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Origins of Western Environmentalism

Strategies to preserve nature arose as newly colonized tropical lands were exploited in the 17th and 18th centuries. Scientists played an important role in this burgeoning concern

by Richard H. Grove

Widespread misgivings about the effects of economic activity on the environment can seem a uniquely modern preoccupation—the result of industrialization, an expanding population and a science sophisticated enough to trace cause and effect. Theodore Roosevelt's pride, the U.S. Forest Service, and the myriad nature refuges established in England by naturalist Nathaniel Charles Rothschild are remembered more as attempts to preserve unspoiled nature than as responses to worries about impending environmental doom.

In truth, the roots of Western conservationism are at least 200 years old and grew in the tropics. Arising in a search for utopia, European-based environmentalism first took shape in the mid-18th century. At that time, colonial enterprise

began to clash with Romantic idealism and with scientific findings.

The setting for this conflict was the threatened ecology of tropical islands and lands, from the Caribbean Sea to Asia. In London, Paris and other imperial capitals, these islands became allegories for the world at large. The power of this metaphor and the simultaneous emergence of a community of professional natural scientists spurred governments to protect the environment.

The image of an untouched tropical island had long been associated with a Western vision of utopia. In the *Divine Comedy*, for example, Dante Alighieri set earthly paradise in a southern ocean. During the 15th and 16th centuries, voyages by Christopher Columbus and Ferdinand Magellan gave Europe its first glimpse of such islands.

As growing international trade extended Europe's commercial reach, it permitted "exploitation" of these sites for more philosophical needs. Exotic lands were seen as symbols for idealized landscapes: Edens, Arcadias or New Jerusalems. Eventually, as the large, uncharted terrains of India, Africa and America were explored, all wilderness became vulnerable to colonialization by an ever expanding myth.

During the 17th century, the full flowering of what could be called the Edenic island discourse led to the realization that European colonial rule could be environmentally destructive. Agriculture and the harvesting of timber,

minerals and game by the government-run Dutch, British and French East India companies began to destroy idyllic terrain. The work of some contemporary artists communicated the extent of this degradation to Europeans. Drawings of Mauritius in 1677, for instance, forcefully depicted the stark reality of felled ebony forests. A coherent awareness of the ecological impact of capitalism and colonial rule began to emerge.

This insight was inextricably linked to the growing social leverage and often radical agenda of the scientific lobby of the time. During the late 17th and early 18th centuries, the urgent need to understand unfamiliar floras, faunas and geologies for commercial purposes attracted many scientists into employment with the trading companies.

These scientists, almost all of whom were medical surgeons or custodians of the early colonial botanical gardens, were an essential part of the administrative machinery of the East India companies. Hendrik B. Oldenland was a case in point: he served as curator of the botanical garden, doctor, town engineer and superintendent of roads for the Dutch Cape Colony in South Africa.

As companies extended territorial acquisitions, the associated research com-

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MAP OF ST. HELENA from 1570 portrays the South Atlantic island as a paradise. In the early 1700s, as forests were cut for timber, St. Helena became one of the first sites for conservation.

munity grew proportionately. By 1838 more than 800 surgeons were employed by the British East India Company in India and in the East Indies. As time passed, increasingly complex administrative and technical demands were made on these highly educated and often independent-minded employees.

By the 19th century academies and scientific societies were established throughout the new territories. These institutions made it easy for scientists to communicate and debate their observations of the changes wrought by imperialism. Environmental theories and an ever growing flood of information about natural history and ethnology were diffused through meetings and publications. Thus, at the same time as it had promoted large-scale ecological change, the colonial enterprise had also created a coterie of men—and some women—predisposed to rigorous analytic thinking about the processes of ecological change and the need for land control.

One of the first places where science spurred conservation was Mauritius. Although initially visited by the Portu-

guese, this island in the Indian Ocean was claimed by the Dutch in 1598; it fell under French rule in 1721 and thereafter became directly associated with the utopic visions of Romanticism and French physiocracy, an economic philosophy based on the “laws of nature” and the methods of Isaac Newton.

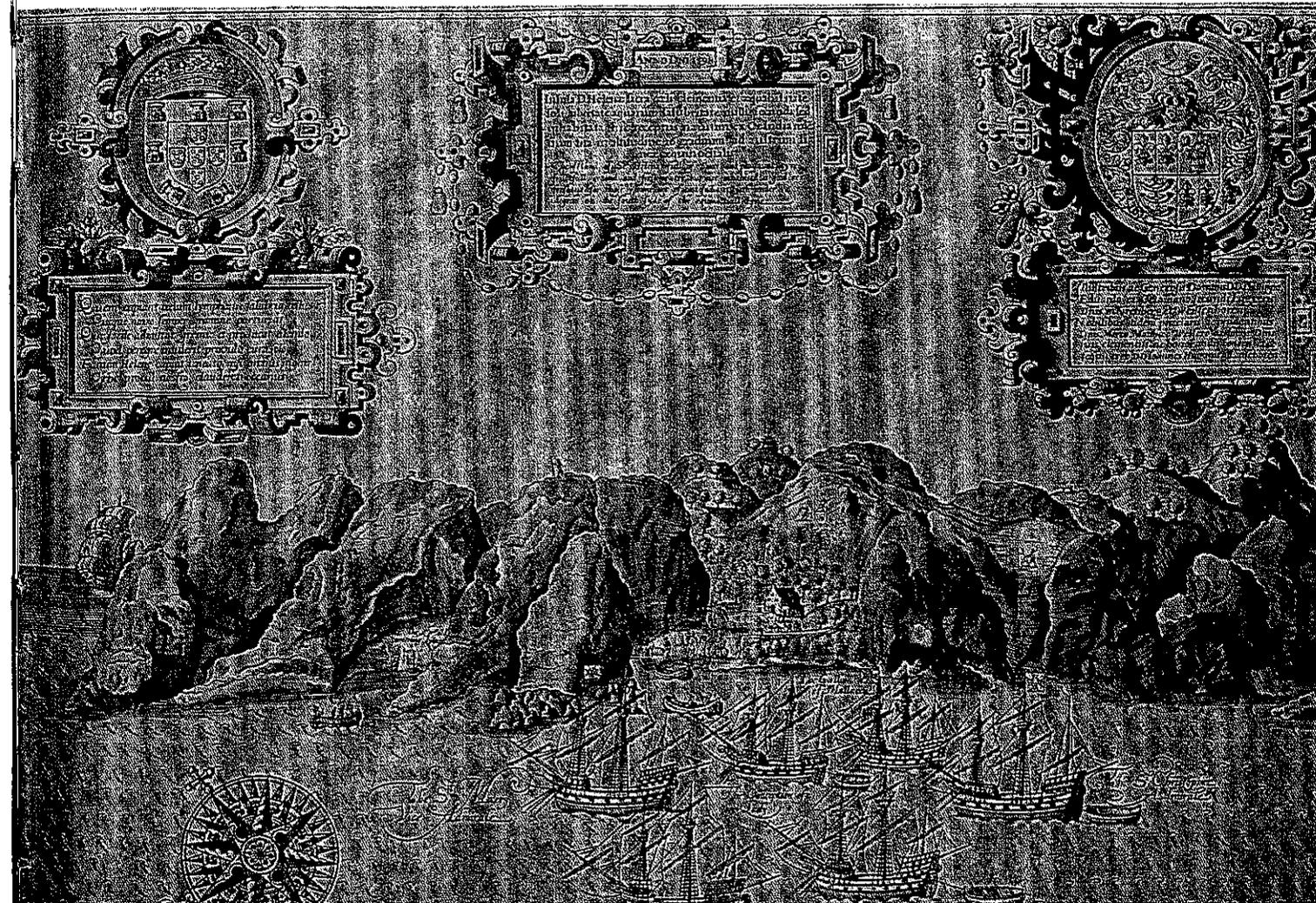
The first Dutch settlers were not conservationists. By the time they left, Mauritius's vast hardwood forests were largely depleted in areas easily accessible from the coast. As a result, zealous anticapitalist French reformers attempted to forestall further deforestation. Mauritius became the site for some of the earliest experiments in conservation.

These initiatives were carried out by scientists who, characteristically, were followers of Jean-Jacques Rousseau and the rigorous empiricism associated with the French Enlightenment. They viewed responsible stewardship of the environment as an aesthetic and moral priority as well as a matter of economic necessity. On Mauritius, these men—including Philibert Commerson, Pierre Poivre and Jacques Henri Bernardin de St. Pi-

erre—wished to construct a just society, uncorrupted by absolutist France.

The strategies of these scientists were founded on an awareness of the potentially global impact of modern economic activity. Commerson, a botanist trained by Linnaeus, had been the royal botanist accompanying Louis Antoine de Bougainville on his voyage around the world. Commerson's wife, Jeanne Baret, traveled with him, becoming the first woman to circumnavigate the globe. (She accomplished this feat by starting the trip disguised as a manservant.) As a result of this journey, she inspired her husband, the most experienced botanist of the 18th century, to take a post as state botanist on Mauritius in 1768.

Bernardin de St. Pierre, an engineer who joined Commerson on Mauritius, was shocked by the deforestation he witnessed on his arrival. Yet he also believed he had found an unequalled harmony between people and nature in Mauritius, a harmony celebrated in his novel *Paul et Virginie*, one of the first French Romantic novels. Bernardin de St. Pierre felt that the preservation of



Events and Ideas That Shaped Western Environmentalism

Marco Polo sets off for Far East and Japan	Christopher Columbus reaches West Indies	Portuguese claim St. Helena	Ferdinand Magellan sets out around the world	Dutch claim Mauritius	Dutch East India Company founded	British settle Barbados; auroch extinct in Poland	Dutch take Tobago	Dodo extinct in Mauritius	Redwood protection on St. Helena	British colonial empire begins in India
1271	1492	1502	1519	1598	1602	1627	1640	1670s	1713	1757
RENAISSANCE					BAROQUE					
1305	1498	1516	1560s	1600	1607	1633	1664	1677	1721	1763
Dante Alighieri starts <i>Divine Comedy</i>	Columbus sights St. Vincent and Tobago	Thomas More publishes <i>Utopia</i>	Deforestation starts in West Indies	British East India Company founded	Jamestown colony established in America	Dutch claim St. Helena	French East India Company founded; Dutch mandate forest protection in South Africa	French take Tobago	French claim Mauritius	British get St. Vincent through Treaty of Paris

this harmony demanded rigorous protection of natural resources.

Commerson and Bernardin de St. Pierre in turn stirred the climatic and economic anxieties of Poivre, who had been appointed governor of Mauritius in 1767. An adherent of physiocracy, Poivre believed scientific knowledge should be applied to land management. Originally a Jesuit missionary, he had studied Indian and Chinese forestry and horticultural methods and had been greatly influenced by the botanical gardens and forest protection methods he had observed in the Dutch-run Cape Colony.

In the course of trying to acquire useful medical plants in India, the Dutch learned that their own classification methods were less sophisticated and efficient than the medicobotanical systems of an Indian caste—the Ezhava—from

Malabar. Hendrik Adrian van Rhee de Tot Drakenstein, who promoted forest conservation in the Cape Colony, organized a translation of the Ezhava texts into Latin. The resulting 12 volumes were published in Amsterdam as the *Hortus Malabaricus*, the garden of Malabar. These books formed the basis of all subsequent European classifications of South and Southeast Asian plants. Recognition of the superiority of the Ezhava system accounted for the first protection of trees and plants by the Dutch.

Although it may have been novel in a Western context, the protection of natural resources has been promoted since time immemorial. This recognition is especially significant today as researchers and others increasingly turn to native peoples for an understanding of the medicinal value of tropical plants or to

small-scale efforts to stem desertification. Indigenous strategies have successfully combated soil erosion and deforestation in precolonial East Africa, the Cape Verde Islands, the Kingdom of Ghana and Mauryan India, as well as in the early colonial empires of China and Venice. As early as 450 B.C., for example, Artaxerxes I attempted to restrict cutting Lebanese cedar.

But the central, innovative aspect of French conservationism on Mauritius was the perceived relation between deforestation and local climatic change. A 1769 ordinance incorporated several stipulations prompted by this understanding: 25 percent of all landholdings were to be kept as forest, particularly on steep mountain slopes, to prevent soil erosion; all denuded areas were to be reforested; and all forests within 200 yards of water were to be protected. Eight years later a fully staffed forest service was set up. And in 1803 clearing of forest was forbidden higher than one third up a mountainside.

The early laws were not confined to forests. Pollution of water by effluent from indigo factories and sugar mills engendered more laws in 1791. In 1798 regulations were introduced to control vital but diminishing fish stocks.

The English were quick to imitate the example of the French policy in Mauritius. Again, these efforts were brought about by scientists, this time in the West Indies and in the Caribbean as well as, later, in India. In Tobago, an island in the eastern Caribbean, the work of Stephen Hales and Soame Jenyns was especially important. Hales, a plant physiologist who lived from 1677 to 1761, pioneered the study of transpiration, root pressure, the circulation of sap and the relation between green plants and the atmosphere. His friend Jenyns was the member of Parliament for Cambridge and one of the Lords Commissioners for Trade and Plantations, the group



SCIENTIFIC SOCIETIES urgently called for conservation in the 18th and 19th centuries. For instance, in the 1860s members of the Madras Literary and Scientific Society advocated establishment of Indian forest reserves. Scientists Edward Balfour (*standing*) and Hugh F. C. Cleghorn (*far right*) were instrumental in these efforts.

Forest reserves established on Tobago	American Revolution	French Revolution	British take back Tobago	Charles Lyell publishes <i>Principles of Geology</i>	Bad drought in South India	Madras Forest Department founded	Darwin publishes <i>The Origin of Species</i>	South African drought	Bird protection laws established in Britain
1764	1776	1789-92	1802	1830-33	1835-39	1856	1859	1862	1868
ENLIGHTENMENT					ROMANTICISM				
1739	1790-95	1791	1810	1835	1852	1858	1860s	1864	1877-78
French pass conservation laws in Mauritius	Severe famines in India	Kings Hill Forest Act passed in St. Vincent	British take Mauritius from French	Charles Darwin lands in Galápagos	British scientists report on deforestation in India	Forest and Herbage Preservation Act passed in South Africa	Drought in India; bird protection laws enacted in Tasmania	Indian Forest Service established	Drought in India

that was responsible for settling Tobago.

Using techniques pioneered by Newton, Hales established a clear link between the atmosphere and plant processes. His experiments suggested a causal relation between trees and rainfall. Hales and his colleagues warned against the dangers of deforestation. Citing the examples of Jamaica and Barbados, where clearing for massive plantations had led to extensive soil erosion, Hales urged Jenyns and the Lords Commissioners to protect forests.

As a result, in 1764 forest reserves were established on Tobago. On land settlement maps these areas, which covered about 20 percent of the island, were marked as "reserved in wood for rains." Rain reserves were a revolutionary concept. They still exist today, although somewhat enlarged, as the oldest reserves of their kind in the world.

Similar measures were enacted on the West Indian island of St. Vincent in 1791. The Kings Hill Forest Act also protected the forests for climatic reasons. This piece of legislation was inspired by Alexander Anderson, the curator of the St. Vincent Botanic Garden—the first such garden to be founded in the Western Hemisphere. Anderson, like his French colleagues in Mauritius, was attracted by visions of utopian landscapes peopled by noble savages. By procuring protection of the St. Vincent forests, he hoped to prevent extinctions of species, protect the climate and preserve the island's idyllic quality. In practice, however, this vision was shattered. During the 1790s, the indigenous Carib people were uprooted and the culture stamped out.

The policies developed on Mauritius, Tobago and St. Vincent eventually provided the justification and practical models for the forest planting and protection systems that developed in India after 1847. Until then, it seems that concerns about environmental change had been delayed by the vastness of the subcontinent, which concealed the impact of soil erosion and deforestation.

The roots of environmentalism in India were strongly reinforced by the writings of Alexander von Humboldt, the famous German geographer and explorer. He promulgated a new ecological concept of the relation between people and the natural world: that of the fundamental interrelation of humankind and other forces in the cosmos. His ideas, which drew extensively from the holistic thinking of Hindu philosophers, presented a scientifically reasoned interpretation of the threat posed by unrestrained human activities.

Humboldt's views influenced some of the scientists working for the British East India Company. These men were receptive to a way of thinking that related deforestation, water supply, famine, climate and disease in a coherent fashion. Humboldt based his theories on detailed observations carried out over several years, supplemented by historical records of the level of Lake Valencia in Venezuela.

Several Scottish scientists, including Alexander Gibson, Edward Balfour and Hugh F. C. Cleghorn, became enthusiastic proselytizers of the conservationist message. They advocated establishing a forest system in India that was unequalled in scale. In an 1852 report, they warned that a failure to set up an extensive forest system would result in ecological and social disaster.

The study took a global approach, drawing on evidence and scientific papers from all over the world. Its authors argued that rapid deforestation might cause severe rainfall decline, reduced runoff and ultimately famine. They pointed to widespread deforestation and ensuing soil erosion on the southwestern coast of India, the Malabar Coast.

Their message struck at the heart of the British East India Company's concerns: revenue. The destruction in Malabar had caused commercially important harbors to silt up and become useless. This experience provided early

evidence of what might happen in the absence of a state conservation program. (It should be mentioned that early warnings about deforestation in India came as much from indigenous rulers as from scientists. In 1830 the Rajah of Nilumbur alerted the governor of Bombay to the serious consequences of felling too many trees.)

The researchers' activities proved highly alarming to the British East India Company. Officials grasped the association between deforestation and famine fairly quickly, fearful as they always were of agrarian economic failure and social unrest. Unfortunately, it required an initial famine for scientists to gain credibility in the eyes of the government. Only then did the state take measures to protect the environment.

In India, periods of serious drought



DODO, which existed only on the Indian Ocean island of Mauritius, is shown with an unidentified animal. The flightless bird became extinct during the 1670s.

between 1835 and 1839, in the early 1860s and between 1877 and 1878 were all rapidly followed by state programs to strengthen forest protection. The forest conservation system set up in India, which was based in part on the Mauritius experience, later provided the model for most of the state conservation systems in Southeast Asia, Australia and Africa and, later, in North America.

Drought prompted environmental policy in other colonies as well. John Croumbie Brown, a pioneer of conservation in the Cape Colony, secured government agreement to conserve forests and prevent burning of grasslands only after the drought of 1862-1863 wreaked havoc on settler agriculture.

The South African drought of 1862, the worst ever recorded, had implications that extended far beyond conservation policies in Africa. It encouraged the development of an entire school of desiccationist theory that related the colonial experience to the world at large for the first time. Many scientists became convinced that most of the semi-arid tropics were becoming arid as a result of colonial deforestation, an idea that has been confirmed by recent study.

Theories of widespread climatic change acquired further credibility in March 1865, when a paper by James Fox Wilson was presented at the Royal Geographical Society in London. The report, "On the progressing desiccation of the Orange River in Southern Africa," made a strong case. Wilson, a naturalist, believed that the Orange River was becoming deprived of moisture and that the Kalahari Desert was expanding. He attributed the

desiccation to the "reckless burning of timber and the burning of pasture over many generations by natives."

Present at Wilson's lecture was the explorer David Livingstone. He vehemently disagreed, asserting that rainfall had declined because of natural geophysical phenomena. Another speaker, Sir Francis Galton, a cousin of Charles Darwin, believed the introduction of cheap axes into Africa by Europeans had promoted excessive deforestation and consequent drought. Yet another member of the audience, Colonel George Balfour of the Indian Army—brother to Edward—sounded a more caustic note. Rainfall decline in India, he asserted, was caused principally by the European community, including the plantation owners.

Balfour argued that countermeasures were necessary. He said he had been informed that the government of Trinidad had prohibited cutting trees near the capital in order to ensure a supply of rain. Balfour was quick to point out that in precolonial times it had been the practice of Indians to sink wells and "plant tops of trees" to encourage water retention. In 1866, in another Royal Geographical Society discussion, Balfour cited the example of Mauritius, where "the Government had passed laws to prevent the cutting down of trees, and the result has been to secure an abundant supply of rainfall." Thus, the debate about climatic change had become international in scope by the mid-1860s. Detailed research raising the possibility that the very composition of the atmosphere might be changing reinforced the concerns.

Such views, which presaged contemporary fears about global warming, found early advocacy in the writings

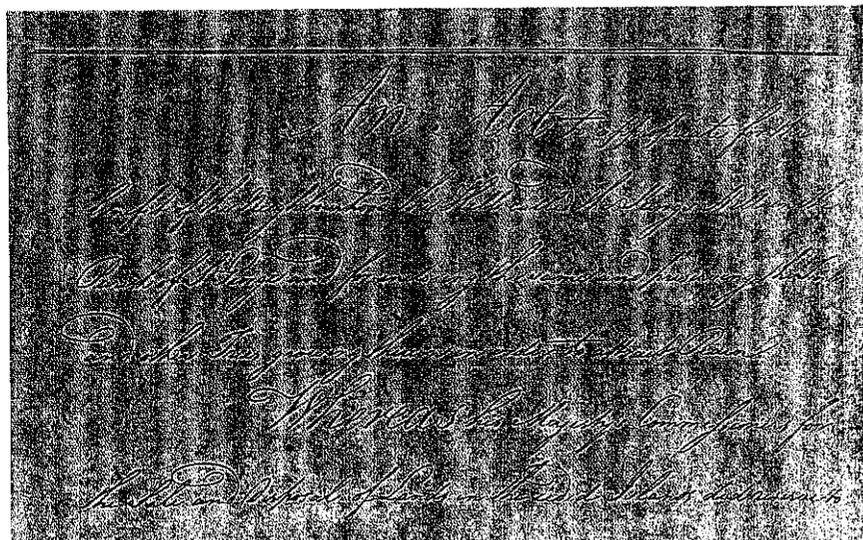
of J. Spotswood Wilson. He presented a paper in 1858 to the British Association for the Advancement of Science on the "general and gradual desiccation of the earth and atmosphere." Upheaval of land, destruction of forests and waste by irrigation were not sufficient to explain the available facts on climatic change, Wilson stated in his paper. Instead, he believed, the cause lay in the changing proportions of oxygen and carbonic acid in the atmosphere. Wilson argued that their respective states were connected with the relative rates of their production and absorption by the animal and vegetable kingdom. This paper probably helped to influence the ideas of debaters at the Royal Geographical Society several years later.

Wilson concluded with a dismal set of remarks. Changes in the atmosphere were "in the usual course of geological changes, slowly approaching a state in which it will be impossible for man to continue as an inhabitant.... As inferior races preceded man and enjoyed existence before the earth has arrived at a state suitable to his constitution, it is more probable that others will succeed him when the conditions necessary for his existence have passed away."

Raising the specter of human extinction as a consequence of climatic change was a shocking psychological development in 1858. Yet it was consistent with fears that had been developing among the international scientific community for a long time. The concept of species rarity and the possibility of extinction had existed since the mid-17th century, when the scope of Western biological knowledge began to embrace the tropical world.

The demise of the auroch, a form of wild cattle, in 1627 in Poland and of the dodo in the 1670s in Mauritius had made a considerable impact. In 1680 the Polish government had set aside large areas of forest where hunting was prohibited. The contemporary survival of the wisent, or European bison, is attributed to this isolated effort. And in 1713 attempts were made to prevent the demise of redwood trees on the South Atlantic island of St. Helena.

The publication in the early 1830s by Charles Lyell of the *Principles of Geology* gave firm foundation to the confused awareness of extinction already shared by some East India Company scientists. The book questioned the permanence of species and laid the basis for modern understanding of geological change. Lyell questioned the ideas presented in Genesis, overturning notions about the speed of environmental processes. Paradoxically, this discussion emphasized



KINGS HILL FOREST ACT of 1791 protected trees on the island of St. Vincent in the West Indies. The British colonial legislation sought to forestall climatic change.

the apparent helplessness of humanity in the face of environmental change.

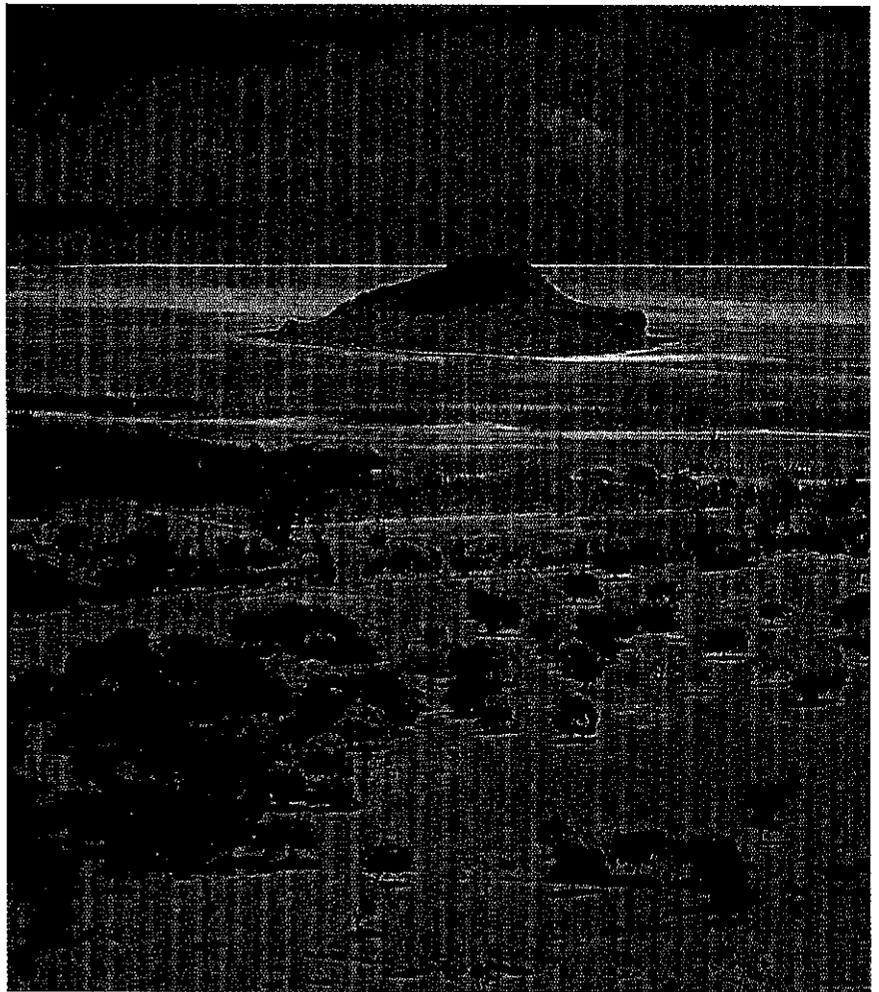
Other scientists were probing these ideas as well. In the 1840s Ernest Diefenbach chronicled the fauna of Mauritius, New Zealand and the Chatham Islands, which lie off the coast of Chile. He too became acutely aware of the potential for further rapid extinction if European economic activity spread. Indeed, a paleontologist named Hugh Edwin Strickland, who understood the threat because of his work on the dodo and other vanished birds of the Mascarenes (Mauritius and Réunion islands), suggested that all of New Zealand be made a nature reserve.

The publication of *The Origin of Species* by Darwin in 1859 placed extinction in the dynamic context of natural selection. His theory served to sharpen the predicament of colonial scientists, many of whom were already aware of the part played by humans in hastening the demise of certain species.

A central part of the response to the existential havoc created by *Origin* served to fuel efforts to enact state conservation legislation. For instance, Cleg-horn, who was the first inspector general of the Madras Forest Department, which was set up in 1856, stated that uncontrolled deforestation would both cause the loss of valuable species and prevent botanists from assembling evidence for evolution. (He was aware that such arguments might not carry great weight with government, and so he chose to emphasize the more obvious economic hazards of climatic change and resource depletion.)

Origin made protection a more valid concept in the eyes of the government. Indeed, between 1860 and 1870, a flurry of protectionist legislation was enacted in Britain and its colonies. Once again the galvanizing force was an island colony: Tasmania. A comprehensive law designed to protect indigenous Tasmanian birds was introduced in 1860, supported principally by an amateur naturalist, J. Morton Allport.

Other territories rapidly followed suit. By 1865 the colonial legislatures of Natal in South Africa and Victoria in Australia introduced laws to protect several animals and birds. Somewhat belatedly, in 1868, the U.K. introduced its first measures to protect birds. Significantly, the architect of the British measure was Alfred Newton, a frequent correspondent with Allport and the first prominent scientist to recognize the validity of Darwin's theory. Such early measures to protect species, all closely connected to opinions of Lyell and Darwin, offered a symbolic as well as practical opportunity to try to reassert control over a



UNTOUCHED LANDSCAPE in Mauritius today is for the most part the result of the creation of forest reserves by the French in the 1700s.

process of environmental degradation that was now understood as global.

By the mid-19th century long-established anxieties about artificially induced climatic change and the loss of species had reached a climax. The spread of Western economic development, initially through colonial expansion, was increasingly seen by more perceptive scientists as eventually threatening the survival of humanity.

If a single lesson can be drawn from the early history of conservation, it is that states will act to prevent environmental degradation only when their economic interests are shown to be directly threatened. Philosophical ideas, science, indigenous knowledge and people and species are, unfortunately, not enough to precipitate such decisions. Time and again, from the 1850s onward, some scientists have discovered that the prospect of artificially induced climatic change, with the full weight of its implications, was one of the few effective instruments that could persuade governments

of the extent of an environmental crisis.

Our contemporary understanding of the threat to the global environment is thus a reassertion of ideas that reached maturity over a century ago. It is to be regretted that it has taken so long for the warnings of early scientists to be taken seriously.

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