environmental enigmas that we admit we can never fully fathom.[44]. □

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NOTES

1. George Perkins Marsh to Charles Eliot Norton, May 24, 1871, Norton Papers, Harvard University.
2. George Perkins Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action* [1864], ed. David Lowenthal (Cambridge, Mass.: Harvard University Press, 1965), 3, 189. Subsequent references and paginations to Man and Nature are to this edition unless otherwise specified.
3. Marsh to Harriet Preston, April 12, 1882, and to William Tecumseh Sherman, Feb. 27, 1872, both in Marsh Papers, University of Vermont (hereafter cited as UVM).
4. Raymond Williams, *Keywords: A Vocabulary of Culture and Society* (London: Fontana, 1976), 184–89.
5. Marsh to Secretary of State William H. Seward, July 7, 1864, U.S. Dept. of State, Papers Relating to Foreign Affairs: Italy: Diplomatic Despatch no. 72, National Archives.
6. *Man and Nature*, 412n42, 414–15; *George Perkins Marsh, A Dictionary of English Etymology, by Hensleigh Wedgwood, Vol. I (A—D), with Notes and Additions* (New York, 1862), 237.
7. Marsh, *The Earth as Modified by Human Action*: A New Edition of Man and Nature (New York, 1874), 320n; *Man and Nature*, 10.
8. Charles Kingsley, The Limits of Exact Science as Applied to History: An Inaugural Lecture. Delivered before the University of Cambridge (Cambridge, England, 1860), 4.
9. Paul A. Roth and Thomas A. Ryckman, "Chaos, Clio, and Scientistic Illusions of Understanding," *History & Theory* 34 (1995): 30–44.
10. David Lowenthal, "Environmental History: From Genesis to Apocalypse," *History Today* 51:4 (April 2001): 36–42.
11. Mart A. Stewart, "Environmental History: Profile of a Developing Field," *The History Teacher* 31 (1998): 351–68 at 356–57.
12. See David Lowenthal, "Environment as Heritage," in *Culture, Landscape and the Environment: The Linacre Lectures 1997*, ed. Kate Flint and Howard Morphy (Oxford: Oxford University Press, 2000), 197–217 at 209–10.
13. George Perkins Marsh, *Speech on the Bill for Establishing the Smithsonian Institution, Delivered in the House of Representatives of the U. States, April 22, 1846* (Congressional Globe, 29 Cong. 1 Sess., App., 850–55).
14. George Perkins Marsh, *Human Knowledge: Discourse delivered before the Massachusetts Alpha of the Phi Beta Kappa Society, August 26, 1847* (Boston, 1847), 18–19, 22, 24.
15. *Man and Nature*, 91.
16. Ibid., 91–92. Marsh here referred to "the harmonies of nature," but he understood such harmonies to be relative, not absolute.
17. William B. Meyer, *Human Impact on the Earth* (New York: Cambridge University Press, 1996), 5–6.
18. Donald Worster, *The Wealth of Nature: Environmental History and the Ecological Imagination* (New York: Oxford University Press, 1993), 170.
19. *Man and Nature*, 111–12, 463–64.
20. Ibid., 464–65. Emily W. B. Russell, "Discovery of the Subtle," in *Humans as Components of Ecosystems*, ed. Mark J. McDonnell and Stewart T. A. Pickett, eds., *Humans as Components of Ecosystems: The Ecology of Subtle Human Effects and Population Areas* (New York: Springer Verlag, 1993), 81–90 at 81, 85, classes

Marsh's unknowns into (1) obvious activities with subtle effects (fossil fuels and pollution), (2) subtle activities with obvious effects (DDT and raptor numbers), (3) subtle activities with subtle effects (greenhouse gases and global climate change).

21. George Perkins Marsh, *The Earth as Modified by Human Action, a Last Revision of Man and Nature* (New York, 1884), 616–17n. Marsh here enlarges on Charles Babbage's *Ninth Bridgewater Treatise* (2d ed., London, 1838). See also George Perkins Marsh, "The Study of Nature," *Christian Examiner* 68 (1860): 41.
22. Wilbur R. Jacobs, "The Great Despoliation: Environmental Themes in American Frontier History," *Pacific Historical Review* 47 (1978): 1–26 at 15.
23. *Man and Nature*, 41, 37, 24n22, 235n180, 42.
24. Ibid., 42–43.
25. Ibid., 15.
26. Samuel P. Hays, *Explorations in Environmental History* (Pittsburgh, University of Pittsburgh Press, 1998), 44–45, 150–52, 176, 381–83.
27. Barry Schwartz, *Abraham Lincoln and the Forge of National Memory* (Chicago: University of Chicago Press, 2000), 306–9.
28. *Man and Nature*, 36, 13.
29. Ibid., 277.
30. Ibid., 280n250.
31. Ibid., 259. Marsh first broached this topic in his *Address delivered before the Agricultural Society of Rutland County, Sept. 30, 1847* (Rutland, Vermont, 1848), 17–19.
32. *Man and Nature*, 51–52n53, 201–2.
33. Even public ownership, Marsh feared, might not save American forests. "The Federal government . . . proved itself unable to protect the live-oak woods of Florida, and it more than once paid contractors a high price for timber stolen from its own forests" (*Man and Nature*, 202n138).
34. George Perkins Marsh, *Irrigation: Its Evils, the Remedies and the Compensations*, 43 Cong., 1 sess., Sen. Misc. Doc. 55 (Feb. 10, 1874), 15–17, 19. John Wesley Powell's *Report on the Lands of the Arid Region of the United States* (Washington, D.C., 1878), echoed Marsh's warnings and met similar resistance from land promoters (Donald Worster, *A River Running West: the Life of John Wesley Powell* (New York: Oxford University Press, 2001), 354–60.
35. Wilfred Beckerman, "Warming to Global Change," *The Times* [London], Dec. 11, 1997; see also his *Small Is Stupid* (London: Duckworth, 1995).
36. Emile Durkheim, *The Elementary Forms of Religious Life* [1912], transl. Karen E. Fields (New York: Free Press, 1995), 213–14, 351–52, 372, 379.
37. Quoted in Cynthia S. Jordan, "`Old words' in New Circumstances: Language and Readership in Post-Revolutionary America," *American Quarterly* 40 (1988): 491–513 at 501.
38. David Remnick, "Future Perfect," *New Yorker*, Oct. 20–27, 1997, pp. 210–18; Stewart Brand, *The Clock of the Long Now: Time and Responsibility* (London: Weidenfeld & Nicolson, 1999); Andrew Blowers, "Nuclear Waste and Landscapes of Risk," *Landscape Research* 24 (1999): 241–61; Paul R. Portney and John P. Weyant, *Discounting and Intergenerational Equity* (Washington, D.C: Resources for the Future, 1999).
39. Marsh to Charles Eliot Norton, October 17, 1863, UVM.
40. George Perkins Marsh, "Physical Science in Italy," *The Nation* 7 (1868): 420.
41. George Perkins Marsh, *Lectures on the English Language. First Series* (New York, 1861), 15–16.
42. Marsh, *Human Knowledge*, 4.
43. William Morris Davis, "Biographical Memoir of George Perkins Marsh 1801–1882," National Academy of Sciences, *Biographical Memoirs* 6 (1909): 71–80.
44. Brian Wynne, "May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide", in *Risk, Environment and Modernity: Towards a New Ecology*, ed. Scott Lash *et al*. (London: Sage, 1996), 44–83; Rolf Lidskog, "Scientific Evidence or Lay People's Experience? On Risk and Trust with Regard to Modern Environmental Threat," in *Risk in the Modern Age*, ed. Maurie J. Cohen (London: Macmillan, 2000), 196–224.

1.Experts estimate that in the 21st century we will go by rocket from New York to Tokyo in 30 minutes. We will be able to reach any point on the globe from any other point through tunnels deep in the earth. The prospect is adventurous and exciting. Itâ€™s possible that within the next two or three decades we will be riding in remote-controlled electronic cars. Trips through metropolitan areas will be made on quiet, swift buses travelling on separate express lines of city streets. Helicopters may carry whole buses loaded with passengers from point to point above city traffic. â€œFlying craneâ€ helic