Teaching Environmental History: Environmental Thinking and Practice in Europe, 1500 to the Present

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THE ECOLOGIST'S *WEB OF LIFE* serves as the guiding principle for teaching and learning in my course on environmental history.[1] Hence, our main task is to work at figuring out how everything we study is connected. From an imagined center of the web we move outward to explore two main areas of environmental history in the western European past: 1) the varied and shifting conceptions of nature, primarily since the Middle Ages, and 2) environmental change created by human endeavor and new technology. Our example of environmental change is the case of industrializing Britain and the impact of railways on the human and physical environments of England and Wales. In pursuing European conceptions of nature we move along two dimensions (Worster 1985; Merchant 1980). The imperialist or mechanistic view regards nature as a system of resources to be managed and exploited for human benefit; standing apart from the natural world, humans can exercise dominion over it. In striking contrast, the organic or holistic conception holds that humans are part of nature, one component of a complex whole. Rather than dominion over nature, organicism reflects a central concern with what today we call ecological balance, a prudent concern to maintain a desirable coexistence among humans, other organisms, and the inorganic components of the environment.

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In following both ideas and practice, the course asks students to think historically. Against the idea of history as a chronological sequence of events and dates—an idea students bring to the classroom—I ask students to learn five elements of good historical thinking. These comprise an understanding of 1) historical change and continuity, 2) the differences in outlook and assumptions held by people in the past as compared to us today, 3) the way the world looked to the people under study, 4) the variety of ways historians approach and interpret the past, and 5) the ways in which the past affects the present (and future). Thus, like the course, the chart that follows attempts to integrate both content and method, joining aspects of past environmental thought and practice with ways of analyzing them historically. In tabular summary, our agenda looks like this:

	Conceptions of Nature		**Practice**
	Imperialist / Mechanist	Organic	
Ancient World	Legalism of the Qin Empire (221 BC-207 BC)	Chinese Confucianism Indian Hinduism Greek holism: Pythagoras, Plato, & Aristotle	Qin Empire under the first emperor, Qin Shi Huangdi Greece Rome
Western Europe: Renaissance & 16th century	Christian anthropo-centrism: man the lord of all creation	Neo-Platonism, Vitalism, & Naturalism	
17th Century	Mechanist Natural Philosophy: Galileo, Francis Bacon, Descartes, Hobbes, Newton, Leibniz	Christian stewardship—man responsible for the welfare of God's creation	
18th Century	Enlightenment—the belief in a science of society; French materialists (e.g. Holbach); French Physiocrats; Adam Smith in Britain	Enlightenment—the secular virtue of compassion toward animals; nature as a source of moral & aesthetic inspiration; Rousseau; the naturalism of French landscape painters	Urbanization and early industrialization
19th Century	Victor Frankenstein as scientist; the ethos of industrial capitalism	Romanticism: Wordsworth; Mary Shelley; Darwin	British industrialization: an extended case study of the effect of new technology on the human and physical environment
20th Century		The Nazi religion of nature; the Gaia hypothesis; modern environmentalism	

Lessons of the Ancient World

To begin the journey, we pull on seven league boots to stride across time and space in the Ancient World, the better to understand how to tease out change from continuity—the new from the *déjà vu*—when we move into early modern Europe. Our guide here is J. Donald Hughes. His provocative book, *An Environmental History of the World*, provides classical benchmarks in environmental practice and ideas. A member of the declentionist school of environmental history, he tells the recurring story of ecological crisis through the ages. His accounts of ancient cities in Mesopotamia and the Sumerian example of Uruk—now in today's Iraq—illustrate the rise and fall of urban settlements that drew increasingly upon rural hinterlands to support population growth and increased production. In Uruk, the flourishing production of textiles, ceramics, and, later, copper and bronze metallurgy, required great supplies of wood for fuel, leading to deforestation, soil erosion, the salinization of ground water, ecological crisis, and socio-political failure. With variations, this is the pattern Hughes presents for the Nile Valley of ancient Egypt, the cities of Tikal in the Mayan Empire, Xiam in third-century (B.C.) China, classical Athens, and Imperial Rome as well as Renaissance Florence. Against these stories of rise and fall, he describes two notable exceptions: in the Pacific, the prudent Polynesians of Tahiti, Hawaii, and aboriginal New Zealand; and in South America, the successful Incans who managed their land exceptionally well until they were overcome by Spanish invaders led by Francisco Pizzaro (1476-1541). Here were two societies that maintained for long periods a balance between population and natural resources.

If antiquity provides ample cautionary tales, it nevertheless created a set of philosophical and ethical ideas that formed real and potential cultural constraints against the degradation of nature. In Hinduism for example, Hughes notes, that the belief in the "oneness" of nature and humanity, the reverence for cows and other animals, and the unequal access to resources embedded in the caste system, all served to encourage conservation (Hughes, 53-55). Against the imperial legalism of the Qin emperor, and the consequent over-exploitation of natural resources to expand imperial power, stood the sturdy ethics of Confucian tradition espousing conservation and harmony between humans and nature (68-73). In classical Greece, even though ecological stress and failure occurred, Pythagoras, Plato, and Aristotle referred to "oneness" in describing the cosmos as an organic whole, a largely living system in which humans and animals were both a part (54-55).

Continuity and Change in Early Modern Europe

Equipped with this background, we leap into early modern Europe and work our way forward deliberately, examining a succession of historical moments in environmental thought and practice. In Carolyn Merchant's treatment of organic thinking in the Renaissance, students encounter an intellectual world at once strange and familiar. Strange are Pico della Mirandola's notions of "world soul," "world spirit," and "world matter," Paracelsus's animistic unity of vital spirit and matter, and Giambattista della Porta's belief that the whole world is a living creature of male and female essences that unite by reason of their natural love. Familiar is the underlying theme of organic unity, the shared inheritance of the ancient, organic cosmologies of Hinduism, Confucianism, and the Greek thought of Pythagoras, Plato, and Aristotle.

Examining the strange and the familiar in Renaissance organicism takes us to the heart of the matter for historians, the study of historical change and continuity. Two books inform our investigation: Carolyn Merchant's *Death of Nature* and Keith Thomas's *Man and Natural World* (1983). In her provocative work, Merchant argues that organic views of nature—in full bloom during the late Middle Ages and Renaissance—were displaced in the sixteenth and seventeenth centuries by two potent forces: the rise of capitalism and modern, mechanistic science. As the tools and empowering beliefs of the new science were married to the profit motive of emerging capitalism, the result was a stronger will and greater capacity to exploit natural resources to a degree never seen before. Looking back from today, Merchant sees this not as a moment of great human creativity but as a turning point with tragic consequences,which we see today in ubiquitous environmental crisis. Although many students are surprised by the argument, they are—as Merchant intended—challenged by her socialist-feminist approach and find her interpretation of Francis Bacon, Descartes, Hobbes, Newton, and Leibniz—five mechanistic thinkers—to be rather compelling or at least intriguing. Class discussions heat up.

Differing Historical Interpretations

Assessing arguments and making interpretations, staple delights of intellectual life, are discomforting novelties for many undergraduates. To help them along, we next study Keith Thomas's *Man and Natural World*. Having found *The Death of Nature* rather persuasive, students need another perspective on change in early modern Europe to recognize the critical importance of evidence and interpretation in historical thinking

and writing. Thomas serves well as tutor and exemplar, for his interpretation of environmental thinking could scarcely be more different than Merchant's. In reading his book, students feel the ground shifting under foot as the historical world takes on very different features. It was during the sixteenth and early seventeenth centuries, he argues, that human feelings of superiority over the natural world reached a peak and then diminished in the two centuries that followed—the reverse of what Merchant described. From Elizabethan pulpits and religious tracts the belief resounded that God, having placed humans at the top of the chain of being, had made the natural world for human use. In sixteenth and early seventeenth centuries, such beliefs were reflected in everyday practices deemed normal: the indifferent and cruel treatment of animals. That this historic belief and practice offend our sensibilities is a measure of the cultural distance our civilization has traveled since then. The past in many respects, *is* a foreign country.

Then Thomas leads us forward in time, recounting a more comforting story of improvement and progress. A first step in that direction came in the late seventeenth century when theologians and writers reinterpreted Biblical texts to construct and preach the principle of Christian stewardship. Just as God put humans at the summit of this earthly world, so He charged mankind with caring for all His creation, as the good shepherd cares for his flock. Cruelty to animals was therefore sinful.

By the mid-eighteenth-century, a new secular ethic formed from Benthamite utilitarianism, and the ideal of human compassion extended moral status to animals and carried its adherents into the realm of modern sensibility. Troubled by the grim aspects of urbanization, writers and readers found renewed pleasure and solace in the natural world of open countryside, craggy waterfalls, and charming meadows. At the same time, the middle classes were drawn to embracing the secular sentiment of compassion as the essence of virtue. They also absorbed the utilitarian principle that reducing pain in the world was their utmost moral obligation. It followed that animals, clearly sensate beings and not just insensible brutes, ought to be treated *humanely*. Although not without restraint or dilemma, Thomas concludes that progress was underway as this modern sensibility toward animals and nature emerged.

Assessing Merchant and Thomas

A paper assignment comes next. This requires a comparative assessment of Merchant and Thomas, so it gets students thinking hard about argument, evidence, and evaluation. To help them prepare I suggest they consider two alternatives: "retrospective" and "prospective" historical

thinking. Merchant's *Death of Nature* is retrospective in this sense: she is centrally concerned with finding and recounting the origins of our contemporary environmental crisis. Looking back, she sets out to discover when and how our current troubles began. Thomas, too, has his eye on the present as he leads us to see how and when the sensibility underlying modern environmentalism came into being. But if both authors are in some ways concerned with "origins," how do they differ? To arrive at an answer, I describe "prospective" historical thinking. The task is to imagine how the world appeared to the people of the European past whom we are studying. How did the natural world look to Galileo (1564 -1642), Francis Bacon (1561-1626), or Descartes (1596-1650)? One hundred fifty years later, how did it appear to a middle-class observer who was exploring the wildlife in the English county of Kent? However much my philosopher colleagues may shudder at what they regard as an epistemological fantasy, such questions are the stock-in-trade of good historians. Empathy focuses the imagination and helps energize and extend imagination and moral sensibilities to people and places beyond our own immediate experience. To reach a prospective understanding of the past requires imagination and practice. We have to try to walk a mile in the shoes of Paracelsus, Francis Bacon, René Descartes, Jean-Jacques Rousseau, or Mary Shelley—to name a few.

With my preferences now out in the open, I hasten to remind students that retrospective historical thinking is useful as well. An interest in discovering how the present came about helps historians frame good questions. What historical developments did contribute to current environmental problems and thinking? Similarly, the framing of historical questions in the light of current theory is another way of opening the past to fruitful investigation. With Merchant, the blending of a socialist-feminist theoretical stance with a concern to get at the root cause of environmental degradation makes for stimulating reading to be sure. It is an account of the coincident emergence of capitalist exploitation of natural resources and the strengthened belief in the human capacity to understand and control nature.

Because any approach has its pitfalls, the challenge—I continue—is to recognize and weigh each one that we encounter. Retrospective accounts, for example, carry the risk of making anachronistic judgments and, more generally, of reading the present into the past. Consider the case of Francis Bacon, the greater promoter of inductive science. Merchant's portrait of him is severe. Singling him out for harsh treatment, she finds in his writings language that nowadays bespeaks "anti-feminist" assumptions and attitudes. In making his case for the new science he drew on the traditional association of nature as female and argued by analogy that just

as it was necessary to bring disorderly women under control during a turbulent time, so it was important to harness the forces of nature. Like women, nature hid her secrets; like men, according to Bacon, science could penetrate the hidden secrets and achieve dominion over nature. In response to this feminist reading, what else could one say? Bacon, after all, was a promoter; he wrote to persuade. What came to mind when he sat down to write? Who was he writing for? Of what did he want to convince them? In England around 1600, what did important people think of natural philosophy—that is, what we call science? Did Bacon believe that natural philosophers received the respect and rewards worthy of their learning and talent?

Consider one of Bacon's contemporaries, the poet John Donne (1572-1631). What can we make of these lines in his poem of 1611-12, *An Anatomie of the World: The First Anniversary*?[2]

> This man, so great, that all that is, is his.
> Oh what a trifle, and poor thing he is.
> …
> And the new Philosophy calls all in doubt,
> The Element of fire is quite put out;
> The Sun is lost, and th'earth, and no man's wit
> Can well direct him where to look for it.
> And freely men confess that this world's spent,
> When in the Planets, and the Firmament
> They seek so many new; they see that this
> Is crumbled out again to his Atomies.
> 'Tis all in pieces, all coherence gone;
> All just supply, and all Relation.

Donne, it seems, was not so easily persuaded by Bacon or anyone else that the "new Philosophy" was beneficial for mankind—far from it. Donne, moreover, was not a lone poetic voice rhyming in the wilderness. Among the educated classes, some shared his metaphysical angst while others regarded Copernican cosmology and the new philosophy skeptically. Others were simply indifferent. In the first decade of the seventeenth century, Bacon and others of like mind were few and far between. As for those belonging to the Establishment of the day, religion and politics mattered, not science. Theologians, men of the cloth, and men of law numbered among the worthy; "scribblers" like Bacon did not. As Roslynn Haynes reminds us, Bacon took up the pen to persuade the Establishment that their hostility or indifference to science was mistaken. (Haynes 1994). To meet this rhetorical challenge, Bacon chose language and flourishes to win over his intended readers. To be persuasive, he appealed both to their patriarchal prejudices and to their desire to appear

as the patrons of society's improvement. Attracting patrons for science, and prestige for its practitioners, were Bacon's conscious aims.

By placing Bacon in historical context, this alternate view brings us back to a prospective understanding of the past, the attempt to understand the thoughts and deeds of past men and women in terms of *their* assumptions, beliefs, and outlooks—not ours. With that in mind, we can ask whether and how well historians communicate an empathetic appreciation of the past. How well do they convey what was different or distinctive about the past? What point of view do they bring to the proceedings?

Several examples must suffice to make the point. The first one returns us to Keith Thomas and his discussion of Elizabethan England. Recoiling from the descriptions of animal cruelty and their religious justifications, students may be tempted to see further evidence of our superiority over a benighted past. But wait a minute, I say. Given the violence of two world wars and genocides in addition, how can we be so smug or confident? Imagine a time when animals were thought to feel no pain. No less than the great philosopher, René Descartes, held that animals were soulless brutes lacking sensate feelings.

As my promptings proceed, our prospective appreciation of difference and change continues. Having followed the transition from Christian stewardship to the emergence after 1740 of secular humanism, the granting of moral status to animals, and the utilitarian injunction to reduce their suffering in the world in England, we shift to France. In Jean-Jacques Rousseau (1712-1778), students discover someone more interesting than the author of the *Social Contract*, a work some have endured but not enjoyed. In excerpts from the *New Héloise* (1761) and *The Reveries of the Solitary Walker* (1776-78, pub. 1782), they discover a different Rousseau: the eloquent advocate for Nature, the botanist and solitary hiker who found inner peace and creative ideas in reveries inspired by gazing at clouds passing in the blue sky overhead. With Rousseau and the Enlightenment, we discuss the elevation of Nature and "the natural" to the lofty position of moral standard and guiding inspiration. We make connections between the organic cosmologies of the Renaissance and Rousseau's eighteenth-century ideal of harmony between man and nature. Undermined by corrupt institutions and narrowly rationalist science, that harmony, he argued, could nonetheless be restored when reason and naturally good sentiments worked in tandem, the head and the heart.

To see how a Rousseauian revaluation of nature was expressed in other ways and by other people of the era, we read parts of D. G. Charleton's *New Images of Nature in France* (1984). To engage his argument about the growing "naturalism" evident in French landscape painting, I present slides ranging from Nicolas Poussin (*Et in Arcadia Ego*, c 1640) to Hubert Robert (*Waterfall Near Roncilione,* c. 1780). This

helps bring Charlton's argument alive and introduces the use of visual images as historical documents in our study of environmental thinking and practice. The gardens at the Palace of Versailles reinforces the point about the growing embrace of natural landscapes by comparing the geometric regularity of its seventeenth-century esplanades and fountains with the constructed "natural" beauty of the late eighteenth-century "hamlet," with its pond, cottage, wild flowers, and random planting: an up-to-date Arcadia for a royal shepherdess and her attendants. At the end of my lecture, a few works by the English landscape painter, John Constable (1776-1837), illustrate how the "natural" harmony of well constructed landscapes was reaching a new intensity in England as well. [See <http://www.mtholyoke.edu/courses/rschwart/pastoral/pastoral.html> and <http://www.mtholyoke.edu/courses/rschwart/hist151f05/lectures/Lecture6_Enlightenment.htm>.]

In the eighteenth century, mechanism had its strong advocates as well. Inspired by the scientific achievements of Newton, confidence in establishing a science of society and discovering social laws was in ascendance. In France, for example, the *Physiocrats* proposed laws governing agrarian development. In Scotland, Adam Smith (1723-1790) expressed a similar vision of social science but articulated a different theory of economic development in his *Wealth of Nations* (1776). Underneath the chaotic interplay of everyday activity was the natural regularity of human passions and interests, an invisible hand that generated wealth and public good through competition and the division of labor—provided that constraints on natural interests by governmental control were removed. In short, *laissez-faire* capitalism was the natural route to national wealth. Beauty, thought Smith, resided in the underlying order of economic laws.[3]

Romantic writers and poets disagreed. As Rousseau before them, they saw in nature not resources to be exploited by selfish human interests but aesthetic beauty and a much needed source of moral inspiration. To see this, we discuss Wordsworth's "Tintern Abbey" and, time permitting, selections from Dorothy Wordsworth's *Grasmere Journal*. In comparing Smith to the Wordsworths, I take the devil's advocate position, typically defending hard-headed Smith against the sentimental Wordsworths.

Mechanism versus Romantic Organicism in Mary Shelley's Frankenstein

Lest male viewpoints dominate, we turn next to Mary Shelley's great novel to witness the struggle between scientific hubris and nature's moral guidance. By this point students are well prepared to read Shelley with fresh eyes, for they have become familiar with some of the intellectual

landmarks that Mary Shelley inserted into *Frankenstein*. The alchemical quest of Cornelius Agrippa (1486-1535) that so preoccupied Victor Frankenstein can be recalled from Merchant's discussion of Renaissance alchemy, natural magic, and Paracelsus. As we read the novel, students note echoes from other previous readings as well. New and interesting for them is the struggle in Victor's mind and heart between Bacon and Rousseau, between Promethean science and the harmony of humanity and nature that Rousseau eloquently espoused. Evident, too, is the new fascination of Shelley's generation with wild nature and the sublime. Previously encountered in Charlton's chapter 3 on "Wild Sublimity," these sentiments were powerfully expressed in Shelley's descriptions of glorious mountains and storms in the Alps. Victor's tragic experiment vindicates the visions of Rousseau and Wordsworth. By separating himself from the pleasures and virtuous feelings bestowed by verdant fields, spring flowers, and "the charms of nature," Victor loses his moral balance, forgets family and friends, and passes into the darkness of single-minded ambition and hubris. Only later does Victor realize his terrible error.

> The summer months passed while I was thus engaged, heart and soul, in one pursuit. It was a most beautiful season; never did the fields bestow a more plentiful harvest or the vines yield a more luxuriant vintage, but my eyes were insensible to the charms of nature.
>
> And the same feelings which made me neglect the scenes around me caused me also to forget those friends who were so many miles absent…but I could not tear my thoughts from my employment, loathsome in itself, but which had taken an irresistible hold of my imagination. I wished, as it were, to procrastinate all that related to my feelings of affection until the great object, which swallowed up every habit of my nature, should be completed. (Shelley 1818, 42)

Environmental Change: Industrialization, Railways, and Landscape in Victorian Britain

In part two of the course we go from the sublime valleys and mountains of Switzerland, we move to Britain to study industrialization, the rise of the steam-powered railway system, and their impact on the physical and human environment. In shifting subjects, we continue to follow the contest between mechanistic and organic views of nature, finding the continuing debate in the advocates and critics of capitalist industrialization. In *The Philosophy of Manufactures* (1835), Andrew Ure celebrated the progress he saw in industrializing Lancashire, suggesting how work-

ing people—not just factory owners—were benefiting from the great changes underway.

> Steam-engines furnish the means not only of their support but of their multiplication. They create a vast demand for fuel; and, while they lend their powerful arms to drain the pits and to raise the coals, they call into employment multitudes of miners, engineers, ship-builders, and sailors, and cause the construction of canals and railways: and, while they enable these rich fields of industry to be cultivated to the utmost, they leave thousands of fine arable fields free for the production of food to man, which must have been otherwise allotted to the food of horses.... Lancashire is the fertile and well-laboured soil in which the seed of factory knowledge will bring forth fruit one hundred fold....[4]

Traveling to see industrializing Manchester for himself, Alexis de Tocqueville captured with his typical astuteness the contrast of new wealth and technical advance with poverty and environmental degradation. (See note 4.) "A sort of black smoke covers the city. The sun seen through it is a disc without rays. Walking the streets he hears the "the crunching wheels of machinery, the shriek of steam from boilers, the regular beat of the looms, the heavy rumble of carts, those are the noises from which you can never escape in the somber half-light of these streets, He also hears "the gay shouts of people amusing themselves, or music heralding a holiday." All in all, the contradictions amazed him:

> From this foul drain the greatest stream of human industry flows out to fertilize the whole world. From this filthy sewer pure gold flows. Here humanity attains its most complete development and its most brutish; here civilization makes its miracles, and civilized man is turned back almost into a savage.

Ure's picture of progress and Tocqueville's evocation of awe and ambivalence found visual expression in J. M. W. Turner's 1844 painting *Rain, Steam, and Speed: The Great Western Railway* [http://www.j-m-w-turner.co.uk/artist/turner-rain-steam.htm]. The juxtaposition of the locomotive rushing toward the viewer in a haze of speed and mist, with a sail boat motionless in the river below, communicates the fascination and unease that the early railway age inspired. Turner's painting anticipated the iconic status that the locomotive and railway achieved as *the* symbols of the machine age, the engines of progress, and anxiety.

This ambivalence waned as the decades move on. As railways became a nearly ubiquitous feature in the everyday landscape, the fascination with the power of steam-driven trains spread. Claude Monet's 1877 painting of the St. Lazare railway station in Paris ("Gare St. Lazare")

serves as a notable artistic example that pays homage to the steam locomotive. More broadly, lesser known prints and paintings of railways and industrial landscapes prove equally revealing when we put good questions to these historical sources. What can we say about an artist's intended meaning? About the assumptions revealed in the images and composition? What objects are included in this painting? Which are in the foreground; which, in the background? What did the foregrounding intend to convey? What about color? What about the smoke rising from Monet's locomotives? Or from those factory chimneys? And so it goes as we work toward prospective understandings and check the anachronistic assumption that any industrial smoke was regarded in the past as pollution. In many images, we learn that smoke signified power and progress, not soot and pollution. [See http://www.mtholyoke.edu/courses/rschwart/ind_rev/images/images-ind-era.html]

From cultural history we move to historical social science. To connect ideas with environmental practice we take up tools of the historical geographer to explore change over time and space. Our principle tool is Geographic Information Systems, which combines computer-assisted cartography, geo-referenced data, and spatial analysis. Here I introduce the basics of GIS to students with no previous experience with the technology. In weekly labs they acquire and sharpen their GIS skills in exercises that lead to a major paper.

In addition to analytical mapping, preparation for the paper assignment comes from lectures and readings. For the environmental effects of British industrialization, we read James Winter's stimulating account, *Secure from Rash Assault: Sustaining the Victorian Environment* (1999). Winter asks that we re-think the belief that industrialization was an unrelieved assault on the human and physical environment. Looking back from the vast ecological changes of the twentieth century, he argues that the scale of environmental damage was more limited and more modest than is generally thought. His chapters on the sustenance of agriculture and forest are convincing; those on railway construction, mining, and the ecological demands of mushrooming cities raise questions about his general argument, making the book an excellent choice for teaching. As for railways, Wolfgang Schivelbusch's *The Railway Journey* (1980) is an excellent point of departure. In contrast to the retrospective argument by Winter, Schivelbusch proceeds prospectively, helping us to grasp the changing perceptions and experiences of contemporaries encountering the new world of railway travel and railway speed. In addition, we learn how cityscapes were reshaped to accommodate railway stations and train tracks. The reshaping of Paris is the paradigmatic example. Other works in historical geography and railway history,

together with primary sources ranging from worker autobiographies to data from the decennial census reports, complete the reading (see References and Bibliography).

Railways dominated the cultural and social landscape of Victorian Britain. They hastened the geographic restructuring of industrial and agrarian production, stimulated new forms of commerce and consumption, and accelerated cultural change. Rapid rail transport served to shrink space, connect remote areas to a central network, and extend the reach and speed of postal service, newspapers, and communications generally. It also marked the landscapes of country and town through the construction of rail lines and stations. In very different architectural styles, the great London stations of King's Cross and St. Pancreas celebrated the railway revolution. They also reorganized city space by pushing aside vast sections of poor neighborhoods, creating in and around them new hotels and shopping districts, and restructuring horse-drawn and tramway traffic to get increasing numbers of travelers to and from their rail platforms.

In the early years of the railway era, contemporaries were awestruck by the experience of speeding through the landscape at twentyfive miles per hours, two or three times faster than the swiftest horse drawn coach. Writing of his first train journey in 1830, the Reverend Edward Stanley recalled the elation he and his companions felt.

> No words can convey an adequate notion of the magnificence (cannot use a smaller word) of our progress. At first it was comparatively slow; but soon we felt that we were GOING, and then it was that every person to whom the conveyance was new, must have been sensible that the adaptation of locomotive power was establishing a fresh era in the state of society….
>
> The most intense curiosity and excitement prevailed…and…enormous masses of densely packed people lined the road, shouting and waving hats and handkerchiefs as we flew by them. What with the sight and sound of these cheering multitudes and the tremendous velocity with which we were borne past them, my spirits rose to true champagne height. [http://www.mtholyoke.edu/courses/rschwart/ind_rev/voices/stanley.html, from *Blackwoods Magazine,* November 1830]

As the years passed and the rail system spread rapidly across the landscape, many Victorians saw in the railroad the reflected image of the technical and moral progress they so cherished. Samuel Smiles is a notable example. A self-educated man, his many books celebrated the feats of civil and mechanical engineers, and the Victorian virtues their

stories embodied. Writing in 1859, he described the railway locomotive, one of their great feats, as nothing less than a moral force for good.

> The iron rail proved a magicians' road. The locomotive gave a new celerity to time. It virtually reduced England to a sixth of its size. It brought the country nearer to the town and the town to the country…. It energized punctuality, discipline, and attention; and proved a moral teacher by the influence of example. (Smiles 1859, 78.)

Not everyone shared such sentiments. Others thought some of the changes ushered in by the iron roads and soot-belching locomotives to be menacing. One troubled voice belonged to the great poet, William Wordsworth (1780-1850), who marshaled verse to protect nature. A year after being named Poet Laureate of England, he campaigned to stop the opening of a rail line from Kendall to Windermere, at the heart his beloved Lakes District. Dreading the inevitable influx of careless tourists and locomotive noise and soot, he denounced the scheme in a sonnet published in London's *The Morning Post*, on October 16, 1844.

> Is then no nook of English ground secure
> From rash assault? Schemes of retirement sown
> In youth, and 'mid the busy world kept pure
> As when their earliest flowers of hope were blown,
> Must perish;—how can they this blight endure?
> And must he too the ruthless change bemoan
> Who scorns a false utilitarian lure
> 'Mid his paternal fields at random thrown?
> Baffle the threat, bright Scene, from Orresthead
> Given to the pausing traveler's rapturous glance:
> Plead for thy peace, thou beautiful romance
> Of nature; and, if human hearts be dead,
> Speak, passing winds; ye torrents, with your strong
> And constant voice, protest against the wrong. [5]

As with the coming of the industrial age generally, so with the railway, Victorians reacted strongly to the transformation of their society and environment as it took place around them. But no matter how elegant the protest, the growth of the rail system only quickened its pace. The locomotive, powered by capitalism and skilled engineering, proved virtually unstoppable. Bacon would have cheered.

Taking up the cudgels where Wordsworth left off, John Ruskin (1819-1900) denounced the onslaught of rail construction in the countryside. The new railways "slashed like a knife though the delicate tissues of a settled rural civilization. They left their scars on park and copse; they

raised high walls of earth across the meadows….Your railroad mounds, vaster than the walls of Babylon, they brutally amputated every hill on their way" (Cited in Barnum 1950, 25). One likely object of Ruskin's jeremiad was the London to Birmingham rail line. Completed in 1837-38 by the engineer Robert Stephenson, it carved its way through some one-hundred miles of valleys and hills, pushing aside untold tons of earth here, tunneling there, and raising huge embankments elsewhere—in all, creating the scars on park and copse that Ruskin so deplored. Nonetheless, the public hailed Stephenson's achievement as fitting testimony to British engineering genius and "the cutting edge" of railway technology.

To make sense of opposing views, those of railway enthusiasts versus those of opponents such as Ruskin, we take a virtual journey to visualize Stephenson's accomplishment in three dimensions. In the later 1830s locomotives were novel and powerful but only powerful enough to pull a train of wagons across level ground. In Stephenson's plans for the London to Birmingham line, that meant limiting the average grade to one foot of rise for every three-hundred feet of length. With an army of strong backs, horses, hand tools, and wagons, Stephenson completed excavations, embankments, and tunnels of unprecedented scale in order to build a relatively level route through one-hundred miles of valleys and hills. To bring this epic feat alive, I use GIS and a digital terrain model, together with maps, graphs, and contemporary images. Map 1 shows the route of the London to Birmingham line on a three dimensional model of the terrain. The accompanying graph displays a profile of the natural elevations through which the rail bed had to be cut. At Tring, there was a huge cutting, two and one-half miles long and up to forty feet deep; at Wolverhampton, an equally imposing embankment led to a second cutting at Blisworth that was one and one-half miles long and up to sixty feet deep. Finally at Kilsby a long tunnel served to flatten out the roadway from Crick to Rugby.[6] The illustrator J.C. Bourne recorded these marvels in his *Drawings of the London & Birmingham Railway* (1838). Published within months of the railway's opening, and the handsome prints in this book attests to the popular enthusiasm for what was seen as an heroic achievement.

Image 1
Wolverton Embankment on London to Birmingham Line (J.C. Bourne, 1837)

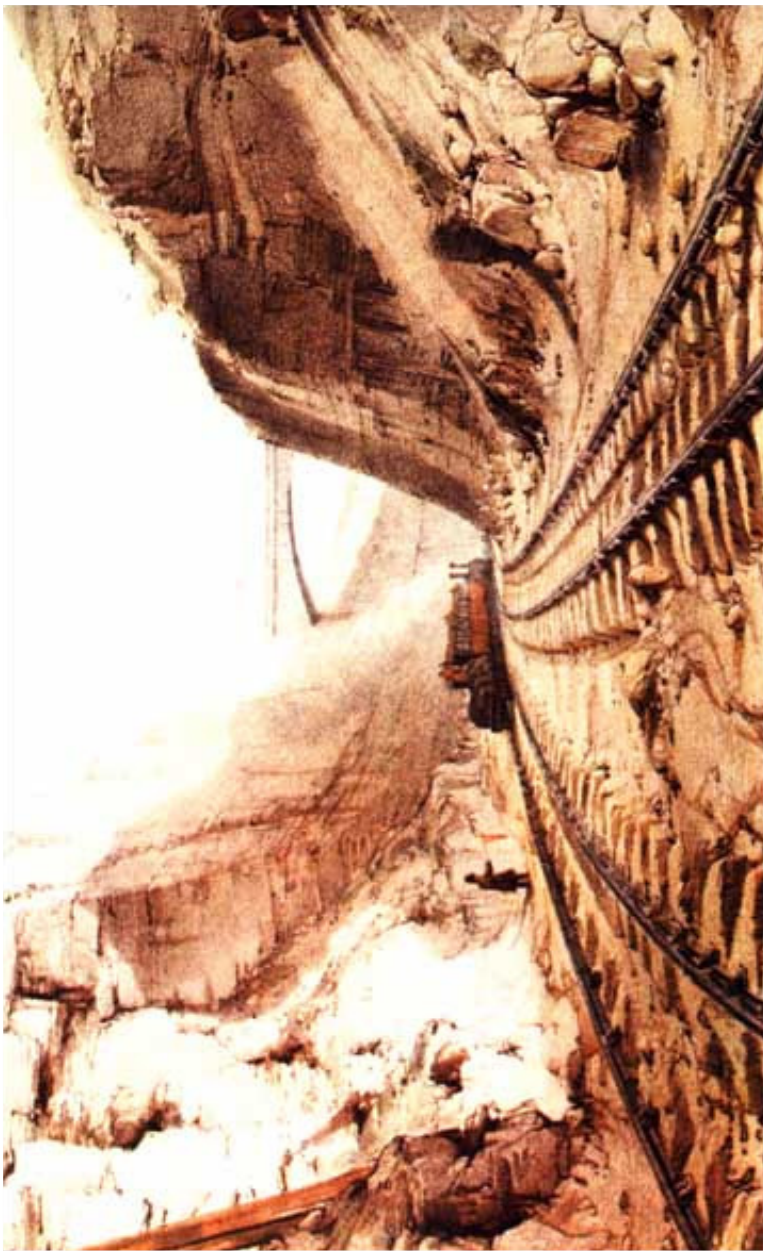
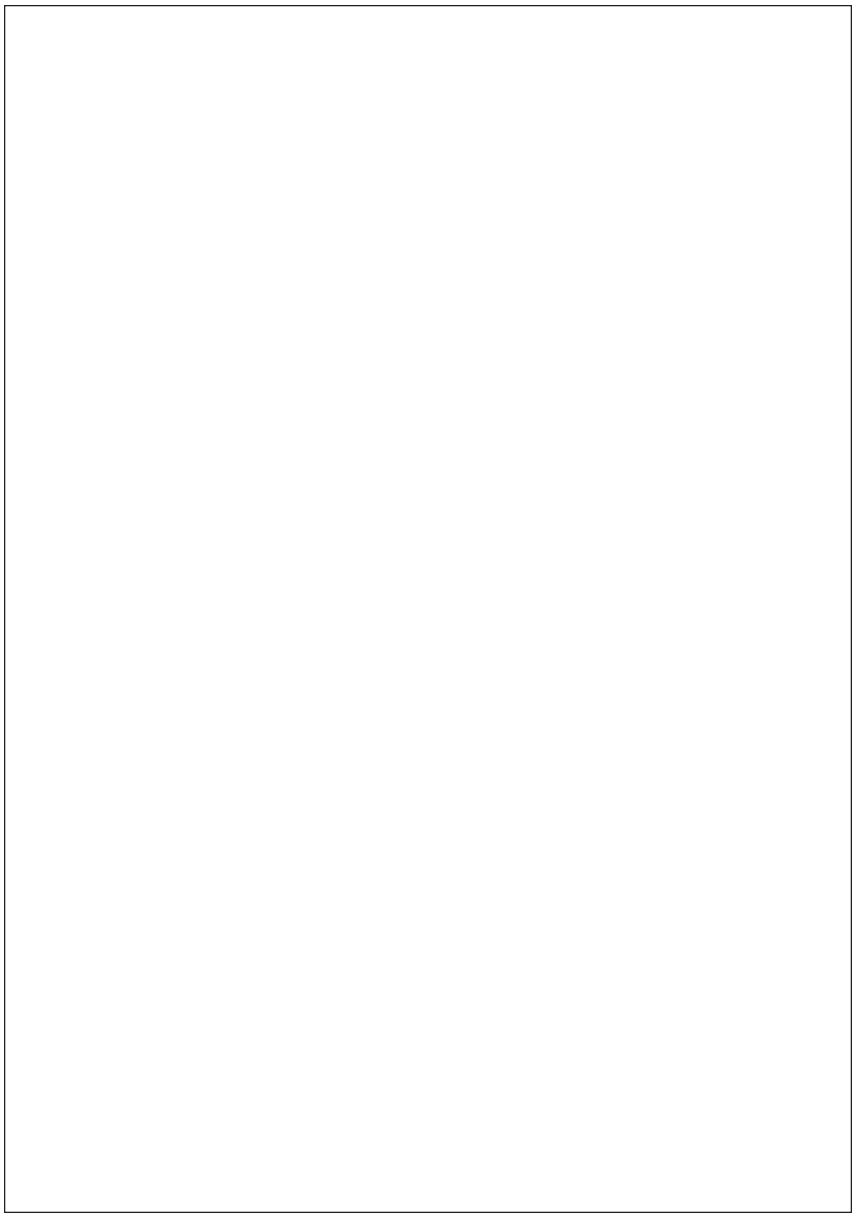


Image 2
Cutting at Blisworth on the London-Birmingham line (J.C. Bourne, 1837)

Image 3
The Kilsby Tunnel under Construction,
(J.C. Bourne 1837).



By the 1860s and 1870s, as locomotives became more powerful and railway technology improved, rail lines were able to pass through the landscape with a lighter footprint than before. Trains were now able to steam over and through the valleys, up grades that were unachievable in the "heroic age" of rail. Rather than flattening the landscape, railways could now negotiate rugged terrain and pushed further into remote and topographically challenging areas of the country. To show this, I turn to the example of central Wales, where rail construction, absent there until the late 1850s began to conquer some of the hills and mountains of the region as a comparison of Map 2 and Map 3 makes clear. Financed largely to bring wealthy tourists to the seaside resorts on the Welsh coast, the new lines also helped incorporate agrarian regions into the expanding national market and rail network.

For the rest of this unit, we shift to a different but related problem, one more readily addressed by students. We ask, where and to what extent railways altered the human landscape in rural England and Wales by facilitating out migration from rural areas? Although it seems reasonable to think that railways would have hastened the rural exodus already underway, I remind my students that a different hypothesis is equally possible, namely that the coming of railways into rural areas stimulated commerce and employment that served to stem the pace of rural out migration. So a first question we investigate is when, where, and to what degree out migration was accelerated or retarded. Next we ask, when, where, and to what degree did rail transport and migration patterns correspond?

Students work in small groups focused on different regions of England and Wales using GIS data from my research on the density of rail transport and the level of net migration in small administrative units (census registration districts). After constructing maps showing geographic distributions of relevant data for the 1850s, the 1870s, and the 1890s, they work at detecting patterns, over space and time, of change in rail transport and net migration, asking to what extent patterns coincided or differed.

When the research on their regions is near completion, we then compare of the work of different groups to highlight regional differences and variations. We also discuss the limits of GIS and the need to qualify points and conclusions. The term "prove" is out of bounds. "Suggests," "likely indicates," "plausible estimate," and the like are the coin of our realm. While the question of railways and migration must be addressed in some way in the papers I require at the end of this unit, the students are encouraged to make the topic their own. Consequently, the topics treated range from the geography of opposition to rail construction, to railways

and tourism (migration into Brighton, Blackpool, etc.), to relationships between railways, mining, and migration, to the gradual invasion of the Lake District by railways and the struggles by Wordsworth, Ruskin, and others to delay and resist it.[1] I've been very pleased with the results. Some papers are stronger than others, of course, but each has shown an impressive grasp of the GIS methods and the basics of interpreting spatial patterns across time. Papers of very high quality I post on the web so future students can read and learn from them.

Returning to Discourse: Darwin, the Nazi Religion of Nature, and Gaia

The third unit of the course studies Darwin and the Darwinian legacy in two very different twentieth-century interpretations of nature-society relations: the disturbing use of natural selection in the Nazi religion of nature, and the scientific extension of it within the Gaia hypothesis. Readings on Darwin and Gaia include chapters from Peter Marshall's history of ecological thought, *Nature's Web, An Exploration of Ecological Thinking* (1992). On Nazi thought, we read chapters from Robert Pois's *National Socialism and the Religion of Nature* (1986) and Luc Ferry's critique of deep ecology, *The New Ecological Order* (1994).

We learn that Darwin would not have understood our categories "organic" and "mechanistic," for he engaged in science without the least thought of the disciplinary identities we possess today. And because he wrote for his fellow scientists, few beyond that small circle understood him at the time, and the cosmological implications that others would assign to his theory scarcely concerned him.[2] He shared with the organic/holistic tradition the belief that humans were indeed one part of nature. Embedded in the web of life, they stood neither above nor apart from nature as Descartes believed, nor near the top of a linear Chain of Being as Plato, Aristotle, and their followers—pagan and Christian alike—believed. In place of linear hierarchy, Darwin proposed the Tree of Life, with successive branches suggesting the organic process of evolution. In contrast to Rousseau, Darwin thought that natural harmony was essentially an illusion. Natural selection meant that only the organisms best adapted to their environment survived. Successful adaptation came through competition among organisms that were interdependent. Cooperation meant little except mutual dependence in the competition for existence. A master at induction, Darwin was in that sense an heir of Francis Bacon. In describing the methods that led him slowly and painstakingly to the *Origin of Species* (1859) and the *Descent of Man* (1871), the great thinker likened his mind to a machine. "My mind seems to have become a kind of

machine for grinding general laws out of large collections of facts" (Marshall, p. 320). In sum, Darwin used mechanistic thinking to substantiate the organic conception of nature: humans were a part of nature, one branch on the Tree of Life. Looking back to Keith Thomas's *Man and Nature*, Darwin's achievement represented the scientific demonstration of what Thomas saw in the eighteenth century: "the dethronement of man" from an unchallenged position at the summit of life.

The distorted version of the Darwin's theory that Adolph Hitler absorbed in anti-Semitic Vienna took its force perhaps from the subtitle of *The Origin of Species:…the Preservation of Favored Races in the Struggle for Life*. According to Hitler, it was essential to recognize the power of nature over humans and thus the weakness of man, subject as he was to the pitiless force of natural laws in the struggle for existence. In that struggle the most "natural" peoples would survive. In Germany, the leaders of the National Socialist Party, believing they knew the inner truths of science, would replace the false dualisms of modernity—nature and culture, material and spiritual, matter and soul—with the "oneness" of the German people (*volk*) with nature. Properly led, authentic Germans would recover the unity that previously existed in the bond of the Nordic farmer with his holy soil. Jews, Hitler asserted, stood apart from nature, an unnatural race that threatened the authenticity of the German *volk* (Pois, chapters 3 and 5). After Hitler came to power, this "reverence" for nature came into political force through the passage of three laws—ones that contemporary ecologists and environmentalists might well applaud if their source were unknown. The first (1933) provided for the protection of animals, the second (1934) severely restricted the right to hunt, and the third (1935) enacted sweeping protection of nature (Ferry, 91).

Pois and Ferry argue that the Nazi religion of nature was not an aberration or an anomaly in Western civilization. Rather, it was linked to a long tradition rejecting a linear ladder of being—the hierarchy of the divine/God over man over nature/earth (Pois, 56-58)—in favor of an egalitarian naturalism of the kind espoused by Renaissance thinkers like Paracelsus (1493-1851) and Giordano Bruno (1548-1600). Moreover, it embraced an organic/holistic conception of nature found in pre-modern cosmology and the romantic longing for a harmonious connection with nature—lines of thought that the class had previously studied and that they could be nudged to recall.

All this usefully raises perplexing questions for the class. Was the Nazi religion of nature part of a tradition that included Renaissance Naturalism and the reverence for Nature expressed so artfully by Rousseau, Wordsworth, and Mary Shelley? Was it related to the seemingly positive decline of anthropocentric thought after 1740 that Keith Thomas has

described? What did it borrow accurately from Darwin and what did it misrepresent and distort? Was it a harbinger of the contemporary movement called "deep ecology"? As we wrestled with these questions, I suggested that drawing a straight line from Rousseau to Hitler would be a mistake, an unexamined over-simplification that makes for bad historical thinking by failing to look rigorously into historical complexity. I reminded students that Rousseau's reverence for nature was connected with his defense of popular sovereignty and democracy, whereas obviously Hitler's had managed to make an apparently similar view of nature legitimize his dictatorial powers as the all-knowing leader/Fuhrer. In short, our look at the Nazi religion of nature served as a good tonic for end-of-term lethargy and : a challenge to re-think the various branches of romantic views of nature.

Finally we considered the Gaia hypothesis and other recent ecological arguments, assessing them in historical perspective. This served as an effective review and conclusion for the course. In holding that the whole earth is a living system, the Gaia hypothesis embraces essential elements of the cosmological animism and unity we found in ancient conceptions of nature and their re-statements in the Renaissance. On the other hand, Gaia is decidedly modern. The theory incorporates Darwinian natural selection and ecological science to argue that the earthly system will continue to evolve forms of life best suited to any changing environment. James Lovelock tells us that, in a system of mutual dependence and natural selection, life will continue with or without humans. In this way our theme of change *and* continuity in the relations of humans and their environments again reemerges to prompt a needed recapitulation of key parts of the course.

A final conversation in class recalled the narratives of decline we have studied and sets these worrisome stories against a more hopeful prospect found in Donald Worster's essay on "The Wealth of Nature" (1993). He brings to mind Merchant's argument about the death of nature but offers his own account of the mechanism of Adam Smith and the environmental degradation inherent in modern capitalism. Asked to read this some students say "Oh, this is so grim and troubling," To the rescue, one could say, comes the promising realism in William Cronon's controversial essay, "The Trouble with Wilderness: or, Getting Back to the Wrong Nature" (1996). While he argues that trying to protect nature by conserving "wilderness"—a shifting product of human imagination—is a fool's errand, he suggests that the earth can be saved by stewarding the environment around us. Re-mediation is a task both real and open to our efforts.. Like Voltaire's *Candide*, Cronon's is a hopeful summons to "cultivate our own garden."

Conclusion: Looking Forward.

In the classroom as on the farm, fruitful cultivation does not mean plowing the same furrows and sewing the same seeds year after year. Experimenting with new varieties, rearranging parcels, and incorporating innovations keeps our garden healthy, and so too should our courses develop fresh and stimulating materials both for students and for ourselves. Although studies in American environmental history continues to out pace those about Europe, there is no shortage of books and articles to be tried in place of those I've described. For this purpose, I offer online bibliographies and discussion lists as a convenient helping hand (see References and Bibliography). Next year, a rejuvenation of sorts in my course will come from substituting Carolyn Merchant's new book, *Reinventing Eden* (2004), for her older *Death of Nature*. This more historically comprehensive account of organic and mechanistic views of nature brings the contest into the present and suggests steps toward a more hopeful ecological future. Two recent studies and my own research will make it possible for me to add to my couarse: one on Germany using David Balckbourn's declentionist narrative of political hubris and ecological failure in Central Europe [*The Conquest of Nature: Water, Landscape and the Making of Modern Germany* (2006)], and another on France using Tmara Whited's intriguing study of state efforts at reforestation and peasant resistance against it during the late 19th century. The extension of my own research into the environmental effects of railway expansion in France will also allow me to move my introduction to historical GIS across the Channel and eventually develop it for comparison of Britain and France.

Other comparative possibilities beckon from the shores, forests, and Great Plains of North America. Given my own research into railways as agents of environmental change, William Cronon's *Nature's Metropolis* (1991) is especially tempting because it examines the transforming role of railroads in linking Chicago with a vast hinterland of animal and plant resources. Next year we will add Henry David Thoreau , thus adding American's romantic ecologist to our study of his European predecessors—Rousseau, the Wordsworths, Shelley. The recent publication of David Foster's fine selections from Thoreau's *Journals* [*Thoreau's County* (1999)] will make available a unparalleled recording of landscape transformation in the mid-nineteenth century. And so it goes in this course's organic evolution, mixing something new with things tried-and-true.

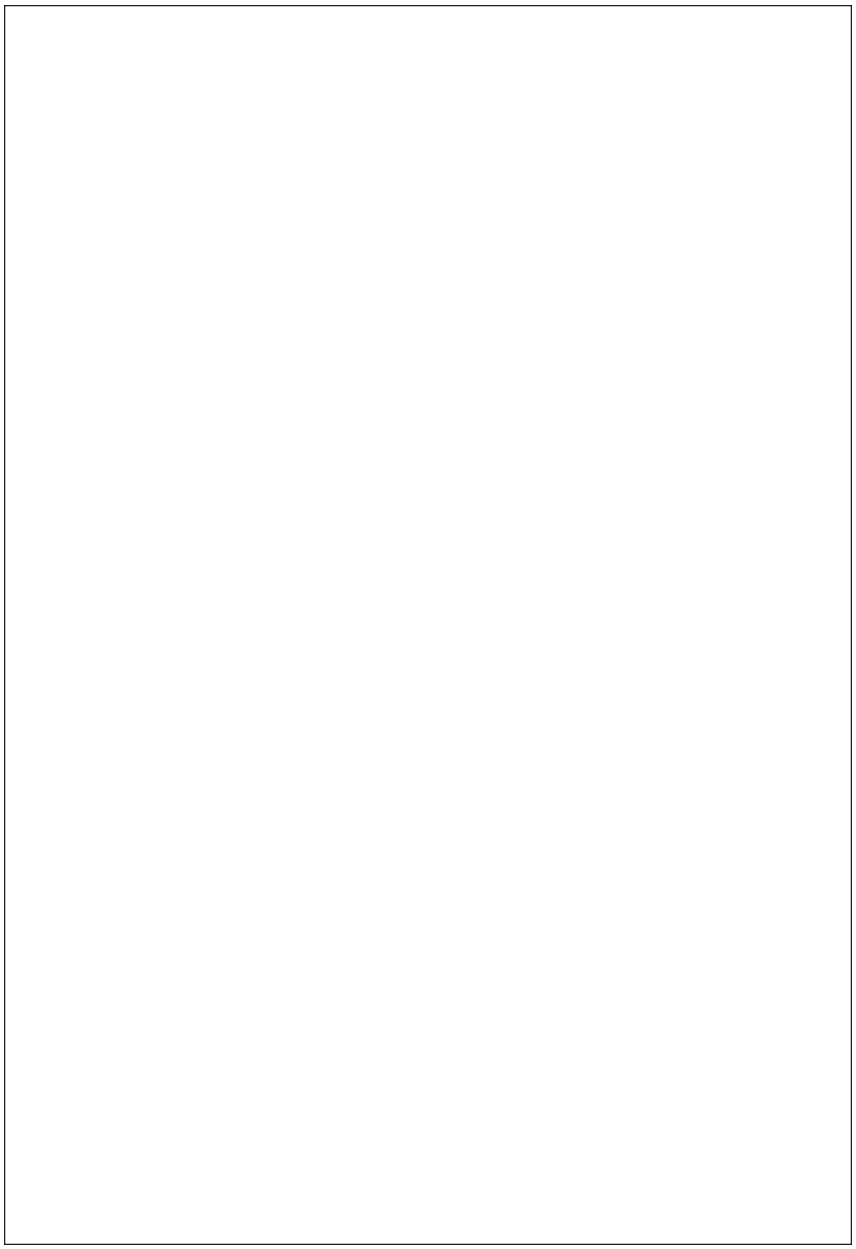
Notes

1. I want to thank the two anonymous reviewers of the manuscript; their helpful suggestions did much to improve the article.
2. From the full poem given at <http://darkwing.uoregon.edu/~rbear/donne1.html>, February 18, 2006.
3. See Adam Smith, "The Principles which lead and direct Philosophical Enquiries, illustrated by the history of Astronomy," c. 1750; "Of the Beauty which the Appearance of Utility bestows upon all the Productions of Art, and of the extensive Influence of this Species of Beauty," in *The Theory of Moral Sentiments*, 1759; selections produced in Alasdair Claire, ed., *Nature and Industrialization* (Oxford: Oxford University Press in association with The Open University Press, 1977), pp. 295-300.
4. Excerpts from Ure and from Alexis de Tocqueville's description of Manchester in his *Journey's to England and Ireland* (1835) are taken from the anthology by Alasdair Claire, Ibid., pp. 67-72 and 117-19 respectively.
5. The copy I consulted is kept at the Public Record Office (National Archives of Britain) at Kew in Surrey.
6. Jack Simmons and Gordon. Biddle, *The Oxford Companion to British Railway History From 1603 to the 1990s*. (Oxford ; New York: Oxford University Press, 1997), pp. 135, 426.
7. Examples of student lab reports and research papers can be viewed on the following web sites: <http://www.mtholyoke.edu/courses/rschwart/hist256/student_work/student_abstracts.htm> and <http://www.mtholyoke.edu/courses/rschwart/hist256/essays.html>.
8. I owe these ideas to Stan Rachootin, my colleague in evolutionary biology and a specialist on Darwin.

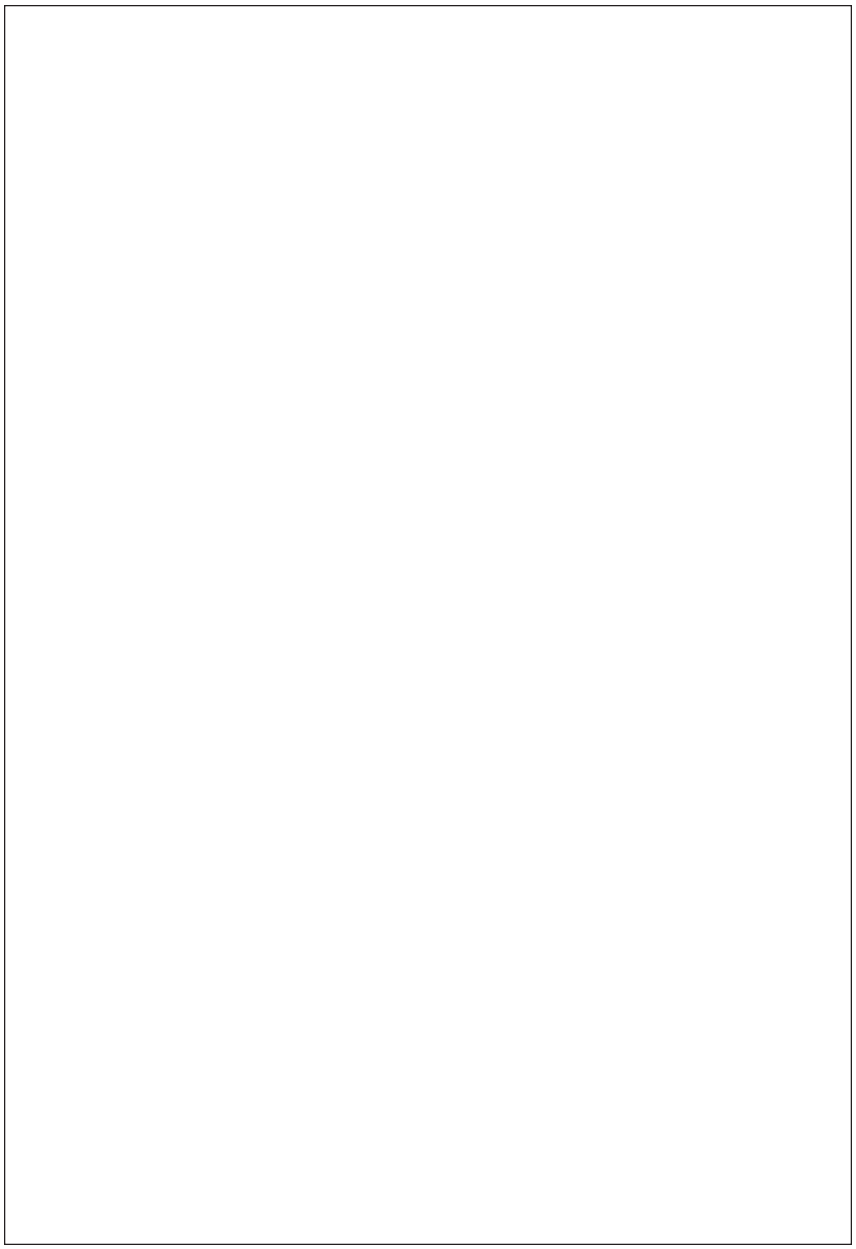
Note on Maps

Comparing maps 2 and 3 shows how new rail lines constructed during the period 1855 to 1876 reached into and over the rugged terrain of central Wales. The color-coding of lines to represent the average slope of terrain covered is the same as in Map 3, with blue representing minimal slopes and red, maximum grades. Where possible, railway builders always preferred routes that passed through lowland valleys, but several lines across central Wales climbed into the highlands and usually without the huge excavations that the London-Birmingham line required some two or three decades earlier, thanks to more power locomotives, the use of steel (as opposed to iron) rails, and other technological advances.

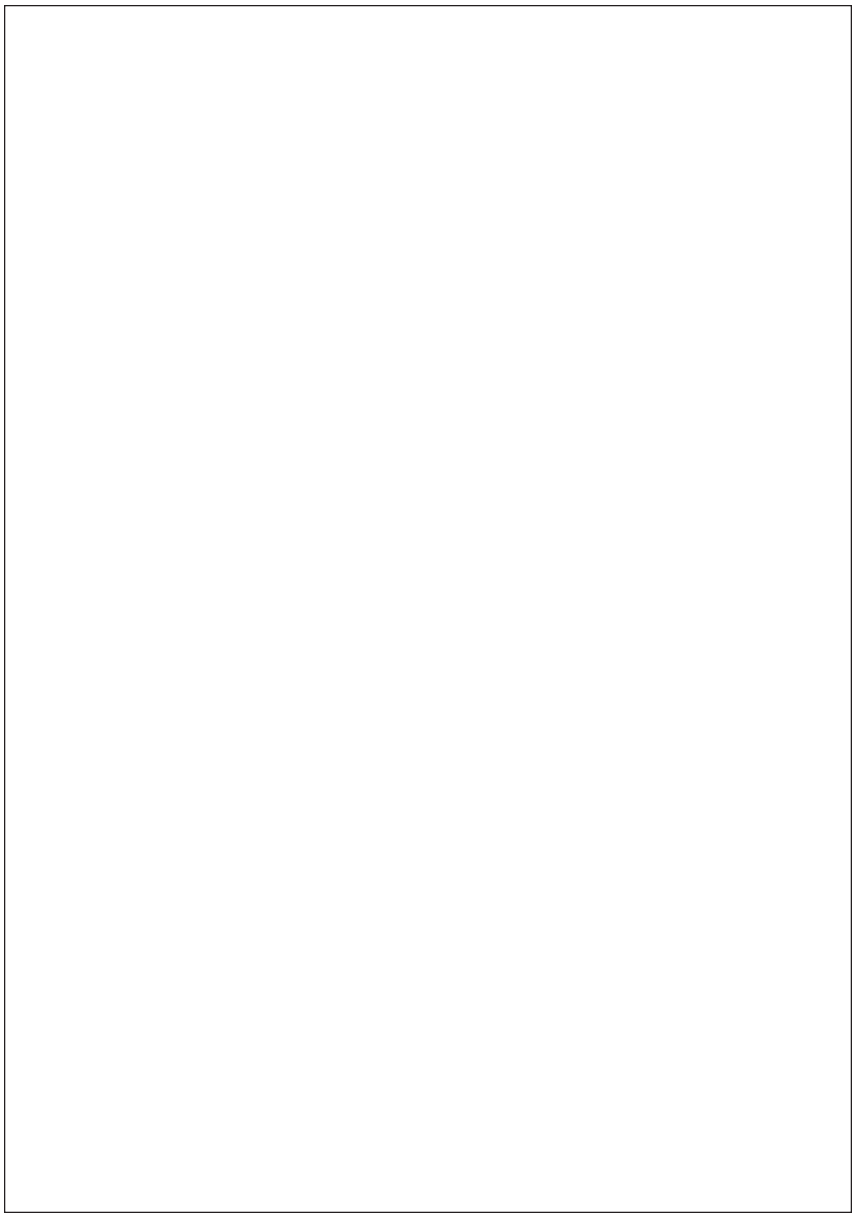
Map 1
The London to Birmingham Rail Line (1837-38)



Map 2
Rail Lines in Wales up to 1855



Map 3
Rail Lines Constructed from 1855 to 1876
Pass through the Welsh Highlands



References and Bibliography

Barman, Christian A. *Early British Railways*. Harmondsworth, England: Penguin Books; 1950.

Blackbourn, David. *The Conquest of Nature: Water, Landscape and the Making of Modern Germany*. New York: W.W. Norton, 2006.

Bourne, J.C. *Drawings of the London & Birmingham Railway*. London, 1838.

Charlton, D. G. *New Images of the Natural in France. A Study in European Cultural History, 175—1800*. Cambridge: Cambridge University Press, 1984.

Glacken, Clarence, *Traces on the Rhodian Shore: Nature and Culture in Western Thought From Ancient Times to the Endo of the Nineteenth Century*. Berkeley: University of California Press, 1967.

Claire, Alasdair, ed. *Nature and Industrialization*. Oxford: Oxford University Press in association with The Open University Press, 1977.

Cronon, William. "The Trouble with Wilderness: or, Getting Back to the Wrong Nature." In William Cronon, ed., *Uncommon Ground. Rethinking the Human Place in Nature*, pp. 69-90. New York: W.W. Norton, 1996.

_____. *Nature's Metropolis. Chicago and the Great West*. New York: W.W. Norton, 1991.

Crosby, Alfred W., *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 1986)

Foster, David R. *Thoreau's Country. Journey through a Transformed Landscape*. Cambridge, MA: Harvard University Press, 1999.

Gregory, Ian; Bennett, C., Gilham, V.L. and Southall, H.R. 2002. "The Great Britain Historical GIS Project: From Maps to Changing Human Geography." *Cartographic Journal* 39, pp. 37-49.

Grove, Richard, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860*. Cambridge University Press, 1995.

Haynes, R. D. *From Faust to Strangelove. Representations of the Scientist in Western Literature*. Baltimore: Johns Hopkins University Press; 1994.

Hughes, J. Donald. *An Environmental History of the World*. London & New York: Routledge, 2001.

Ferry, Luc. *The New Ecological Order*. Chicago: University of Chicago Press, 1995.

Lawton, Richard, and Pooley, Colin G. *Britain, 1740-1950: an Historical Geography*. London: Edward Arnold, 1992.

Marshall, Peter. *Nature's Web. An Exploration of Ecological Thinking*. London and New York: Simon and Schuster, 1992.

Merchant, Carolyn. *The Death of Nature: Women, Ecology, and the Scientific Revolution*. San Francisco: Harper & Row, 1980.

_____. *Reinventing Eden. The Fate of Nature in Western Culture*. New York and London: Routledge, 2004.

Pois, Robert A. *National Socialism and the Religion of Nature*. London: Croom Helm; 1986.

Pooley, Colin G, and Jean Turnbull. *Migration and Mobility in Britain since the Eighteenth Century*. London: UCL Press, 1998.

Schivelbusch, Wolfgang. *The Railway Journey. The Industrialization of Time and Space in the 19th Century*. Berkeley: The University of California Press, 1986.

Schwartz, Robert M. "Railways and Rural Development in England and Wales, 1850-1914." In Christian Sorrel, ed., *Frontères, contacts, échanges: Hommages à André Palluel*. Chambéry : Presses de l'Université de Savoy,: 241-259. (Draft copy available

at <http://www.mtholyoke.edu/courses/rschwart/rail/>.
Shelley, Mary Wollstonecraft. *Frankenstein. The 1818 Text, Contexts, Nineteenth-Century Responses, and Modern criticism*. Edited by J. Paul Hunter. New York: W.W. Norton, Critical Editions, 1996.
Jack Simmons, *The Railway in Town and Country, 1830-1914*. London: David and Charles, 1986.
Smiles, Samuel. *Self Help; With Illustrations of Conduct and Perseverances* (London, 1859).
Thomas, Keith. *Man and the Natural World: a History of Modern Sensibility*. New York: Pantheon Books, 1983.
Whited, Tamara L. *Forests and Peasant Politics in Modern France*. New Haven: Yale University Press, 2000.
Winter, James. *Secure from Rash Assault. Sustaining the Victorian Environment*. Berkeley: University of California Press, 1999.
Wordsworth, William. *Guide to the Lakes*. 5th ed. (1835). Edited by Ernest De Selincourt. London: Henry Frowde; 1906.
_____, "Lines Composed a Few Miles above Tintern Abbey on Revisiting the Banks of the Wye during a Tour, July 13, 1798." In *The Norton Anthology of English Literature*, 2nd edition. Vol. 2: 96-99. Edited by M.H. Abrams et al. New York: W. W. Norton, 1968.
Wordsworth, Dorothy. *The Grasmere and Alfoxden Journals*. Edited by Pamela Woof. Oxford: Oxford University Press, 2002.
Worster, Donald. *Nature's Economy. A History of Ecological Ideas*. 2nd ed. Cambridge and New York: Cambridge University Press; 1985.
_____. "The Wealth of Nature." In *The Wealth of Nature*, pp. 203-243. New York: Oxford University Press; 1993.

Images

Blisworth Cutting. <http://www.spartacus.schoolnet.co.uk/RAblisworth.htm>, November 16, 2004.
Kilsby Tunnel. <http://www.spartacus.schoolnet.co.uk/RAkilsby.htm>, November 16, 2004.
Wolverton Embankment. <http://www.makingthemodernworld.org.uk/stories/the_age_of_the_engineer/01.ST.04/img/IM.0366_zl.jpg>, November 16, 2004.

Course-Related Web Sites

History and Literature: A Cultural History of Mary Shelley's Frankenstein, 1500-1850
<http://www.mtholyoke.edu/courses/rschwart/hist257s02/home.htm>
<http://www.mtholyoke.edu/courses/rschwart/hist257s02/welcome.htm>

Interpreting Nature: Environmental Thinking and Practice in Europe, 1500 to the Present
<http://www.mtholyoke.edu/courses/rschwart/hist256/>

Seminar on Environmental History: Nature and Industrialization in Great Britain, 1780-1914, with an introduction to historical GIS
<http://www.mtholyoke.edu/courses/rschwart/hist361/index.htm>
<http://www.mtholyoke.edu/courses/rschwart/rail/intro_hist_gis.htm>
<http://www.mtholyoke.edu/courses/rschwart/ind_rev/>
<http://www.mtholyoke.edu/courses/rschwart/rail/>

Selection of Student Papers and Lab reports
<http://www.mtholyoke.edu/courses/rschwart/ind_rev/research/research.html>
<http://www.mtholyoke.edu/courses/rschwart/hist256/student_work/student_abstracts.htm>

On-line Resources

<http://www.h-net.org/~environ/ Discussion list for environmental history, H-Environment>
<http://www.eh-resources.org/ Environmental History Resources with basic bibliography>
<http://adm-websrv3b.sdu.dk/ European Society for Environmental History>
<http://www.lib.duke.edu/forest/Research/biblio.html Environmental History Bibliography>