Meaning in Technology

Arnold Pacey

The MIT Press
Cambridge, Massachusetts
London, England

5

The Sense of Place

Environmental Perspectives

In Africa there is a landscape of rock surfaces and boulders, scrub and grass, whose hills offer long views, and where an apparently tiny structure is a rectangular stone slab on a low plinth. It is the grave of Cecil Rhodes, founder of an alien colony in this land. Cut into the solid rock of the Matopo Hills, it is seen by some as an intrusion upon a traditional sacred site. The rectangular geometrical shape is expressive of a technological ability to master even the hardest rock, and it clashes with nature's freer shapes.

The site illustrates two kinds of meaning that we tend to find in landscape: a sense of nature as something beyond us, before which we stand in awe, but also a feeling of being invited to leave our mark. A famous character in Chinese literature named Monkey, once bounded to the very edge of the universe, where he found five great columns. He should have felt wonder and respect, but his impulse instead was to leave his mark, so he urinated on one of the columns—on one of the fingers of God.[1]

Another significant landscape lies among the tablelands and mountains of New Mexico, where D. H. Lawrence (in 1923–24) and other literary figures once took refuge. They sensed this to be a place apart from the busy, urbanized, industrializing world, and some were attracted also by the fact that this was still a sacred world for the Navajo Indians, whose country it was. The irony is that, during the 1940s, this place of escape became the setting for the most ambitious effort hitherto for wresting nature's ultimate forces from her control, because then the Los Alamos laboratory was established there, and a community of atomic scientists took up residence.

Commenting on the stark irony of this situation, Debra Rosenthal has remarked that efforts "to regain the lost world of . . . a pretechnological paradise are easily ridiculed as naive and vulgar romanticism. In western culture, the vision of life in harmony with nature was superseded long before . . . Lawrence took refuge in the raw mountains of northern New Mexico." But still "somehow the dream of harmony persists, even in the shadow of the bomb."[2]

Today, with the Cold War over, we perhaps feel less threatened by the bomb (although it still is a threat). But many people feel far more threatened by the prospect of environmental catastrophe, and are probably right to do so. Indeed, this threat may be considerably more serious than most commentators admit. I often think that if people realized what is really at issue, they would immediately abandon their cars, switch off their refrigerators, and eat only organically grown vegetables with no meat or fish. Or they would boycott the energy businesses whose lobbying has (in 1997) prevented effective agreement to reduce greenhouse gas emissions. Why, then, is this chapter not dedicated to promoting a fridge-free, vegetarian lifestyle (a subject on which I am peculiarly well-qualified to write)? Or, to be more realistic, why is it not concerned with political analysis of the business interests that are so busily encouraging pollution and subverting research on the subject? Why then do I start by talking about landscapes in New Mexico and Zimbabwe, and quote from a Chinese fictional work?

One reason, of course, is that as in the rest of this book, I believe that political analysis, which is absolutely essential, needs to be complemented by an understanding of how individuals experience the environment. In this chapter, that will mean especially how they experience landscape, whether in New Mexico or in their own home area, and how they feel about marking the landscape, either as Monkey did it, or by constructing dams and irrigation systems, or bridges and highways.

A second reason why I am not tackling the worldwide environmental crisis head on is that much of the usual discussion relies on forecasts of population growth, resource use, pollution emissions, deforestation, extinction of species, and climate change. Although these topics represent enormously serious issues, they are frequently misrepresented. Some oft-

quoted facts about deforestation in Africa are simply wrong, for example, and invite damaging solutions to imaginary problems.[3] Predictions about resource utilization and depletion, beginning with the work of nineteenth-century economists,[4] and continuing with modern systems theorists,[5] have usually proved to be overpessimistic. Yet when the subject is properly presented, we find that there is an inescapable limit to human use of the environment.[6] Moreover, even if we cannot predict what may occur, history records earlier environmental catastrophes in which the human population was drastically reduced, and we can surely learn from them.

But although this second part of the book again offers only a discussion of individual experience, rather than analysis of the world situation, it attempts a wider perspective than Part 1. It tackles larger themes and different points of view, being less oriented to the experience of engineers, designers, or users of equipment. Its approach is clarified if I refer again to the point made in the Introduction about my experience in 1951, when I was introduced to technology as a subject with two contrasting themes. On the one hand, there was pleasure and excitement in making things (or seeing and understanding how they were made), with enjoyment of their architectural and musical characteristics. On the other hand, there was the impulse to make life better for people: to ensure that material needs were more adequately met, to relieve suffering, and to enrich quality of life.

For many engineers and scientists, these two themes complement one another. In their work, enthusiasm for the aesthetic purposiveness of technology is linked to socially useful applications. However, my own perceptions during the half century since 1951 is that these two kinds of purpose in technology have been pulling apart. On the one hand, I am as sensible as ever of the thrill of discovery and creativity, and of the musicality, aesthetic achievement, and craft skill to be found in the practice of technology. I have used Part 1 of this book to celebrate these things, to assert their value, and explain their importance, even while warning against their seductiveness.

On the other hand, it has become clear that all this wonderfully transcendent purposiveness is often out of step with social purposes that need to be addressed. When engineers and scientists turn from talk of discovery and creativity, which always commands respect, and instead make claims about how society will benefit and how life will change for everyone, feelings of skepticism, cynicism and even disgust at the complacency of such claims overwhelm my initial curiosity and interest. Similar promises were made in 1951, specifically about the benefits of nuclear power, about improvements in everybody's quality of life, and about how science would eliminate malnutrition and starvation throughout the world. Today's promises about how agricultural science will feed growing populations ring equally hollow in a world where malnutrition seems no less prevalent, and when agro-industry is protected by "food disparagement laws" that limit open discussion.[7]

In later chapters, we may gain further insight into this paradox of what is valuable in science and technology, and what seems to betray its social meaning. Here it suffices to consider what might be meant by saying that quality of life for some people (myself included) has deteriorated since 1951. This statement, of course, is contrary to the statistics for standards of living in industrialized countries, which show steady improvement. However, those are statistics based on data for gross national product (GNP) per capita, and critics point to incidents such as the wreck of an oil tanker to show the inadequacy of GNP in this context. After such an incident, the millions of dollars spent on cleaning up beaches have put extra wages in the pockets of the workers employed and led to extra sales of detergents and other materials used, all of which add to GNP. Thus an event that diminishes quality of life for many people is recorded in the statistics as an increase in standard of living, because only the positive impact on wages and sales is measured; the negative impacts are widespread, hard to measure, and ignored.

Given the unsatisfactory nature of statistics based on GNP, we might refer to figures for expectation of life and educational achievement, most of which have also consistently improved since 1951. Or these data can be combined with GNP data to produce a "human development index," as is done in an annual United Nations report that tends to show how Canada and Japan have very good quality of life, with the United States and Britain some way behind. However, all these measures depend on what one most values, and for many people, quality of life ought to be related also to stress (or lack of it), hours available to spend with their children, and various aspects of the environment, such as noise levels (which increase remorselessly). Thus when it is asserted that quality of

life in the United States (for example) has declined by some specific percentage during a decade when per capita consumption steadily increased, it is hard to believe that the precise figures have any meaning.[8]

Although it would be nice to have something unambiguous to measure, quality of life is ultimately about what people experience, or how they respond to it, and whether the experience and response together enhance their well-being. Once again, therefore, it is necessary to consider individual experience, as Langdon Winner does, for example, in describing the part of California where he grew up, between Los Angeles and San Francisco. He mentions new highways invading the surroundings of some communities, and recalls that "in a few short years the town witnessed the coming of freeways, jet airplanes, television . . . food additives, plastics. . . . The shape of the house and the activities of the family were refashioned to accommodate the arrival of all kinds of electronic gadgets."[9]

Whereas people in general accepted most of this innovation and change without question, taking it all for improvement and progress, Winner balances gains and losses more critically. The one clear gain he records was the coming of the Salk vaccine. The losses include a reduced availability of fresh food and its replacement by a less enjoyable, more heavily processed diet. But much of what he says concerns the environment, though with a rather specific emphasis. Where he could have said much about the elimination of plant species or instances of pollution, what comes over more prominently is how the home has been altered, how attractive buildings have been replaced by characterless ones, and in general, how the surroundings of the town have been filled up with rather anonymous constructions.

Today social scientists and philosophers discuss people's responses to environmental change, and they would say of Winner's experience that his sense of place has been offended. Buildings and countryside that gave his area identity have been replaced, and even the home has been reshaped, by implication making it less like home.

Valuing "Place" and Relating to Nature

In a study of what might be meant by "sense of place," philosopher Jane Howarth notes that there are at least two ways of assessing the value of a landscape, both of which may be relevant when it is to be changed by a planned development.[10] First, we can catalogue rare species, assess biodiversity, and note habitats vulnerable to disturbance or pollution. We may even (dubiously) attempt a cost-benefit analysis to assess gains and losses likely to arise from the development. These efforts reflect a scientific approach in which we regard ourselves as separate from the landscape and generally detached. We attempt to assess all the issues objectively. When we adopt this point of view and think of the people who enjoy the landscape, we tend to regard them as using it as a playground or taking pleasure in a spectacle.

Second, though, if we live in and like a place, none of this scientific analysis expresses quite what we feel about it, and we may think that we ought to assess the locality from this other point of view also. That means exploring what we mean by "sense of place." When I write reports on planned developments in my own area, I discuss the archaeology and botany of the landscape as scientifically as I possibly can, but I also try to explain in what way the landscape helps to identify my community, Addingham, and to define its location as a significant place. Speaking generally, Jane Howarth suggests that what we often feel about the place where we live is "attachment" of a kind that "goes very deep, is of significance in the life of the individual . . . (and) is an important part of being human. It is comparable with one's attachment to one's closest friends."[11]

Such feelings may also include a sense of attachment to "nature as nature," rather than to nature as statistics or Latin names for species. When thinking about a place in its totality, we do not separate ourselves as subjects from the place as object, but consider ourselves as part of the place. Similarly with nature, so that some philosophers have said that we are then taking a *participatory* rather than a *detached* view of life.[12]

These are very strong statements, and some may doubt whether anybody in the modern world really feels like this about Nature (now often with a capital "N"). Or if they do, aren't they being excessively sentimental and certainly prescientific? It is of interest, then, that some exceptional scientists seem to have depended on a participatory attitude to Nature of precisely this kind. Thus Barbara McClintock's researches on maize (corn), cited in a previous chapter, were motivated by a "feeling for the organism," and Edward Wilson, another modern biologist, remarks that the best of science "doesn't consist of mathematical models and experiments. It springs fresh from a more primitive mode of thought."[13]

In the nineteenth century, Michael Faraday's extraordinarily fruitful researches on electricity were "a face-to-face, heart-to-heart inspection of things." His diary is a record of intimate dialogue with Nature, posing questions and waiting attentively for answers. The "emotional basis of Faraday's science" was humility and a sense of wonder and joy in the natural world.[14]

Such responses to Nature could often be linked to specific places, as when Joseph Banks, almost a century before Faraday, decided to become a botanist after finding himself alone in a country lane surrounded by wild flowers.[15] Determined rationalists, of course, have no sympathy for these attitudes. For them, Sir Isaac Newton's wonderfully logical account of the motions of the planets once served as a powerful example of how a rational, mathematical understanding of phenomena was possible, free of emotional "enchantments." But now we know that Newton had sympathies for certain alchemical ideas regarding nature that "he dared not publish," even though they had contributed to his concept of gravitation. In these words Morris Berman sees the "disenchanted," rationalist view of nature as founded on self-censorship and "buttoned up" feeling—on separating oneself from nature (now with a small "n") and abstracting from it only those things that can be measured and calculated.[16]

Despite the many insights and material benefits that come from looking at the world in a detached way, many people still feel that there should be acceptable ways of acknowledging their own responses to sun and sky, mountains and oceans, and the burst of new life at every springtime. Forests and seashores are still places to which we can feel drawn. The ocean has its own "strange power . . . which fills our language with its metaphors," as mountains still seem to have "presence."[17] One such is Beamsley Beacon, a hill close to where I live that constantly draws one's eye. In the grander landscapes of North America, a correspondent reports, the Rockies also have presence to which people in Calgary react strongly, often with respect and exhilaration, but sometimes with a sense of claustrophobia. It is easy to understand why people untouched by disenchanted science sometimes identified hills with spirits. Conversely, it is also easy to see why the rational men of the eighteenth century turned deliberately away, like the self-censoring Newton, or like the travelers of this period who pulled blinds across the windows of their coach to avoid having to contemplate the mountains of the English Lake District.

Among thinkers of the Age of Reason who were prepared to look at mountains, some analyzed the feelings that arose by saying that the mountains were "sublime" in the sense of being awesome and thrilling, whereas many other aspects of nature were "beautiful" in a less threatening way. This distinction was made by people who had lost the old visceral sense of Nature as alive and organic, but who still felt an emotional response. It was a distinction made by philosophers, including Burke and Kant, but the fact that they wished to speak of the sublime implies that they wanted to recognize their emotional reactions to nature rather than dismissing them as unimportant. And it seems futile to deny that there has been some sort of appreciation of landscape and nature in nearly all civilizations and cultures. Indeed, certain responses to nature seem inextricably linked to feelings of attachment to territory, to the sense of place, therefore. They are not just the product of the romantic movement.

However, we need to acknowledge that the romantic view can be seriously one-sided. Think of the painter or poet who saw the countryside only on fine summer days and had no experience of what it was like to work in the fields in all weathers. Think also of today's hikers who find relief from the pressures of urban living in the quiet of the Welsh hills unaware that farmers in the area are under greater economic pressure than most city dwellers, experiencing more depression (more often leading to suicide) because of the isolating loneliness of a landscape that makes living so hard.

A century ago, in the fen country around Ely in Cambridgeshire, many acres of land would often flood in winter, and then "the little fen villages seated upon their small hills" stood up out of the water "like castle-crowned islets in Swiss lakes." Some people went skating when the floodwater froze, and there were days of "picturesque beauty" as in paintings by Dutch masters. But for those who lived in the villages, these floods could mean tragedy. Rarely was life "so starkly grim."[18]

Poverty was extreme in many other parts of the English countryside during the nineteenth century. It therefore gives pause for thought that those who had experienced the hardships of rural life and came to write about them could still appreciate the beauty of their surroundings. An outstanding example is John Clare, the "peasant poet" of Northamptonshire. His editors comment that much of what he wrote could have become merely sentimental in the hands of a more conventional writer, but what made the difference was that Clare "knew village life from the inside." He referred to the regular periods of unemployment that were part of the farming year as "leisure's hungry holiday," and knew all the agonies resulting from the enclosure movement. At the same time, his observations "of flowers and bird life are those of the finest naturalist in all English poetry."[19]

The paradox of natural beauty in a rural scene full of oppression is more explicit still in Flora Thompson's description of harvest in the English Midlands. Having grown up in a laborer's cottage, she remembered "night scents of wheat-straw and flowers . . . and the sky . . . fleeced with pink clouds. For a few days . . . the fields stood 'ripe unto harvest.' It was the one perfect period in the hamlet year." The work of harvest, too, was enjoyed when, "in the cool dusk of an August evening, the last load was brought in." But then comes the sharp stab of reality, as Thompson remarks that it did not do to look below the surface and notice the starvation wages. Describing the harvest celebration, she remarks: "The joy and pleasure of the labourers in their task well done was pathetic, considering their very small share in the gain. But . . . they still loved the soil and rejoiced in bringing forth the fruits of the soil, and harvest home put the crown on their year's work."[20]

So in this inquiry into the meanings people find—or construct—in landscape and in work on the land, it may be worth reaching back to an earlier period, beyond the contradictions of nineteenth-century romanticism. In medieval poetry, for example, one finds a powerful feeling for Nature in the world of Hildegard of Bingen and Francis of Assisi, as well as in thirteenth-century sculpture portraying leaves, fruit, and flowers. One can find it also in the way Thomas Traherne, during the seventeenth century, wrote about his sense of identity with Nature: "Your Enjoyment of the World is never right, till every Morning you awake . . . and look upon the Skies and the Earth and the Air as Celestial Joys . . . till the Sea it self floweth in your Veins, till you are Clothed with the Heavens, and Crowned with the Stars."[21]

This represents what was referred to earlier as a participatory consciousness—a sense of being involved in nature— and we contrasted that state of mind with the detached consciousness that has been associated with the growth of science over the last three centuries. Intermediate between the two is the sense of wonder at and longing for harmony with nature expressed by some modern scientists,[22] as well as poets and painters.

Disregarding this intermediate position, there is a contrast to be drawn, then, between two ways of looking at nature. On the one hand, there is participatory experience of the vividness and purposiveness of everything in the world, and on the other there is the more detached outlook within which all such talk is fantasy. Some people would say that to acknowledge feelings of any kind can only get in the way of a proper scientific approach. Individuals who take this view prefer their science to be presented as "the experience of no one." Their thinking tends to be object-centered (as defined in Chapter 2), and they seek to avoid working in an involved, participatory way, which they think would lead to bias.

Participatory Technologies

Many of the traditional craft technologies discussed in Chapters 2 and 3, including wheelwrights' work, pottery, and many kinds of metalwork, were practiced in a participatory way, with the individual worker feeling a strong personal involvement with materials, and making full use of the vital immediacy of sight, touch, and other senses. The skills of the soil scientist have also been mentioned in drawing a comparison between detached classroom experience and moments of "participatory" insight, when soil was actually dug up and felt between the fingers.

Of course, prescientific peoples in all parts of the world required knowledge and skill related to the landscapes in which they lived, and inevitably, this knowledge was at first of a participatory kind. It was the knowledge needed for hunting, gathering, or growing food and for obtaining other necessities: materials for making shelters, fibres for ropes

and clothing, herbs for medicinal use. And it was knowledge that could be gained only by experience of the most practical, involved kind.

It is often assumed that early human populations could exploit their local landscapes to obtain food, fuel and shelter, without disrupting the environment, but this is another romantic illusion resulting from modern mythmaking. Our tendency to assumed that all "primitive" peoples lived in harmony with nature is a reflection of what we would like nature to mean for us. No human groups ever had a painless way of fitting into their environment. Some groups, indeed, devastated large areas, or employed destructive methods of hunting (for example, driving herds of buffalo over cliffs).[23] Attitudes and skills capable of correcting such damaging activity were learned only slowly.

During the thousands of years in which humans have lived in Australia, many of the larger marsupials were forced into extinction and the landscape was modified by systematic burning of vegetation. The philosophy of harmony with nature developed by Aborigines in more recent centuries is the result of a painful earlier process of learning to curb destructive tendencies and to live in a way that the landscape could accommodate. Not all peoples achieve this, and it is not true that early hunter-gatherers were instinctive conservationists. Those who survived into recent times were able to survive precisely because they managed to learn restraint, often by developing mythologies that encouraged a "reverential attitude to the creatures they kill, and to nature as a whole."[24] Any surviving descendents of twentieth-century civilization will, in the long run, be those who similarly evolve an attitude of restraint.

Another kind of technology related to landscape (and seascape) in which non-Western peoples were often highly skilled was navigation in trackless deserts, in snowy wastes, or at sea. On the Pacific Ocean, for example, people could travel by canoe from one island to another, undertaking voyages lasting several days out of sight of land. Their navigation techniques depended on integrating several kinds of sense experience relating to winds, waves, seabirds, the smell of distant land, the apparent color of water over reefs, and the sun and stars. Swell patterns in particular could provide many clues to the location of islands, and were recorded by means of "stick maps" formed by lashing slender sticks together in complex geometric patterns.

Although Polynesian seafarers have lost many of these skills through contact with the West, people of the Caroline Islands have continued to practice traditional navigation and have intrigued and puzzled mathematicians with their skills. Visual thinking of a high order is involved in distance estimates, as also in using astronomical knowledge to represent a conceptual "star compass." But serious mistakes are rare, and the smells, swell patterns, and bird life associated with the destination island are usually observed at the expected point in the voyage.[25]

Travelers on land also used the stars for navigation, especially across the deserts of the Middle East, but landscape features more often provided means of establishing position and direction. Thus the Inuit people of the Arctic can undertake long journeys in apparently featureless tundra and ice fields without getting lost because they pay close attention to snow contours, ice features, the quality of what's underfoot, and the wind. The Inuit can visualize large expanses of landscape as a map, but a significant part of their skill is related to language. Their vocabulary compels geometrical precision, and hence influences observation of land and ice. Thus the Inuit do not simply say that a rock projects from the snow "over there." They have to say "over there and up" (or "down," or "on the level").[26]

In Australia, the aboriginal people used song in a similarly precise way, with tune, rhythm, and words combining to describe the topography of vast deserts, conceived in terms of distinct traverses, each defined by its own song. But the songs are music and poetry as well, evoking memories of that particular landscape, and what the Ancestor did there.[27] Indeed, most traditional systems of geographical knowledge incorporate expressions of memory, values, and feelings, as Western Apache place-names in Arizona do, for example.[28] That is what distinguishes these knowledge systems as participatory.

So although it is well worth enquiring how traditional navigation functioned, we deceive ourselves if we think that Caroline Islander astronomy or Inuit snowscape specifications can be wholly translated into the language of scientific discourse. The fact is, these systems of navigation and geography are more than scientific knowledge, and carry other meanings to do with sense of place, and with life in a particular landscape. That is shown by what happens when people are displaced from their traditional way of life, or are forced to leave their traditional territory. Whereas they might adapt knowledge based on scientific study to new surroundings, people who depend on participatory experience rather than the knowledge achieved by detached minds can be fundamentally disoriented if transferred to a fresh environment. When people from hunter-gatherer communities have lost their land to colonists, or because of alien concepts of land tenure, they have commonly been engulfed by a terrible loss of meaning. Breakdowns and suicides become more common, people turn to drink, and there are community-wide dislocations. One person involved in this kind of situation has said: "We feel you are wanting to take away the spirit life . . . if you take away the power to control this land."[29]

In South America, where indigenous forest dwellers have been displaced by gold diggers, road builders and cattle ranchers, the result is to compel people to live "in a profound state of disharmony." Moving from forest villages to live in the poverty-stricken fringes of Lima, Bogota, La Paz, and São Paolo, "they have lost the meaning of their lives, the memory of the creation of the world." The Brazilian Indian who spoke these words makes the point that it is not only the injustice of losing their land that hurts, but the human and ecological disharmony.[30]

It would be easy to feel that although many such "backward" people have experienced great trauma, which illustrates the strength of their attachment to a place, personal and emotional upheavals have always been a part of modernization. But we should also note that for many such people, historical episodes with moral implications are remembered by the places where they occurred, and those who fail to remember the names of those places—hills, crags, trees—forget their own history also.[31]

Thus the sense of place may sometimes be linked to memories of local ecological disasters, and incorporate generations of experience that may have taught people how to live within limits set by nature. If modernization consisted of the careful use of science to show how to live fuller lives within those same limits, modernization could be very welcome. But when we observe a ruthless process of uprooting peoples, undermining their quality of life, and discarding their memory and experience, then we should be reminded of how readily we forget our own history, in North America and Europe, of dust bowls and other ecological catastrophes. The latter perhaps seem to include merely local disasters in which few people actually died. But there are also less frequent episodes of demographic collapse such as that in fourteenth-century Europe, when a long period of overexploitation and misuse of land was a contributory factor, prior to the epidemic of bubonic plague.[32]

Many people in the West lack awareness of this, partly because our own traditions of writing history have been dedicated to celebrating progress rather than recording warnings. But in addition, our inheritance of a mechanistic worldview gives little scope for us to acknowledge participatory experience, and warnings that might have come from that. Yet even as we deny the reality of such things, many of us, on another level, still tend to feel deep meanings in landscape and nature. One indication is the sense of mourning, loss, even depression that Hamilton-Paterson detects among people living in landscapes being despoiled by industrialization, house building, or road construction.[33] Another is that a few people, most conspicuously artists, seem not fully themselves in alien surroundings. Not only do they have a strong sense of place, but as with the indigenous peoples just quoted, personal identity for them seems to derive something from landscape.

In North America, for example, there are celebrated poets of place such as John Steinbeck in relation to the Salinas Valley, Faulkner in Mississippi, and Frost in New Hampshire and Vermont. And today, Wendell Berry is well known, among environmentalists at least, for the novels and poetry he writes about his corner of Kentucky.[34] There is also Harold Horwood, author of a stunning, celebratory book about life on the coast of Nova Scotia (Canada), where he finds a "sense of contentment, a sense of being in a place where one wants to be. . . . Here you could well believe that man and the world grew up together, perfectly suited and matched."[35]

By contrast, Margaret Atwood's sense of Canadian landscapes is of their inhospitable character. There are problems "in acceptance of the land" such that the deserted farmstead is an important symbol. Meanwhile, Dennis Lee explores the inflections of being Canadian in another way, stressing the importance of occupying "imaginatively and with integrity, one's own life and land," because if we live in a place that is radically in question for us, "that makes our barest speaking a problem."[36]

For me, English examples are the most vivid, and especially the experiences of visual artists. Thus John Constable produced many of his best paintings in the landscape he had known as a child and to which he constantly returned. Reflecting the immediacy of his visual experience, there was meaning for Constable in minor details: "Willows, Old rotten planks, slimy posts & brickwork, I love such things. . . . As long as I do paint I shall never cease to paint such places." Similarly, Robin Tanner, artist and etcher, would pick out details of a scene: "finely forged gate handles," or a "magnificent ashwood hay rake." But if these were not part of his home area in Wiltshire, and did not fit his sense of place, "something came between these things and me."[37]

Other people also seem to discover what their lives mean partly through attachment to a home territory. L. T. C. Rolt, onetime engineer, found this in the hills of the Welsh borders, and any similar hills aroused "strange exaltation" in him. Arthur Ransome recorded that whenever he returned to his home ground close to Coniston Water after a long absence, he would go to the shore of the lake and in a personal ritual, "dip my hand in the water."[38]

Farmers might seem to have greater reason to identify with the landscape where they live than any of these writers and artists, but when detached, economic attitudes to agriculture as a technology prevail, not all do so. On the Grey Prairie of Illinois, farmers of German descent tend to be concerned with continuity of landholding, regarding ownership of land as a sacred trust to be passed on within the family. That is a philosophy of place, encouraging a mixed farming strategy to maximize security, if not income. It involves a shared commitment of time from several members of a typical farming family. By contrast, Yankee farmers, of English descent, are more commercially oriented and entrepreneurial, regarding land as a commodity and agriculture as a wealth-creating business. The land on Yankee farms is predominantly given over to grain crops, and there is little livestock of any kind. There is greater concern to maximize financial returns, but less emphasis on "preserving soils for future generations."[39] Detached attitudes dominate.

However, it is not only farmers who have strong feelings about land. A comment on the urban scene in America notes how modern people look nostalgically to former rural lifestyles, yet are unwilling to sacrifice the comfort, convenience, and cash that they find in the cities. So they attempt to hang on to the spiritual value of nature in the modified "arcadia" of the leafy suburb. Around 1900, when streetcars linked suburbs to the city, it was said that technology was "putting arcadia within reach of city dwellers who would otherwise be denied its moral benefits."[40]

Many urban dwellers develop a sense of place around purely man-made landmarks, and the links between place and nature are then broken. Works of architecture or engineering rather than hills, trees, and lakes become the most prominent aspect of people's surroundings. Thus apart from designing suburbs in which trees and flowers are ever-present reminders of pastoral landscapes, there is also in our culture an enthusiasm for works of engineering and urban/industrial development that create new kinds of landscape or impressive spectacles within the existing scene.

Marking Land and Cherishing Nature

Historians of science often talk as if there is an unambiguous distinction between the detached, disenchanted worldview inherited from the scientific revolution of seventeenth century Europe, and the more "primitive," organic view of nature that preceded it. One cannot deny a major change in habits of thought that may be dated from about then. But throughout this chapter we have noticed that modern people have feelings about nature and place that seem to represent a lingering residue of an earlier outlook. Even the most disenchanted and scientifically minded modern person quite often comes to identify with a specific point on the landscape and feels that he or she has put down roots there.

In other ways, apart from the way we develop a sense of place, landscape seems to invite responses from us. I discuss three kinds of response in particular, of which the first two receive fuller attention in the next chapter.

First, an impulse to mark the landscape seems an integral part of the sense of place, as we noted on the first page of this chapter, with reference to the grave in the Matopo Hills, and Monkey's insistence on marking the pillars at the end of the universe. Whether or not it is appropriate to compare it with the way animals mark breeding territories with their scent, this impulse certainly has a long history in human cultures. That is especially well illustrated by the rock paintings and carvings to be

found in many parts of Australia, Africa, and Europe, some very ancient. In all these regions, there have been peoples who modified places important to them by leaving marks that alter the earth. Their paintings or carvings are likely to have been connected with rituals or commemorations, sometimes connected with territorial claims or hunting or ancestors.

Although some of these marks—particularly the paintings—were the work of hunter-gatherer peoples, it is noticeable that these groups tended to mark the landscape only lightly. Richard Bradley argues that this is not because they lacked the capability or numbers to build larger monuments, but may reflect an attitude of respect for the land, or of feeling part of nature. The development of agriculture was associated with a changed attitude to landscape, Bradley argues. It was associated also with larger monuments for burial or ritual. In Europe, some of the most striking rock art was created when agriculture and pastoralism were still in their infancy, and hillside carvings seem to mark the furthest outposts of settlement or summer grazing.[41] Later, as much larger tracts of landscape were laid out with fields and houses, such ritual marking of the land no longer had much point. Buildings were more prominent landmarks, and later, in the medieval landscape, the church spire was a powerful pointer. Today, works of engineering as well as a great diversity of other structures mark the land, and we are conscious of the need for ritual marking only at the furthest limits of endeavor, as when we plant a flag on a mountain summit, or at one of the poles—or on the moon.

If these kinds of marking are one characteristically human response to landscape, a second response is the impulse to explore every detail of the place with which we identify as well as to adventure beyond its boundaries. Mumford comments that if "boundless oceans, starry skies, had not awakened his (or her) mind . . . the human would have been a very different creature."[42]

Third, though, many of us feel that we specially cherish certain features of our home ground. Sometimes also we encounter living things that seem so delicate and fragile that we feel drawn to protect them. That feeling may have stimulated the domestication of plants in ancient times. Today it is reflected in the houseplants, window boxes, or flower borders that many people maintain—and the animals they keep. Some of the peoples in South America and Australia quoted earlier cherish their lands as they cherish the communities to which they belong: The two things interlock. For a few artists also, the sense of place may be almost equally pronounced. Jane Howarth emphasizes the word "cherishing" in describing ways of valuing nature and place that carry these various connotations of caring for and protecting.[43]

Just as Part 1 of this book argued that technology by itself is better appreciated if we pay attention to human responses, so now we see that human impacts on the environment are better understood if we are aware of people's responses to nature and place. Equally, the work of conservationists is better informed if they understand the various ways in which people cherish plants, birds, and animals, even apart from their ecological significance.

One reason for valuing nature may be practical. People who are sick, or individuals who are stressed or suffering breakdowns, are found to benefit just by watching clouds drift across the sky, by seeing the slow changes in a growing plant or a bud bursting into flower. To enjoy such things can be to retune to a steadier pace of life. The seashore is especially good for retuning, because the expansiveness of the horizon, where it dissolves into sky, and the light glinting on water, combine with so many rhythmical experiences: waves, tides, and the flight of the many birds inhabiting coastal places.[44]

But we should be wary of valuing nature only as an aid to health, especially when we notice social scientists writing in manipulative language about measuring "quality of environment . . . by its capacity to promote behavioral or economic goals." These experts comment on how the importance of natural environment "in maintaining self-identity is firmly established in the psychological literature."[45] But one may still agree with Keith Basso that this analysis is too much rooted in a materialist, use-oriented attitude. Thinking especially of the Western Apache people, he comments that human groups everywhere "maintain a complex array of symbolic relationships with their physical surroundings . . . which may have little to do with the serious business of making a living." Scientists committed to measuring statistical regularities tend to miss this, because they regard the semiotic dimensions of the environment as epiphenomena, and they lack real interest "in what human beings take their environment to mean."[46]

Yet to understand what aspects of the environment are most strongly cherished and why, "should become part of our knowledge of human beings," Basso argues. Some ecologists know this, and have learned from the attitudes of indigenous peoples to their environments. However, what they have learned is usually formulated on a systemic level of abstraction, "well removed from the level of the individual." Basso then reminds us that "it is individuals, not social institutions," who make and act on the meanings of landscape and nature.[47]

Some thinkers, though, have learned more positively from the kinds of experience Basso documents. They talk much about "deep ecology," and seek a holistic philosophy that would integrate modern science into a more rounded approach to the understanding and cherishing of nature. Some who take this view suggest that "mind" or "self" is not a quality limited to humans and a few higher animals, but has ramifications for all the natural world.[48] Except in its most naive manifestations, this is not an attempt to reinvent nature as spirit, nor to reinvent God, but it could tend toward thinking of nature in terms of explicit purposes working themselves out.

That seems to me a dangerously overelaborate way of explaining why humans have a sense of being part of nature, with attachments to natural places. We do not need such elaborate explanations, because biologically, we are of nature, and as Chapter 1 argued, some of our sensibilities relate to processes and rhythms found throughout nature. The latter are related also to our sense of purposiveness and direction in life and are often reflected in music. But links between ourselves and nature are evident not only in our awareness of life's rhythms, but also, in a different way, in human responses to place.

In today's world, there is perhaps an increased sensitivity to nature among a minority who campaign to protect the environment, who study and enjoy the living things around them, and who celebrate their sense of place. In my own locality, there are "field days" in springtime during which people walk through and record their local landscape, giving expression thereby to their sense of attachment to it.

For the majority in modern consumer society, though, it is easy to feel that relationships that involve cherishing nature and place have all but disappeared. Many people prefer machines that express domination over nature through their noise and power: four-wheel-drive vehicles or speedboats, for example. Others seem to have turned their back on nature altogether to live in an electronically mediated world. The digital revolution, Mark Slouka remarks, demands that we should "move indoors to renounce the external world," because technology is now seen as the "new nature," with virtual reality (VR) regarded as more exciting, more "real" even, than what is dismissively denoted as RL (for "real life").[49]

But people are also withdrawing indoors "because the world outside our homes has less and less to offer," due to the decline in quality of life noted earlier. Along a major highway in California, Slouka notes numerous communities with "identical (and very expensive) houses . . . each with a two-car garage. The postage-stamp lawns are manicured, perfect and empty . . . no life outside the home is possible here. There is no playground, no park, no field or meadow."[50]

This way of treating the environment is characterized as "de-creation" by Hamilton Paterson, who describes an island in the Philippines that Japanese companies have de-created to make it into a holiday resort served by helicopters, hydrofoils, and high-tension lines.[51] The process is being actively pursued all over the world, and like the other authors quoted, Hamilton-Paterson discusses it with immense feelings of loss. Contact with landscape and nature that once contributed meaning to people's lives is drastically reduced. When people are not visiting Disneyland or commodified holiday resorts, what is left for them to do but live indoors, with their home entertainment systems and virtual pets?

The new lifestyle provides many opportunities for making money on a grand scale, and much of that money translates into power over media empires, and over the shape of the electronic worlds now coming into being. It is in those worlds that we are now expected to locate our sense of place. But as the next chapter suggests, there are other options with regard to nature apart from turning our backs on it and then de-creating it.

6

Exploration, Invention, and the Remaking of Nature

Invitations from Nature

Thomas Jefferson's book *Notes on the State of Virginia,* begun in 1780, is mainly a factual account of the economy and government of his own home state. But in some passages, strong feelings emerge about the land as a source of meaning, and even of virtue. He held that America had a unique opportunity "with such a country before us to fill with people and with happiness," and with such "an immensity of land courting the industry of the husbandman."[1]

The word "courting" here is especially appropriate in expressing a part of human experience of landscape and nature, for we can feel so strongly drawn to specific places, or to specific activities within the landscape, that it is as if nature were indeed "courting" us, or "inviting"[2] our participation. Reflection on my own responses leads me to associate a landscape not seen before with feelings of anticipation, and definitely, with being invited to explore, or to linger and even settle. Readers have challenged the appropriateness of this language, but if I am to explain what I often feel about landscape, words about being invited or courted are those that come to mind. Equally, some places, such as the tops of mountains, can invite one to leave a mark: another stone added to the summit cairn, perhaps, or initials scratched upon a rock.

Feelings like this may relate to the sense of place discussed in Chapter 5 in either of two ways. We may feel invited to use, cultivate, or explore the nooks and crannies of a place we already know well, and to which we are already attached. Or the newness of an unfamiliar territory, or even the arrival of spring, may awaken an impulse to go further, exploring the unknown. Mabel Shaw, living in Central Africa in the 1930s, expressed this second feeling by commenting that in the first days of the dry season, the "sting and sparkle, freshness and fragrance" of early morning "filled one's inmost being with a strong wanderlust; to be on the road; to see Lake Tanganyika lying like a dream of still loveliness; to pitch one's tent in the vast forest."[3]

If this is seen as an authentic human response, it may need to be understood as arising from *participatory* experience of landscape, using this term as it was defined in Chapter 3. Then the contrast is quite clear with the *detached*, analytical style we often prefer.

Biologists and ethologists emphasize that an exploratory drive is part of everybody's makeup, and is present in animals also. It is an urge as basic as hunger, and is easily observed in laboratory animals and domestic pets. Exploratory behaviour is especially prominent when mammals are young, as they begin to learn what their surroundings offer in terms of food or shelter—and what hazards they need to avoid. On this level, exploration is part of the play behaviour of animals and humans that was discussed in Chapter 4 (where bibliographical references are found). There we saw that playful exploration can lead to collecting and classifying objects from the environment. But it can also include a ruthless curiosity, as when a child pulls some legs off a spider to see if the creature can still walk, or captures a butterfly and detaches its wings.

We have already noted that primeval humans did not easily live "in harmony with nature," nor do children. Rather, as they grow up, they find themselves increasingly moved by conflicting impulses. The sense of place and of identity with a home territory is in tension with an urge to explore way beyond that territory's limits. The impulse to protect and cherish small animals, flowers, gardens—perhaps whole ecosystems—is in tension with a destructive curiosity about nature. It may be in tension, too, with the need to use natural resources, and sometimes with aggressive urges to hunt or exploit. One expression of that tension is that some hunter-gatherers had rituals for asking forgiveness of the animals they killed.

Not only are we more aware of conflicting impulses as we grow older, but the way we resolve tensions among them may change. A retired British politician who is now prominent in movements to protect the

countryside recalls how, as a boy, he enjoyed shooting starlings with an air gun, until one day he saw a bird he had injured writhing in agony, and was too upset to shoot any more.[4]

Even William Wordsworth, whose poetry so strongly suggests harmony with nature, admitted that in boyhood he took eggs from birds' nests, and set snares to catch woodcock. Going out late to see what he had caught, he felt "a trouble to the peace" of the starlit night. He also occasionally took a bird trapped by "another's toil," that is, in another man's snare, and that "Became my prey."[5]

Wordsworth writes of this as if it were one of "the coarser pleasures of my boyhood days." Other writers see it as a phase in the childhood of most boys (rather than girls).[6] One might guess that it was an impulse that, to a degree, persisted into adult life in former hunter-gatherer societies, but that, as with the two examples quoted here, it is an impulse that many modern people grow out of. However, for a significant minority, destructive impulses not only persist and influence attitudes to nature, but may be reflected in attitudes to people also (as we shall see in Chapter 8).

But interest in other animals was never limited to the destructive activities of boys who killed birds or insects. There has always been admiration as well for animals that could run very fast, swim well, or fly. When the horse was domesticated during the Bronze Age, its speed when running seems to have been the quality that people most envied and wished to appropriate for themselves. About 2000 B.C. in the Middle East, a pair of horses harnessed to a chariot could enable men to travel at speeds never before experienced. So the sun god, traversing the heavens each day from horizon to horizon, was imagined to be drawn by horses. And here, as in so many branches of technology, invention that appealed to the imagination (or was useful in warfare) preceded practical, utilitarian developments. Harness that enabled the horse to be used for heavy haulage, or to be saddled for easy riding, developed much later than the chariot.

The flight of birds had immense imaginative appeal in most cultures, and there were many legends about people who attempted to fly. It is wrong to assume that humans invented flying only in the twentieth century. "Man has always been airborne in his imagination."[7] In China, kites large enough to lift people were made centuries ago, and in the West, practical balloons were invented before 1800. People also experimented with wings, at first trying to make them flap. In the 1890s, though, Lilienthal showed how the principles of gliding could be used. In the next decade, another aviation pioneer developed his ideas about aircraft design in part by watching an albatross that glided with motionless wings above a ship he was on in the South Atlantic.[8]

The antiquity of the impulse to fly has sometimes been recognized in a limited, literary way. In the 1920s, an author who referred to the new power of "mechanical flight" commented on how often this was described by allusion to the old story of Icarus,[9] whose father made wings for himself and his son to fly from Crete to Greece. Arthur Koestler also commented on basic themes that keep cropping up in fiction and myth, and talks about ancient and persistent preoccupations that psychoanalysts have discussed in terms of "archetypes."[10] These are themes that connect with something "obscure and latent" going back beyond all modern expressions of technology, one example being the struggle to wrest power from the gods. This the legendary Prometheus did when he stole fire and gave it to man—and then was punished by being chained to a rock. Some historians have developed nice metaphors for the modern age of rapid technological progress—the period since the start of the industrial revolution—by asking: How did Prometheus escape from his chains? Who unbound him and released his creative energy? How did he enable humans to escape the inhibitions that had previously limited their inventiveness? The answer Prometheus himself gave to the last question was: "I sent blind hopes to settle (human) hearts."[11]

In discussing this archetypal struggle to control fire and all its power, Koestler mentioned many parallel legends, including the story of Adam eating of the tree of knowledge and more recent legends, such as that of Faust. He noted that these stories all describe human efforts to acquire power over nature, and they all offer warnings about the dangers of such an enterprise. Not only was Prometheus punished, but Icarus flew too near the sun, and waxen components in his wings melted.[12]

Although the search for Promethean power may become an obsession for some people (including the builders of bombs and rockets), obtaining more limited powers of motion or flight can be liberating in an innocent, enjoyable way. To set off on a journey and be able to choose one's

speed—walking, cycling, riding a horse, driving a car—is to fulfill one's sense of individual capability and freedom. The very feeling of motion becomes a pleasure to be enjoyed.

Part of this enjoyment may again belong to our animal inheritance. When otters (for example) are playing, if they find a steep bank, wet and slippery after rain, they may slide down it, then run round and slide again repeatedly. Motion such as that is in itself enjoyable. Animal play may be explained as a process of refining muscular skills so that controlled but rapid motion is possible when needed for hunting, or to run from danger. Human sports and games can perform a similar function and are undoubtedly enjoyable too. The availability of horses, chariots, bicycles, and now cars can enable us to dramatize and reenact pleasures of motion and control first experienced in play.

Some of the ideas that are common currency regarding inventions such as the bicycle and automobile are influenced by rhetoric about the impact these inventions have had on society, and the way this has determined patterns of social change. In many instances, though, this form of words puts matters the wrong way around. Many inventions arise from the impulse to play, the enjoyment of motion, and the sense of being invited by nature to explore or imitate. It is these impulses that are the sources of the impacts discussed. It is they that are the causes of change, if we must speak in causal terms.

Similarly, in the modern world of computers, we can observe play and exploration in users' behaviour, and a sense of liberation. Here also, much is said about the impact of computerization, as if we were dealing with something that has come on us like a meteorite from nobody knows where. The reality is that the source of this technology is as much human as other major inventions. Like literacy, printing, firearms, bicycles, and automobiles, computers are self-revealing inventions. It is what we learn from them about ourselves—our impulses, purposes, abilities, and potential—that makes these technologies seem revolutionary.

Explorations and Journeys

Although human responses to nature may include impulses we can recognize also in playing otters and galloping horses, or in a human desire to fly like birds, one of the strongest impulses is that which makes us wish to explore the world and undertake hazardous journeys. Although this is an impulse that individuals in most human groups have experienced from time to time, people have varied greatly in how they explain it to themselves. In some societies people "went walkabout," and in others they went on pilgrimages. Christopher Columbus thought of his own explorations in mystical, often Biblical terms, sometimes seeing himself as a latter-day Noah.[13]

Captain James Cook, by contrast, was much more like the prosaic and rational investigator that a scientist is supposed to be. He was given to few expressions of feeling, and had a specific, scientific objective for his first voyage: to observe the 1769 transit of Venus from Tahiti. He was like a scientist also in that "nothing . . . gave him greater satisfaction than exploding myths and establishing truth," notably about the Great Continent that some had supposed must exist in the South Pacific. In that respect, Cook's greatest achievement was to prove a negative.[14]

Underneath his reserve, though, Cook was driven by restless energy and a willingness to persist with possibilities that others had not the courage or vigor to pursue. In January 1774, when his ships were at their furthest point south in Antarctic seas, Cook was "not sorry" that ice blocked the way into even more inhospitable regions. Significantly, too, he admitted that "ambition" had led him so far, and that this was "not only farther than any other man has been before me, but as far as I think it possible for man to go."[15]

Historians seem at a loss, however, to explain the ambition of explorers, especially those nineteenth-century men (and some women) whose expeditions into the unknown (as Europeans saw it) seem to defy all reason. In the exploration of Africa, for example, there is little clarity in any account about the motivations of individuals, some of which, indeed, seem to reflect "purposiveness without purpose." But Alan Moorhead offers two significant comments. First, many of the explorers seem to have been "born with something lacking in their lives," and experienced "a fundamental restlessness." Second, some felt "impelled to go back again and again." Yet they were rarely touched by the beauty or grandeur of the African landscape. It was all seen as "hostile, incomplete, not to be regarded with an aesthetic eye until . . . reformed and reduced to order."[16]

By contrast, English explorers may have been attracted to the polar regions by the awesomeness yet tranquility that icebound landscapes inspired. However, English expeditions were often characterized by "poignant absurdity" and incompetence. Whereas Scandinavians such as Amundsen were glad to learn from the Inuit inhabitants of the Arctic how to travel, hunt, and fish in that terrain, English explorers sometimes starved as a result of their contempt for Inuit methods.[17]

That was especially and tragically true of Franklin's search for a northwest passage through arctic seas north of the Americas, in which his ships were crushed by ice and men died of hunger. Was there not some purpose that apologists for this venture should have acknowledged, apart from the commercial value of a northwestern route to Asia, if one should be found?

Having posed the question, an otherwise unremarkable book on arctic exploration points to motives relevant not just to exploration but to other aspects of science and technology, speaking of "the poetry, almost the mysticism, behind the long search." Once a problem is set, its solution becomes an imperative, "as Everest soars and must be climbed." Behind the scientific curiosity in exploration lurks something "harder and more primitive, something that can make myths, found systems of thought, and people the empty seas." Herbert Read is quoted as speaking of moments when an artist "is carried beyond his rational self, onto another ethical plane." The quest for the Northwest Passage was "so extraordinary a phenomenon of the human spirit" that it must be seen in those terms.[18]

The deficiency of this account is that it sees only nobility in what might otherwise be regarded as a destructive obsession, and does not recognize the negative aspect of quests and imperatives. Another author, writing about Ranulph Fiennes, a modern adventurer who has walked to both the South and North Poles, wondered if he is driven by a wish to be always testing himself. Linked to that, "something fundamental is missing—a lack of interest in and understanding of other human beings."[19] Similar things were said about Jean Batten, a pilot who made record-breaking solo flights between Australia and England in 1934 and 1936. She seems to have been entirely absorbed by her enthusiasm for flying, and was "the greatest navigator and all-round aviator of her day." Yet her life was a "lonely tragedy." It seems almost that her achievements were an outcome of that loneliness.[20]

Noting how people of comparable personal character become involved in maritime exploration of an "obsessive" kind, Hamilton-Paterson wrote of Robert Ballard's search for the wreck of the *Titanic* as a quest pursued with such determination that it was as if some "private thing" had been lost, not just a shipwreck—as if he were searching some "psychic deep" within himself.[21] A clue to what might be missing, and what is being searched for, is again that many of these adventurers seem to have lacked understanding of the more intimate side of life.

There may be a connection here with the findings of psychologists quoted in Chapter 2 that some individuals drawn to work in engineering appear to be slightly autistic, and prefer research with an object-centered focus. It could be that some people became explorers in the nineteenth century for similar reasons. They had a greater interest in the physical shape of continents than in the people inhabiting them, and maybe were drawn to polar regions because there was nobody else there. Solo flights and voyages would have a similar appeal. Among explorers, as among scientists and inventors, a compulsive interest in a project or "quest" does therefore seem to be one direction in which object-centered interests can take a person.

Remaking the Landscape

When Thomas Jefferson wrote of America as a land "courting the industry of the husbandman," he was thinking, quite clearly, of wild landscapes being tamed and used for agriculture. He did not envisage such a drastic remaking of the landscape as we so often encounter today, when whole tracts of countryside can disappear under the concrete of freeways and flyovers, dams or urban sprawl. In many people's experience, technology has largely displaced nature in the immediate environment of their lives. Ezra Pound expressed the positive side of this displacement when he saw New York lit up at night: "Here is our poetry, for we have pullled down the stars to our will."[22] But half a century after Pound, Jacques Ellul put the matter in a different perspective by remarking that the current aim of civilization was to replace the "natural milieu" of people's

lives with a "technical milieu" in which "everything that goes . . . to make livelihood, habitat and habit is modified."[23]

The technical milieu has become a reality since Ellul wrote to a quite extraordinary extent, partly through the alteration of landscape, but partly also as the electronic media have become so prominent that they seem to become an alternative world to which some people withdraw. That raises again issues that emerged toward the end of the previous chapter. The human impulse to mark the landscape was originally a response to the sense of place and a primitive need to demarcate territory. But land use is now so intensive that in many places, it has begun to extinguish the human meanings associated with place. Questions need to be asked about different ways of using land and the balance among them. But for some people, the point of balance has long been passed, and the conditions of their lives are depressing to the human spirit.

To present the modern environmental crisis in terms of low morale and loss of meaning is not the usual approach, though. More commonly, the crisis is seen as a question of biodiversity, pollution, or resources. The focus of this book on matters of personal experience and existential meaning may seem much less important. Yet the economic and ecological degradation of the environment has a counterpart in human experience of alienation and loss that needs to be recognized. Indeed, the remaking of the world as a technical milieu—and now the remaking of the genetic basis of life—raises urgent questions on every level: existential, social, and economic, as well as ecological.

As some people see it, the drive to replace nature, at least partly, with a technical milieu is the great modern gamble. The question they have in mind is whether this new order is something we can support over a long period. Is it sustainable? Can we maintain the production of crops, energy and other essentials in a world where many natural processes have been modified or replaced? This is the bet of the century—the twenty-first century—not only because of the risks inherent in replacing natural systems, but also because the aim is not a new equilibrium, but a world of continuous change, equated with technical progress and economic growth. Associated with this is the attitude that if there are problems with our technical world, we need more technology, not less, to solve them.[24]

The latter point has to be considered in the knowledge that air pollution is already altering weather systems throughout the world, and that the extinction of plant and animal species is becoming as momentous as the great extinction associated with the disappearance of the dinosaurs. Few wilderness areas remain unaffected by human activities, with tourists and refuse tips now even in Antarctica (although fortunately, there is a fifty-year ban, from 1998, on mining and oil exploration south of latitude 60°S).

Even so, Bill McKibben is largely correct in saying that "the separate and wild province, the world apart from man," has been gravely compromised. Or as others have said, we have created a world in which people find themselves "bound fast in a new ice age of technology and bureaucracy" in which shallow optimism and synthetic scenery are provided by Disneyism in all its manifestations, but real nature is hard to find.[25]

Another kind of synthetic world, though more transient and also more thought-provoking with regard to how people feel about transformations of landscape, is suggested by the artist Christo, who has explored the significance of human marks on the land, and on monuments in towns, with his famous plastic curtains and wraps. More soberly, Richard Long and Andy Goldsworthy are artists who have investigated the meaning of landscape by making their own patterns with stones, twigs, branches, or leaves on smooth beaches or grassy hillsides. These tend to demonstrate human modifications of the landscape that "feel" appropriate,[26] just as some painters and poets portray landscapes with human-made fields and roads that seem fitting and even beautiful.

In this context, the civil engineer can rightly feel that his or her constructions have potential to add meaning to the terrain, rather than, as critics may say, despoil it. Indeed, the engineer can point to a tradition of feeling that it is proper and right for humans to leave their mark on the land; that landscape can be charged with meaning,[27] and that nature can be "hallowed" by human activity. As one modern poet says:

Nothing but human use can glorify
field, mist, air or light
common possession and the common right.[28]

But there is considerable tension between different views about this. "To some people, a river valley is incomplete, unfulfilled" if it is not traversed by a road or flooded by a dam. "To others the opposite holds." Part of the problem is that in many places, there is already too much development. One line of electricity pylons can be thrilling, like a row of giants stalking the land. But a network of pylons and cables makes the countryside a prison camp, trapping us in the concrete jungle that so often spreads rampantly around the pylons' feet. We are faced with the vanishing of entire landscapes, and it is this that "threatens us most" as on one Pacific island that has lost all its indigenous birds, and "the quietness of death reigns where all was melody."[29] And the destruction of forest landscapes in South America and Africa means that fewer migrant birds return north each year. In Europe, as in North America, the noise of road traffic more than ever replaces birdsong as the predominant rural sound.

Yet it has been widely accepted as permissible and appropriate for large parts of the natural landscape to be entirely replaced by a man-made technological environment. The development of cities presupposes this for limited areas, but industrial societies take over many other areas for transport infrastructure, mines, and factories. The nineteenth-century industrial landscape, "with its cavernous factories draped in smoke" was quite often seen at the time as a legitimate expression of "man's new powers of transformation." It was understood in terms of the "technological sublime" as something that could rival or perhaps replace the sublime in nature.[30] Today, the smoke of that kind of environment is regarded with distaste, but not the principle of a wholly transformed landscape. Wilderness, forest, and farmland are giving way to cityscape and concrete jungle on every continent. It is necessary, then, for us to ask where the balance lies between ways of using land that are humanly and ecologically valid, and ways of marking and using it that both depress the human spirit and irreversibly destroy ecosystems.

Engineering and Gardening

If we look at different ways in which people have tried to define where the balance between nature and technology should lie, there is a range of ideas to consider, extending from the ancient art of geomancy through the ideal of the garden and the Enlightenment concept of a middle landscape to modern concepts of sustainability. Before considering these, however, it is worth noting two engineering approaches, Chinese and European.

One of the most eloquent expressions of the latter is to be found in the autobiography of L. T. C. Rolt, a British engineer who found great satisfactions in a career in mechanical engineering—building engines and harnessing the elemental forces of fire and steam—but who then felt appalled by the dirty, denatured industrial city that this activity had created, and by the impoverished lives of many of those employed there. Later, though, he found a happier balance between engineering and nature in the English canal system, whose waterways were small enough in scale to enhance rather than dominate the landscape, and whose earthworks and aquatic features provided many new niches in which wildlife could flourish. Some of the same things have been said about old canal systems elsewhere in the world, such as those of Lombok and Bali in Southeast Asia. This kind of engineering did not attempt to dominate or replace the natural world by an industrial one. It could express "harmony with nature."[31]

In another of his books, Rolt seems to identify himself with nineteenth-century engineer James Nasmyth when he was confronted with a bleak vision of industry during a visit to the English "Black Country." There, "the earth seemed to have been torn inside out. . . . Its entrails are strewn about . . . and the smoke of the ironworks hangs over it . . . Amidst these flaming, smoky, clanging works, I beheld the remains of what had once been happy farmhouses, now ruined and deserted . . . surrounded by clumps of trees, black and lifeless."[32]

Both Rolt and Nasmyth, through conflict within their own lives, exhibited the desire for technology to be used in ways that harmonize with rather than threaten nature. Both were gifted and enthusiastic engineers, yet were appalled by some of what engineering led to, and both retired from the engineering profession relatively young.

In China, over many centuries, a comparable dilemma about what harmonizes with nature and what does not was reflected in discussions between two schools of thought in hydraulic engineering: one favored "confining and repressing Nature," the other preferred "letting Nature take her course."

In his volume on civil engineering in China, Joseph Needham showed that engineers who took the latter view were mainly Daoist (Taoist) in philosophy, and where irrigation works were concerned, believed that the building of dams should be avoided, and that other structures should work in partnership with nature, such that "a good canal is scoured by its own water; a good embankment is consolidated by the sediment brought against it." The opposite view prevails now, in modern China, otherwise the high-risk Three Gorges dam would never have been contemplated.

Needham further described a great irrigation scheme in Sichuan province, built about 200 B.C., and capable of watering thousands of acres without resort to a "big dam" approach. Some long time after it was completed, two temples were built overlooking the headwaters of the main canal, to commemorate the engineer-administrators responsible for its construction. As Needham said: "The Chinese were never content to regard notable works of great benefit to the people from a purely utilitarian point of view." With their characteristic sensitivity to the significance of human marks on the landscape, and their ability "to raise the secular to the level of the numinous," they could see beyond practical engineering to deeper meanings. Moreover, the statues and inscriptions in the temples are not only of religious significance, and not only praise the builders, but they also include texts poetically setting out the engineering principles of deep channels and low spillways that the works embody.[33]

Such Daoist sentiment, which is not against technology, but which avoids the attempt to conquer nature by means of massive forms of construction, may be a philosophy that can be adapted to address some of our present dilemmas. The irrigation scheme that it celebrates, if accurately reported, is also an example of sustainability, having been in operation for more than 2,000 years.

Better known today is another Chinese tradition regarding land, complementary to the way of thinking just quoted. Sometimes referred to as geomancy, but also well-known by its Chinese name *feng shui* (which means "wind and water"), this can be compared with European traditions in alchemy (Chapter 3) to the extent that it refers to authentic participatory experience. As in alchemy, there is also a tendency to mystification, although the subject matter is land forms and "energies," rather than metals and "virtues." Undoubtedly, in many parts of China, *feng shui* helped create landscapes in which buildings were sited in a balanced visual relationship with hills and water (sometimes including artificial lakes, as at the Summer Palace west of Beijing).

One further way in which peoples of many cultures have expressed their feelings about the relation between human artifice and the natural world is by making gardens. It should come as no surprise, then, to notice that the Chinese have long been enthusiastic about gardens (in which water was often a feature), and about the study of botany and horticulture.[34]

Mumford stressed the importance of the garden during an early phase of human innovation, when plants were being domesticated and pottery was first made. Traditions established in this phase of human history may well linger in all cultures where horticulture and agriculture are practiced. One visitor to the famous and lovely garden in France that belonged to Monet, the Impressionist painter, saw it as an expression of widely shared values. "People of all nationalities, from all over the world, were wandering round, all understanding what they saw without need of interpretation. The love of human creativity and natural life in that garden was . . . palpable and overwhelming in its intensity."[35]

But the garden as a vision of gentle creativity and harmony with nature is not the only possibility. Much conventional gardening today aims at excessive tidiness and neatness through drastic overuse of chemicals. Historically, where the ideal of technology as controlling and overpowering nature was as influential as it is today, gardens were often strictly geometrical in layout and heavily dependent on mechanical technology. It is no coincidence that the great gardens of Europe during the period of the scientific revolution were of this kind, with the skills of hydraulic engineers reflected in their elaborate fountains (as at Versailles).

Medieval Islamic culture showed a similar mechanical emphasis. Gardens were places to escape from the scorching deserts of Syria, Arabia, and Iraq, and depended on a good deal of technical artifice to overcome this arid aspect of nature. Many references in Islamic poetry, and in the popular *Arabian Nights,* mention gardens "watered by crystal brooks," or "shaded by palm trees and refreshed by a gentle flowing stream" in which "apples, plums and quinces hang in clusters from the boughs." Always there was water and shade to make a welcome contrast with the harshness of the surrounding deserts, and much water was also needed to ensure the survival of fruit trees. Elaborate supply systems were designed using canals, aqueducts, and tunnels. Fountains were often contrived as garden monuments, and these frequently depended on lifting water to a high cistern using a wheel with a chain of pots or other mechanisms. In medieval Baghdad, the machine and the garden worked in partnership, and both were subjects of intellectual interest. Water engineering, with its aqueducts, header tanks, pipes, water-raising wheels, and occasional pumps, made the garden possible. A book written in A.D. 1206 mentions pumps with metal cylinders associated with designs for garden fountains. It is remarkable, indeed, how often the most demanding technical problems that engineers have had to solve relate to monuments rather than objects of utilitarian concern.[36]

But although Islamic gardens might require the use of elaborate technology, much of it would be hidden, and in the garden itself all one would see might be a fountain or pool. More expressive of the ideal of partnership between nature and technology is the garden into which some aspect of everyday technology is openly introduced. Today, many people do this without aesthetic intent by allowing a parked car to dominate their limited garden space. Others ornament their plots with items expressive of a lost rural lifestyle, such as old wagon wheels, barrows, or horse plows. Such gardens seem to be saying that there was once a form of technology that could be seen as a partnership with nature, but no longer.

More positive was the image of machines in a garden illustrated in a schoolbook of 1910, with models designed for teaching children about the principles used by different power sources: steam, wind, and water. Taken individually, many of the small machines represented could be seen as examples of human mastery over nature, but presented in a garden setting surrounded by big trees, they took their place beside flowers and a neatly mown lawn as portraying a balance between nature and artifice. For one reader of that schoolbook, at least, this garden implanted "a longing to participate in a world in which the works of nature and human kind do not conflict but complement each other."[37]

The Middle Landscape

Daoist engineers in China and gardeners in many cultures expressed a view about how technology should be used that had parallels with the ideal of a "middle landscape" discussed in the United States from about 1780. For example, one of Thomas Jefferson's correspondents characterized the western frontier of settlement as a place where men behaved "no better than carnivorous animals," but at the same time, he described Europe as possessing an oppressive society of great estates, and landless people in poverty. Midway between lay the good farmland and "fair cities" of the eastern parts of America, one region of which was described by another writer as a "middle state, between the *savage* and the *refined*." Here was a land of "substantial villages, extensive fields . . . decent houses, good roads, orchards, meadows, bridges." America was "a place apart—a peaceful, lovely, classless, bountiful pasture."[38]

This, then, was a "middle landscape" in which nature was modified, but not obliterated, by the creation of meadows and orchards. And it presented an ideal with which Jefferson greatly sympathized, even while he recognized that the industrial revolution was taking root in America. His book about Virginia expresses views on this that, we should note, incorporated a social ideal. He wanted to fill the country "with people and with happiness," and looked on farming as a morally improving way of life that would contribute to that goal.[39]

Jefferson admitted these views to be "theory only," but a pastoral ideal remained strongly alive in America. Leo Marx has argued that the idea of the continent's landscape as a garden—a scene of productive and virtuous labor—has stirred deeper feelings in American culture than the apparently more exciting frontier ideal of the Wild West. The middle landscape was the garden ideal in another guise. It was a province where "sufficiency" was emphasized more than economic growth, and where the husbandman was "free of the tyranny of the market."[40]

Gardens and farms of this kind express feelings of attachment to land, and they mark the landscape in a way that expresses the sense of place that an attachment brings. In those respects, there seems to be some continuity with primitive attitudes to landscape and nature. In other ways, however, the idea of harmony with nature expressed by a garden

or middle landscape is quite different from the relationship with nature felt by many of the hunter-gatherer peoples mentioned earlier. For some of them, Nature was a world of spiritual activity—of the Earth mother, the Great Spirit, and the living spirits of animals and trees. By contrast, the people of the Enlightenment who spoke about middle landscape would regard nature as a world of impersonal forces. Farms and gardens were technologically contrived by countering those forces with ax and plow.

Moreover, the contrived garden was valued more than nature's garden. When European colonists first arrived in Virginia and other of the milder parts of North America, they encountered such a profusion of fruit, flowers, trees, and game that they sometimes felt they were already in a garden where "scarlet blankets of strawberries painted the bellies of (their) horses . . . and grapes bowered the streams and rivers." Frederick Turner commented that in describing it thus, if this was a garden, "the whites wanted it not as it was but only as they might remake it," by cutting back the trees, shooting the wildlife, and banishing the native peoples whose "nature religion" the Europeans found disturbing.[41]

The middle landscape was essentially a remade garden, harmonizing with nature to a degree, but artificial in its control of planting and wildlife and its use of machines. Moreover, the early phases of industrialization could often fit neatly into this middle landscape. The first factories were powered by waterwheels and had to be dispersed along the rivers. Usually they were not very large, but David Nye comments that "even the Amoskeag and Lowell factories, which reached impressive proportions, were at first perceived to be in harmony with the natural order." The steam-driven factories that came later more often "dominated their surroundings and were understood to be dynamic, unnatural environments."[42]

The middle landscape was in many respects the creation of "scientific consciousness," reflecting confidence in human control of nature, and human ability to improve on natural landscape. But yet there is a residue of feeling in the writings quoted, which implies the lingering influence of more traditional, participatory responses.

The same mixture may be encountered in the very different social context of a nineteenth-century Russian estate as it was described by

Tolstoy. On a day when the landowner was inspecting a new threshing machine, indeed, his thoughts were switching from participatory to scientific modes. He looked at the sunlight on the threshing floor, and "at the white-breasted swallows that flew chirping in under the roof . . . then at the peasants bustling in the dark dusty barn." What was the purpose of all this? Was it really just about producing grain to fill one's belly? The swallow seemed to indicate an answer—but then his mind reverted to its habitual, scientific way of thinking, and "he looked at his watch to reckon how much (was) threshed in an hour."[43]

Much discussion of agriculture in the West proceeds on the assumption that farming has only economic meaning: the kind of meaning with which Tolstoy's landowner was dealing when he timed the work of the threshers. Farmers are regarded as entrepreneurs whose land is merely an investment, and who plan their strategies for growing crops or raising livestock solely with a view to the best possible financial return. This ignores the way that farmers may be motivated by the social and personal meanings they find in their work. Far from trying to maximize financial returns, they may be thinking of the security of their families while at times making decisions on the basis of what they like doing, and what gives them satisfaction. As Tolstoy's landowner watched some peasants bringing a hay cart home, a woman "broke into song," and others joined her, their voices in unison. There ought to be room for satisfactions of this kind, Tolstoy implied.

If this were just a comfortably placed writer with a romantic view of agriculture, his point might not be worth our attention. But harvest celebrations were once widespread, and are mentioned also by those who write from a laborer's point of view (Chapter 5). At harvest time in Ireland, every wagonload of oats brought back into the stackyard was "like the end of an act of creation." After the last load, "elated and set free we began at once to make ready the Harvest Dance."[44] Tolstoy is surely right to show how satisfactions of this kind gave meaning to farming even while economic calculations were important and necessary. Similarly, Jefferson's interest in science and its application to farming coexisted with a strong sense of the social and moral meaning of agriculture. The middle landscape was not only (or even mainly) a way of thinking about farming in relation to nature. It also implied an ideal for society.

Currently, questions are often asked about agriculture of the kind that depends on chemical fertilizers and pesticides, elaborate machinery, and monocropping. Comparisons are made with various forms of agriculture that are said to be "sustainable," involving fewer (or no) chemicals and emphasizing mixed cropping (or indeed, mixed farming with livestock complementing crops). This can easily lead to a wholly technical discussion about what practices are sustainable in the long term, but there is sometimes another dimension to the debate as well. Those who feel concerned about the environmental implications of modern agriculture also tend to be uneasy about farmers who have no sense of place and appear alienated from local communities. There may seem to be a correlation between these rather detached attitudes and interest in the most modern techniques. By contrast, advocates of sustainable agriculture may start with ecological concerns that were hardly recognized before the twentieth century, but often come back to a quasi-Jeffersonian solution at the social level. Ideas about committed farmers, family holdings, and a gardenlike middle landscape tend to reappear.

For example, one book that gave technical detail about soil conservation, biodiversity and sustainable levels of energy use also presented agriculture as a "cultural activity that provides meaning, cultivates moral responsibility, and continues traditions of caring for the earth and future generations." The book showed why it is important to understand how human society, land management practices, and farm technologies can evolve together as a system that "values humans as well as the ecological components," and takes account of "environmental soundness, economic viability and social justice among all sectors of society."[45]

When it comes to the specifics of all this, the similarity with Jeffersonian ideals becomes very evident. Wendell Berry wrote "a defence of the family farm," and others have cited Amish, Mennonite, or German-descended farmers in the American Midwest and Canada as people who practice agriculture on a family basis, using techniques that approach sustainability (if not wholly, at least to a significant degree).[46] Such farmers, it becomes clear, create a diversified middle landscape even where they have not much considered the scientific or philosophical reasons for doing so. Moreover, they sometimes influence neighboring communities, occasionally negatively when they seem stuck in the past, but often positively through their example of self-help and environmental concern.

Modern Environments

During one of his trips into the virgin forests of Maine, Henry David Thoreau climbed Mount Katahdin, which at 5,268 feet (1,610 m) is the highest mountain in the state. Afterward he wrote: "Here was no man's garden. . . . It was not lawn, nor pasture, nor mead, nor woodland, nor lea, nor arable, nor waste-land. It was the fresh and natural surface of the planet Earth, as it was made forever and ever." That defines wilderness relative to middle landscape, as does Thoreau's comment that the vast forests of Maine were "inhuman," however beautiful, and "it was a relief to get back to our smooth but still varied landscape (in Massachusetts)."[47]

It sometimes seems that for many people in modern consumer societies, even middle landscape is too stark, the weather too variable, the necessity occasionally to walk too tiring. So they are happier relaxing indoors with their electronic entertainments. To take that attitude, though, is to say that land and nature no longer have meaning except as means to produce food and raw materials. We might as well leave living things to be engineered in whatever way scientists think will best enable the land to produce food for a growing population and profits for agroindustry. We might also just as well subscribe to the view that market forces will stimulate whatever innovations are required to keep us fed and clothed. If resources of some essential material or fuel begin to run short, the argument goes, prices will increase, and that will prompt inventive people and progressive companies to seek other materials to do the job, or find other sources of energy. Economists who think this way seem so impressed by human creativity that they believe people to have limitless capacity to invent new resources.

However, many aspects of the environment, including the atmosphere, soil structures, and biodiversity, are outside the scope of economics. So "a free-market approach to the global pollution crisis seems inherently impossible. No one owns the air or the water." With no private property for sale, there is no free-market price for clean air, and so no incentive to take measures that will keep it clean. Clever ways have been devised for getting around this, such as requiring every industry, household, or vehicle that causes pollution to have a permit before it may operate. If permits had to be bought, and were freely traded, their rising price could create market pressures that would tend to limit pollution.[48]

Something might well be gained this way, although most feasible schemes deal with only a fraction of the overall environmental problem—with pollution but not biodiversity, or with energy but not entropy. Modifications to industrial processes informed by the so-called natural step approach may take more account of these issues, but rarely the whole range.[49] Even then, answers on a technical level may be unrelated to the existential experience of people who feel alienated from nature, which may be a more serious part of the problem for all of us than we usually allow. For some communities, alienation from nature leads to abuse of the environment. For others, it is clearly a major source of unhappiness and ill health. Jerry Mander sees the fate of aboriginal peoples, such as those of South America and Australia discussed earlier, as a critical symptom. He also observes that Westerners lack the "sense of the sacred" possessed by many such people, and that as a result, our technology is too much oriented to "overpowering nature."[50]

It is striking, indeed, how many authors come back to ideas about the sense of the sacred or a reverential attitude to nature once the seriousness of the environmental crisis is recognized. For then it is apparent that this is not a crisis that can be dealt with merely by creating economic incentives to reduce pollution, nor by cleaning up industrial processes and using "environment-friendly" consumer products, however helpful such measures may be as a start. Changes in lifestyle and a fundamental redirection of values and goals are required also. Such changes, it seems to be thought, depend on recovery of the reverential.

For example, in discussing the alarming rate of extinction of animal species, Colin Tudge mentions human populations that eventually arrived at some degree of balance with the landscapes they inhabited. A sense developed among them that they shared those landscapes with the spirits of trees and animals. This made people sensitive about what they took from nature for food, fuel, clothing, and shelter. In other words, religious feeling seems to have been supportive of environmental values. But today, Tudge remarks, "we have largely abandoned religion," and some would add that the Judaeo-Christian tradition was anyway more likely to encourage exploitation rather than conservation. So there is a need, Tudge suggests, if not for a new religion, at least for attitudes that can perform its former function.[51]

Perhaps these new attitudes will derive from the philosophy of "deep ecology," as it has been expounded, for example, by Freya Mathews. She also wrote of the need for a reverent conservationist attitude and asked whether nature embodies "a spiritual principle." She then added that rituals of place stemming from the sense of attachment to landscape can contribute to ecological insight by making one aware of local detail, and the particulars of specific environments.[52]

Alan Drengson, another exponent of deep ecology, has argued in a comparable way that "humans are . . . meaning-creating beings" who need to invent myths and stories that convey values and meaning. Such myths are "vital for individuals and cultures." He then asks whether the "recovery of our larger visionary self" as it might be achieved through such mythmaking can be related to "technology practices so that they will be ecologically wise?"[53]

My own approach is somewhat different and more distrustful of modern myths and new religions. The field days held in my own locality might count as "rituals of place," but they comprise only walking, looking, and recording the landscape in which I live. Apart from that, one should not jump from recognizing the limitations of disenchanted materialism into the comfortable embrace of some reinvented religion.

Instead, I look for something more basic, namely an "affirmative way"[54] of keeping in touch with my own feelings, and of enjoying the wonderful vitality and musicality of nature, through visual and tactile experience and my sense of place, not least as the latter is expressed by gardens. Indeed, the garden, properly understood, could be a paradigm—a model—for all our dealings with nature, especially if we regard national parks, wildlife reserves and any field where nature is cherished as garden.

Michael Pollan discussed the garden as a place "where nature and culture can be wedded," and suggested an "ethic of garden" that would paradoxically "cultivate" wilderness while recognizing that humans need to modify landscape and attack pests and diseases to survive. The ambition of conquering the earth should be abandoned, he added, in favor of a more collaborative approach in which we borrow nature's methods, as in organic farming, and protect nature's diversity.[55]

With regard to diversity especially, even small suburban gardens can be surprisingly effective as refuges for wild animals and birds. In Britain, ornithologists with suburban gardens now record a wider range of species than their rural counterparts because of the damaging effects of chemicalized agriculture in many rural locations. White-tailed deer have flourished in the backyards of Cincinnati. A naturalistic garden near Nuremberg, Germany, has attracted 700 animal species (insects, birds, mammals), and a comparable garden in Leicester, England, has 1,800 (including some very rare insects).[56]

A more abstract way of looking at the issue, and of summarizing the argument, would be to see the garden as a place where the defined purposes of the human gardener, conservationist or farmer encounter the undefined purposiveness of nature. We have a choice between *either* imposing our own purposes without any compromise, *or* of understanding and working along with nature's own purposiveness.

There is a close analogy here with the way we encounter the purposiveness of nature in the rhythms of our own bodies, yet also have conscious goals for our lives. We can choose to force the pace and live a goal-driven life. That can lead to more stress than is good for our health, which may be compared with the effects of agricultural practices that seek to make nature conform to our patterns. Or we can periodically retune our lives to more natural rhythms, as suggested earlier in this chapter, by taking time to enjoy growing plants or to walk by the sea. Or, more fruitfully, we can find ways of combining our own defined purposes with a natural rhythm of life, as J. S. Bach did in music when he paced compositions to incorporate heartbeat and breathing rhythms while at the same time exploring mathematical patterns, emotional resonances, theological symbols—and anagrams on his own name.[57]

A garden, in the wide sense indicated earlier, can be the ecological analogue of that kind of music, allowing us to do most of what we want to do in agriculture and other technologies, but at an altogether different pace. A garden can be a paradigm for environmentally appropriate technology to set against the currently dominant paradigm that aims to remake nature and compel us to live entirely in a technical milieu.