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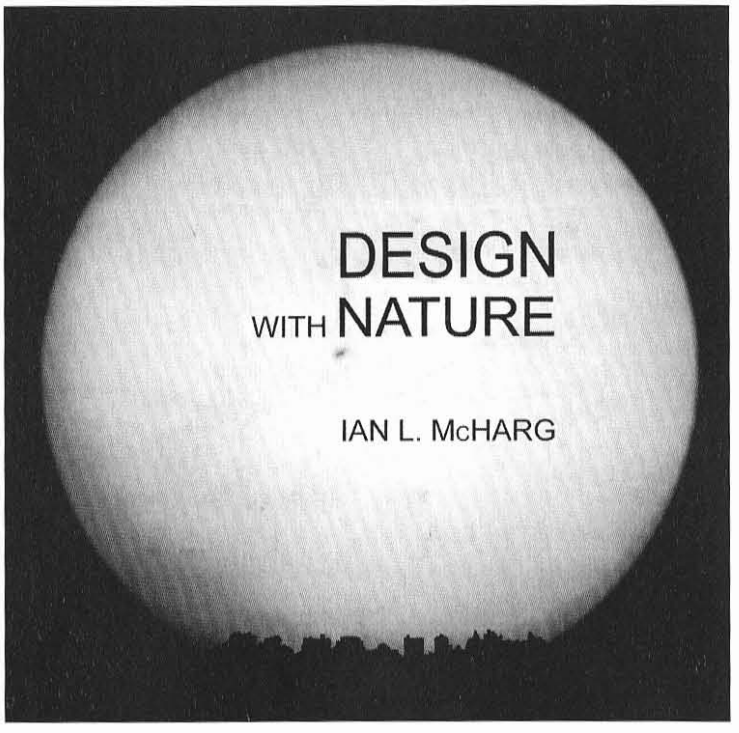
Ian McHarg, Landscape Architecture, and Environmentalism: Ideas and Methods in Context

Anne Whiston Spirn

In 1959, Ian McHarg introduced prominent scientists, humanists, and poets to landscape architecture by inviting them to speak in his course Man and Environment at the University of Pennsylvania. In 1969, he published *Design with Nature*, a finalist for the National Book Award and a book that led to fundamental changes in the teaching and practice of landscape architecture (Fig. 1). For the next decade, he promoted landscape architecture as the instrument of environmentalism and helped shape national policy on the environment. McHarg is among the very few landscape architects since Frederick Law Olmsted Sr. who have commanded widespread notice, respect, and influence outside the design and planning fields.[1] But what, exactly, are his contributions to landscape architecture within the context of environmentalism? While there is consensus on the importance of his influence, there is disagreement over the nature of his legacy. A perplexing figure, he has always generated controversy within the profession, at least among North Americans. The conflicts and inconsistencies embodied in McHarg's words and actions are those of the profession itself—the tensions between preservation and management, nature and culture, tradition and invention, theory and practice.

This essay draws mainly from primary sources—Ian McHarg's own writings, departmental archives, professional reports, interviews, and my own firsthand experience. I was a graduate student in landscape architecture at the University of Pennsylvania in the early 1970s and worked with McHarg in his office from 1973 to 1977. Some of the projects I discuss are ones I worked on myself, including the Woodlands New Community and Pardisan. Others are projects with which I had less direct experience. As a faculty member at Harvard from 1979 to 1986, I achieved some critical distance before returning to Penn as a professor (and chairman of the department from 1986 to 1993). I am grateful to Ian McHarg, Meto Vroom, Michael Hough, Carol Franklin, Narendra Juneja, and Richard Westmacott for their insights and information and to Michel Conan for his wise advice and encouragement.

[1] Books by Loren Eiseley and René Dubos were considered for the National Book Award in the same year but were not selected as finalists. While the profession seems to have a sense of entitlement about outside commendation, no one other than McHarg has attained the same degree of recognition and influence outside the field.



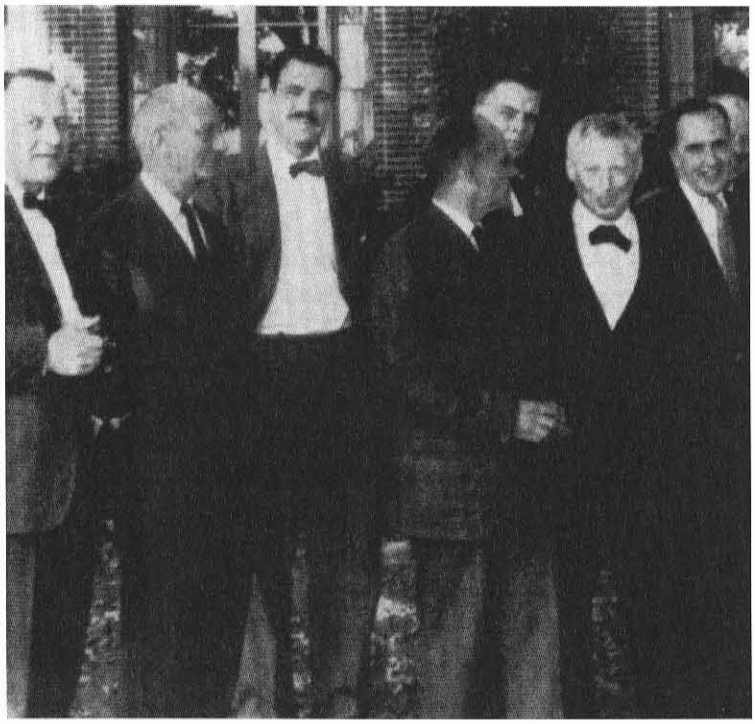
1. Design with Nature *(Garden City, N.Y.: Natural History Press, 1969) led to fundamental changes in the teaching and practice of landscape architecture.*

McHarg, Landscape Architecture, Environmentalism

Ian McHarg was born in Scotland in 1920, fought in World War II, then studied landscape architecture and city planning at Harvard University from 1946 to 1949.[2] After graduation, he worked and taught in Glasgow and Edinburgh, then returned to the United States in 1954 as an assistant professor of city planning at the University of Pennsylvania. At the time of his arrival, the Department of Land and City Planning, founded in 1950, was the most exciting planning program in the country. In a photograph from 1959, surrounded by colleagues at Penn, McHarg looks confidently into the camera (Fig. 2). He stands between Lewis Mumford and J. B. Jackson; to their right is William Wheaton, and to their left is David Crane, Louis Kahn, and Holmes Perkins. (All but Jackson were members of the Penn faculty.) Three years earlier, in 1956, McHarg had founded a newly reinstated Department of Landscape Architecture, for which he gradually built a faculty. The 1961 list of faculty and visitors included Karl Linn, as assistant professor, and Jack Fogg, a botanist, as an associated faculty member; Gordon Cullen, Aldo Van Eyck, and Denise Scott-Brown as research staff; and Garrett Eckbo, Philip Johnson, Dan Kiley, Robert Royston, and Peter Shepheard as visiting critics.[3] This list conveys McHarg's extraordinary ambition for the fledgling department; composed mainly of architects and landscape architects, however, it

[2] Among the courses he took was John Kenneth Galbraith's The Economics of Agriculture.

[3] Reproduced in Ian McHarg, *Quest for Life* (New York: John Wiley, 1996), 133.



2. Portion of a photograph by Grady Clay from Architecture, *January 1959, showing (from left to right) William Wheaton, Lewis Mumford, Ian McHarg, J. B. Jackson, David Crane, Louis Kahn, and Holmes Perkins (photo: courtesy of the Architectural Archives of the University of Pennsylvania)*

did not yet exhibit the remarkable range and depth of intellectual concerns that were to characterize the faculty by the end of decade. The ecologists and geologists who became influential members of the faculty later in the 1960s had not yet arrived.

The development of landscape architecture and city planning in the twentieth century and the context of American environmentalism put McHarg's contributions in perspective. Landscape architecture and city planning share a common history in the United States. Many of the first metropolitan and regional plans in the nineteenth century were developed for park systems that integrated recreation, transportation, storm drainage and flood control, and wastewater management, and that created a framework for future urban development. The authors of such plans were landscape architects like Frederick Law Olmsted and his sons, John Charles and Frederick Law Olmsted Jr., Charles Eliot, and John Nolen. Such landscape architects as these devised plans for entire new communities and were among the founders, in 1909, and first presidents of the National Conference on City Planning.[4] The first course in city planning at an American university was initiated in 1909 at Harvard University's School of Landscape Architecture. By 1923, the school offered a

[4] See Anne Whiston Spirn, "Urban Nature and Human Design: Renewing the Great Tradition," *Journal of Planning Education and Research* 5 (autumn 1985): 39–51; Cynthia Zaitzevsky, *Frederick Law Olmsted and the Boston Park System* (Cambridge, Mass.: Harvard University Press); John L. Hancock, "Planners in the Changing American City, 1900–1940," *Journal of the American Institute of Planners* 33 (1967): 290–304; Alex Krieger and Lisa J. Green, *Past Futures: Two Centuries of Imagining Boston* (Cambridge, Mass.: Harvard University Graduate School of Design, 1985).

city planning option in the master's degree program, and, in 1929, a group of landscape architecture faculty established the first school of city planning in America, with Henry Vincent Hubbard as its first chairman.[5] These events had a great impact on landscape architecture at Harvard and other universities. Those faculty who founded city planning were interested in broad social and environmental issues, and they and their colleagues in other institutions wrote some of the first city planning textbooks.[6]

The faculty who remained in landscape architecture, at least at Harvard, were primarily interested in garden and park design. When McHarg pursued joint degrees in landscape architecture and city planning at Harvard in the 1940s, he bridged a persistent schism there; later, in his teaching and practice, he reintegrated regional planning and landscape architecture. But the tension between planning and design in landscape architecture still persists.

Unlike McHarg, most landscape architects have neither the knowledge nor the interest to embrace the entire scope of the discipline—the shaping of landscape from garden to region—within their practices and theories. The synthesis forged by McHarg and others has tended to dissolve, not because of inevitable strains imposed by professional practice and the demands of specific projects, but because the study and practice of the two ends of the spectrum—garden design and regional planning—have tended to attract individuals of dissimilar temperaments who borrow methods and theories from disparate disciplines rather than generating them from within the core knowledge and actions of landscape architects.[7]

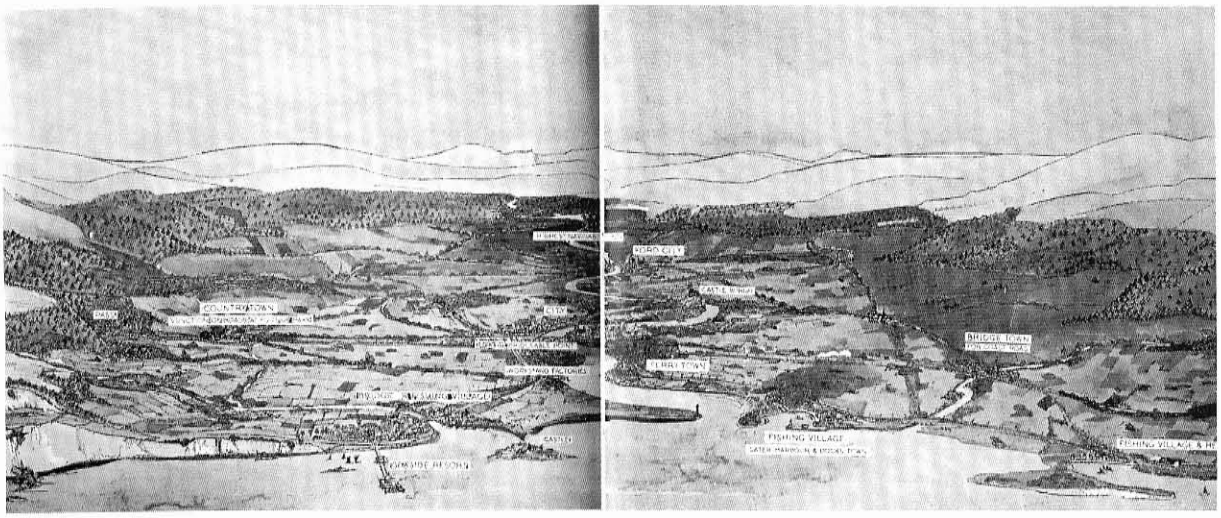
In Great Britain, a close relationship also existed between landscape and town planning, though they developed differently than in the United States.[8] Patrick Geddes, a Scottish biologist and geographer, advocated the unity of city and region as a basis for planning. He presented these ideas in an exhibit for the Cities and Town-Planning Exhibition of 1911 and elaborated upon them in his book *Cities in Evolution,* published in 1915. His ideas were influential in North America, particularly for Mumford and fellow members of the Regional Planning Association. In his autobiography, Mumford described how he imported Geddes's book from

[5] Hubbard was married to Theodora Kimball, the librarian responsible for the collections of the Schools of Architecture, Landscape Architecture, and City Planning at Harvard. When Hubbard and other faculty seceded from landscape architecture to form the new school, Kimball reclassified all related books to city planning. Norman Newton, personal communication, 1980. A young faculty member in landscape architecture at the time, Newton reported that this move generated hard feelings between those who left and those who remained in the School of Landscape Architecture.

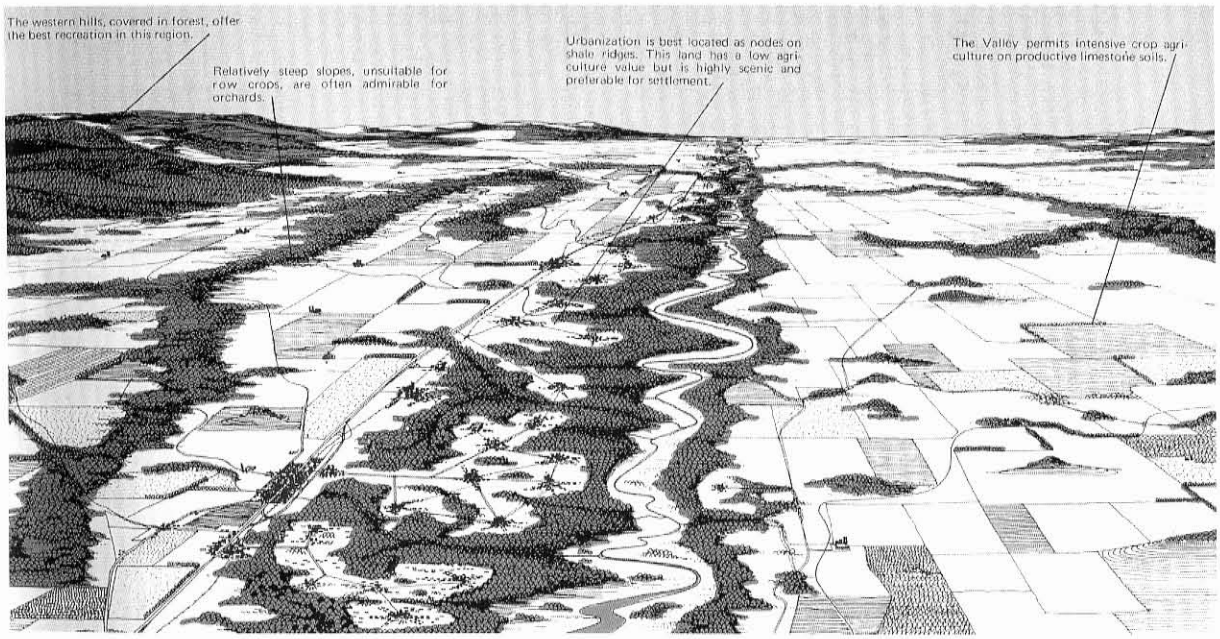
[6] Examples include John Nolen, ed., *City Planning* (New York and London: D. Appleton and Co., 1916), Theodora Kimball and Henry Hubbard, *Our Cities To-day and To-morrow: A Survey of Planning and Zoning in the United States* (1929; reprint, New York: Arno Press, 1974).

[7] Many tensions and contradictions in landscape architecture stem from inherent, unresolved conflicts among the disciplines it draws from. I have treated this subject in "The Authority of Nature: Conflict and Confusion in Landscape Architecture," in *Nature and Ideology: Natural Garden Design in the Twentieth Century,* ed. Joachim Wolschke-Bulmahn (Washington, D.C.: Dumbarton Oaks, 1997).

[8] J. C. Loudon produced a plan for metropolitan London, "Hints for Breathing Places for the Metropolis" (1829), discussed in Melanie Simo, "John Claudius Loudon: On Planning and Design for the Garden Metropolis," *Garden History* 9, no. 2 (1981): 184–201.



3. The "valley section" (from Cities and Town-Planning Exhibition *[1911], reprinted in Patrick Geddes,* Cities in Evolution *[London: Williams and Norgate, 1949]).*



4. Great Valley physiographic region, Potomac River Basin Study of 1965–66, reproduced in Design with Nature.

England in 1914: "No one can possibly guess the exciting effect of that book on me."[9] A new edition of the book was issued in 1949, the year McHarg returned to Scotland, and Geddes's papers were at the Glasgow College of Art, where McHarg taught a course in 1952.[10] Though McHarg does not acknowledge him as an influence, Geddes's "valley section," the model by which he organized his analysis of a city and its region, resembles the methods of McHarg and his colleagues from the 1960s (Figs. 3 and 4). That Geddes's work, its aims and methods, prefigured much of McHarg's does not diminish McHarg's contribution, but failure to appreciate the importance of Geddes's work as a precedent is telling. The desire to be seen as original is typical of landscape architects, who fail repeatedly to build upon prior efforts and often reiterate ideas without advancing them significantly.[11]

From 1897, when John Muir and Gifford Pinchot split bitterly over grazing rights in Yosemite, a persistent schism in American environmentalism has divided those who advocate preserving natural landscapes and protecting them from the disturbing influence of humans (Sierra Club, Wilderness Society, Earth First) and those who promote the "wise use" of natural resources (Resources for the Future, U.S. Forest Service).[12] The conflicting views of Muir and Pinchot are also embodied in McHarg's words and deeds: when he calls humans "a planetary disease," he speaks as Muir; when he proposes that natural resources be used wisely for human benefit, he sounds like Pinchot. In 1969, McHarg saw that "clearly there is a desperate need for professionals who are conservationists by instinct, but who care not only to preserve but to create and manage."[13] The conflict between preservation and change is McHarg's most persistent inconsistency, and it highlights the contradictory position of landscape architecture as a profession. As agents of change, landscape architects are inevitably entangled in this conflict.

Pedagogical and Professional Practice: Ideas in Action

For environmentalism, McHarg, and landscape architecture, 1962 was an important year. Rachel Carson published *Silent Spring;* McHarg taught a studio course with an ecolo-

[9] Lewis Mumford, *Sketches from Life: The Autobiography of Lewis Mumford, the Early Years* (Boston: Beacon Press, 1982), 150–51.

[10] McHarg says he was first introduced to the work of Geddes in 1951–53, but that he did not study it (*Quest for Life,* 112, 380). Nevertheless, Geddes's ideas were in the air, as evidenced by the reprinting of *Cities in Evolution* in 1949. Mumford, whom McHarg acknowledges as a mentor, was greatly influenced by Geddes. Mumford named his son "Geddes" and calls Geddes "The Master" in *Sketches from Life,* 152.

[11] McHarg ignored precedent when he asserted, as he has many times, "I invented ecological planning in the 1960s" ("Ecology and Design," in *Quest for Life.*) The importance of McHarg's contributions is not diminished when seen in the context of work by others such as Phil Lewis, Angus Hills, and Arthur Glickson, who pursued similar ideas from the 1950s and early 1960s, not to mention many prior figures, such as Patrick Geddes and Warren Manning. This tradition was not acknowledged in the Department of Landscape Architecture and Regional Planning at the University of Pennsylvania when I was a student there in the early 1970s, nor did we draw from it in our work at Wallace McHarg Roberts and Todd during that period. Though both department and firm made numerous innovations, there were also many reinventions.

[12] See Anne Whiston Spirn, "Constructing Nature: The Legacy of Frederick Law Olmsted," in *Uncommon Ground,* ed. William Cronon (New York: W. W. Norton, 1995).

[13] Ian McHarg, *Design with Nature* (Garden City, N.Y.: Natural History Press, 1969), 151.

gist for the first time, hired a forester as a full-time faculty member, and founded the firm Wallace McHarg with his colleague, architect and planner David Wallace. From 1962, environmentalism was fully integrated into McHarg's teaching and professional work, and he emerged as a leader who played an increasingly important role in shaping national environmental policy.

McHarg used his position at the University of Pennsylvania to develop ideas about environmentalism and landscape architecture through the speakers he invited, the faculty he hired, and the courses he taught. He tested and revised these ideas in practice, applying them to projects for specific clients in particular places. By 1969, the year McHarg published *Design with Nature,* Penn's Department of Landscape Architecture was among the leading programs in the world, much as his professional office, Wallace McHarg Roberts and Todd (WMRT), was among the foremost firms of landscape planning. From 1962 until his break in 1979 with David Wallace, William Roberts, and Thomas Todd, the ideas and methods of McHarg and his colleagues at Penn and WMRT evolved in a dynamic dialogue between theory and practice. The university studio was a place of theoretical experiment; the professional office, a place to test ideas in actual places, with real clients and programs.

McHarg taught his course Man and Environment throughout the 1960s and 1970s. "It permitted me," he says, "to invite the most distinguished speakers in the environmental movement for the illumination of students and the development of my knowledge."[14] The course consisted of thirty-six lectures: McHarg gave six, and the remaining were given by colleagues at Penn, like Mumford and Loren Eiseley, along with visitors from all over the country, including the anthropologist Margaret Mead and the biologists René Dubos and George Wald. Carol Franklin, a partner in Andropogon Associates and an adjunct professor at Penn, recalls that when she took the course in 1963, eight of the lecturers were Nobel Prize winners.[15] Most speakers were invited back year after year; they, in turn, invited McHarg to speak at their own institutions and to publish essays in books and journals that they edited. In 1960–61, he hosted a television series, "The House We Live In," organized for CBS in Philadelphia, which was based upon his Man and Environment course and featured some of its speakers. The course and the television series permitted McHarg to develop the philosophical and scientific ideas for his book *Design with Nature* and prepared the ground for its reception outside the profession of landscape architecture. Among the most influential ideas on his teaching, practice, and writing were the notions of nature as process, of places as products of physical and biological evolution, of adaptation and fit (René Dubos), and of man as a planetary disease (Loren Eiseley).[16]

Studio courses applied these ideas to landscape architecture. McHarg, with his colleagues and students, devised the methods for an approach he called "ecological planning and design" that was taught, used, and refined in studio courses and adapted to diverse

[14] McHarg, *Quest for Life,* 157.

[15] Carol Franklin, personal communication with author, 1998.

[16] Ian L. McHarg, "An Ecological Method for Landscape Architecture," *Landscape Architecture* 57 (January 1967): 105–7.

projects in the office. This approach emerged gradually, evolving with new refinements each year. To his first class in the newly reinstated Department of Landscape Architecture, in 1956, he posed a study of Cape Hatteras. The students' report explained processes of beach formation and erosion, the development of plant communities, and the relationships of animal communities to their habitat. Although the studio did not produce a specific plan or design, it was an embryonic first step toward ecological planning at Penn.[17] In 1959, Lewis Clarke, an Englishman, was hired to teach "the first ecological design studio" at Penn on Levittown.[18] Three years later, McHarg taught a planning studio for Harvey Cedars, a second-home development along the New Jersey shore, in which students studied natural processes and landscape form. William Martin, an ecologist, also worked with the studio, which provided the material for "Sea and Survival," the second chapter in *Design with Nature*. When Nicholas Muhlenberg joined the faculty in 1962, he introduced new ideas and authors into the curriculum. E. Lucy Braun's *The Deciduous Forests of Eastern North America,* for example, became an influential text. After Muhlenberg's arrival, the biome, the physiographic region, and the river basin provided an indispensable context for the curriculum at Penn. These remained the powerful, integrative core of Penn's landscape architecture curriculum for thirty years, thereby tying the teaching of landscape architecture theory, method, and practice to three key concepts of geography and environmental science and management.[19]

By 1962, McHarg was ready to try these ideas out with real clients on a real project. Wallace McHarg's first project was the "Plan for the Valleys," seventy square miles of valley farmlands and forested uplands north of Baltimore, Maryland. The region was in the path of an expressway that would bring new suburban development, and the wealthy residents had asked David Wallace to help them preserve the scenic beauty and environmental quality of the area. The firm based its proposals on an analysis of the region's natural resources and hazards, organized by its physiography, or what McHarg termed "physiographic determinism."[20] It recommended that new development take place on open plateaus and that wooded slopes and open valleys be preserved. In "Plan for the Valleys," McHarg stated the credo that would guide his work for the firm throughout the next seventeen years:

> The area is beautiful and vulnerable; development is inevitable and must be accommodated; uncontrolled growth is inevitably destructive; development must conform to regional goals; observance of conservation principles can avert destruction and ensure enhancement; the area can absorb all prospective growth without despoliation; planned growth is more desirable and as profitable as uncon-

[17] G. M. Cope et al., "Plan for Cape Hatteras" (Philadelphia, University of Pennsylvania, 1956). McHarg himself does not cite this project and describes a 1961 course by Lewis Clarke and a studio by himself in 1962 as the first ecological design and planning studios at Penn (*Quest for Life,* 167–70). I am grateful to Meto Vroom for telling me about this studio and for giving me a copy of the report.

[18] Michael Hough and Tony Walmsley were among the students in the Clarke studio.

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[20] McHarg, *Design with Nature,* 81.

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[20] McHarg, *Design with Nature,* 81.

> trolled growth; public and private powers can be joined in partnership in a process to realize the plan.[21]

McHarg the practitioner is, like Pinchot, a persuasive pragmatist. Practice has a creative role in refining and even generating theory, and practice is shaped by the types of projects for which clients seek professional advice, which is, in turn, influenced by socioeconomic, political, and cultural contexts. In the 1960s, McHarg's practice was shaped by the construction of the federal highway system and its effects on rural areas in metropolitan regions. After the New Communities Act of 1968, it was influenced by federal subsidies for new, planned communities. In the early 1970s, his clients were mainly private developers of new communities and resorts. By the mid seventies, after the energy crisis of 1973 and the economic recession of 1974, most of his clients were public agencies seeking to control and direct growth taking place in their region or to address environmental quality issues related to federal legislation. Managing the environmental consequences of suburban and exurban growth constituted most of McHarg's professional work from the time of his plan for the valleys in 1962.

In 1965, Secretary of the Interior Stewart Udall appointed McHarg to a task force of the American Institute of Architects on the Potomac River basin, and McHarg decided to use his studio courses at Penn to generate information, explore issues, and assume leadership of the task force. In *Design with Nature,* he presented a summary of work produced by students over the course of the year (1965–66), distilled from "five hundred maps and several pounds of reports."[22] In contrast to practice, the university offered McHarg the opportunity to frame problems, pose questions, and select sites. In 1969, he observed, "A professional landscape architect or city planner is limited in the projects he undertakes to problems presented by his clients. A professor, in contrast, suffers no such constraints and is enabled to undertake projects he deems worthy of study."[23]

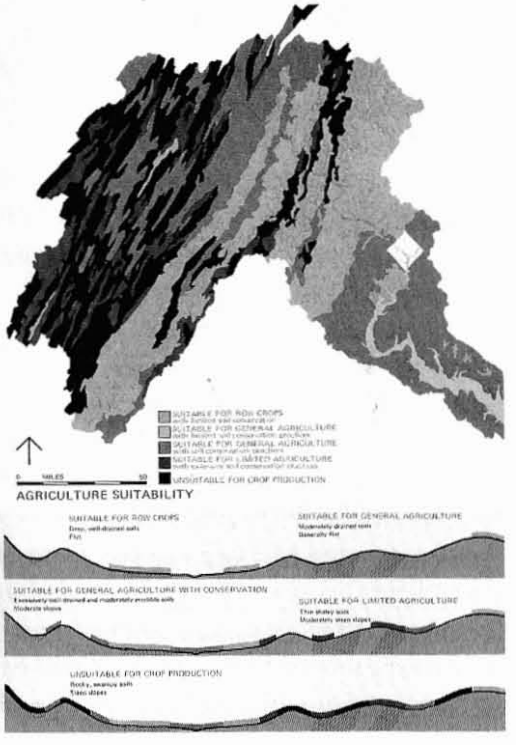
The Potomac River Basin Study was a seminal project. It used most of the methods that were later refined in professional and academic projects of the late 1960s and the 1970s, including the overlay and the matrix (Figs. 5 and 6). It was also the first study to combine the physiographic region and the river basin as the primary organizing context for ecological planning and design—a framework that linked past, present, and anticipated future actions and multiple landscape scales from garden to region. Bird's-eye views and sections of the diverse physiographic regions within the river basin (the Allegheny plateau; Ridge and Valley; Great Valley; Piedmont; and Coastal Plain) summarized patterns of topography, geology, soils, hydrology, vegetation, current land use, and potential uses deemed suitable for particular locations. These drawings invite comparison of patterns from region to region within the river basin; they bear striking resemblance to Geddes's "valley section" of 1911.[24]

[21] Wallace McHarg, "Plan for the Valleys," quoted in McHarg, *Design with Nature*, 82.

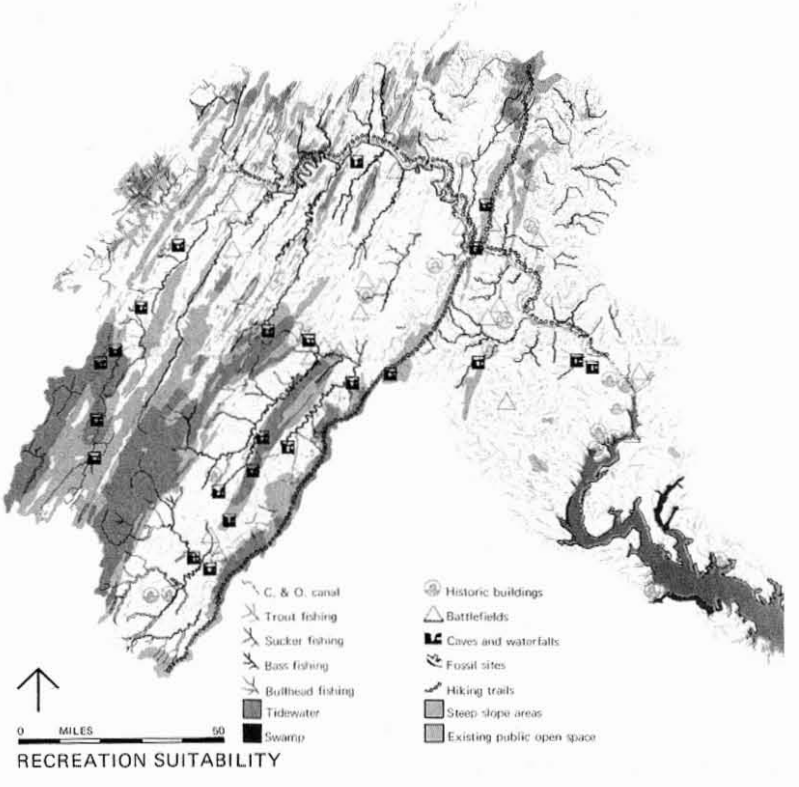
[22] McHarg, *Design with Nature,* 151.

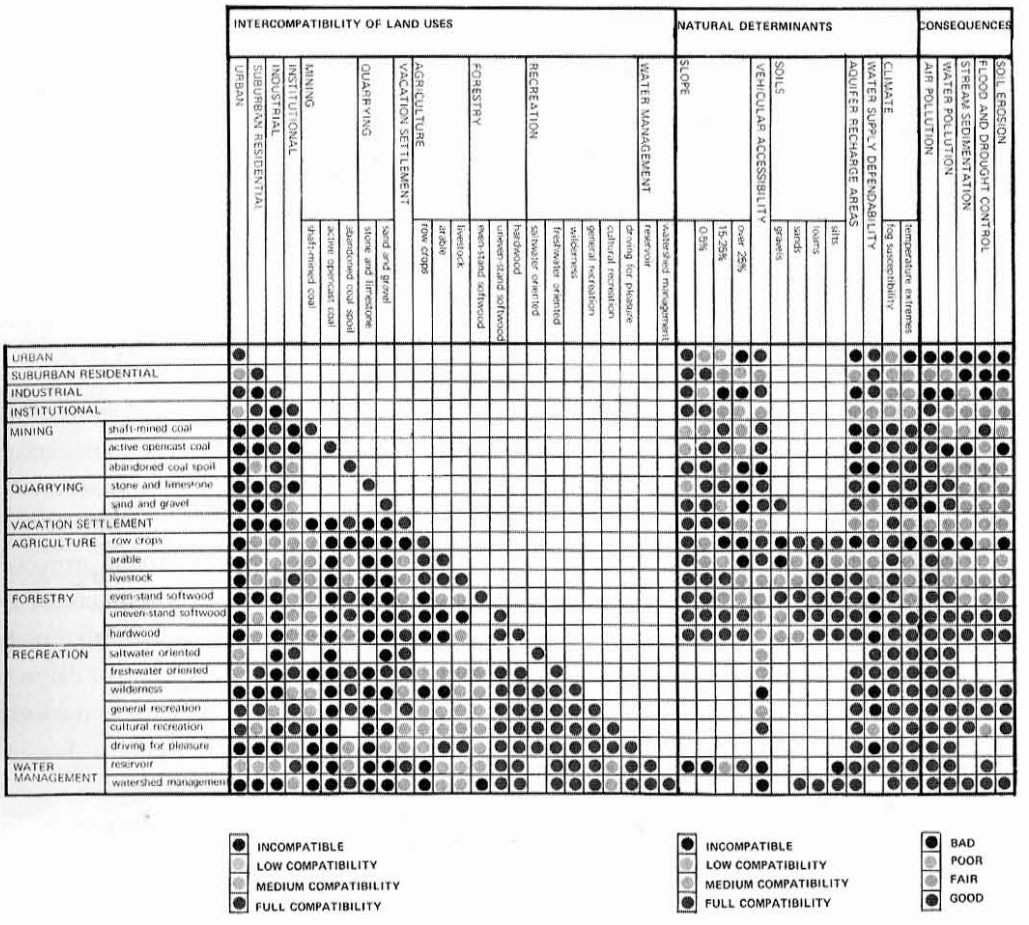
[23] Ibid., 127.

[24] See Patrick Geddes, *Cities in Evolution,* ed. J. Tyrwhitt (London: Williams and Norgate, 1949). The whole project is an exemplary application of Geddes's idea that city and region are an organic whole.



5. Overlays of factors to reveal spatial patterns of "intrinsic suitabilities" for diverse land uses, Potomac River Basin Study of 1965–66, reproduced in Design with Nature.





6. This matrix, which was employed to produce "suitability" maps, shows compatibility among diverse land uses and various "natural determinants" and records the planners' assessment of potential conflicts and their consequences. Potomac River Basin Study of 1965–66, reproduced in Design with Nature.

The students conducted a comprehensive survey of the river basin, which McHarg termed "the ecological inventory" and his students later came to call "the layer cake" or "the litany." It was always the same list, in the same order (climate, geology, hydrology, soils, vegetation, and wildlife), sometimes further elaborated by field. In 1967, he described the reasons for this ordering:

> Written on the place and upon its inhabitants lies mute all physical, biological and cultural history awaiting to be understood by those who can read it. This is the prerequisite for intelligent intervention and adaptation. So let us begin at the beginning. The place, any place, can only be understood through its physical evolution. Both climate and geology can be invoked to interpret physiography, the current configuration of the place. If one now knows historical geology, climate, and

> physiography, then the water regimen becomes comprehensible—the pattern of rivers and aquifers, their physical properties and relative abundance, oscillation between flood and drought. Knowing the foregoing and the prior history of plant evolution, we can now comprehend the nature and pattern of soils. . . . By identifying physiographic, climatic zones and soils, we can perceive order and predictability in the distribution of constituent plant communities. Animals are fundamentally plant related so that given the preceding information, with the addition of the stage of succession of the plant communities and their age, it is possible both to understand and to predict the species, abundance or scarcity of wild animal populations.[25]

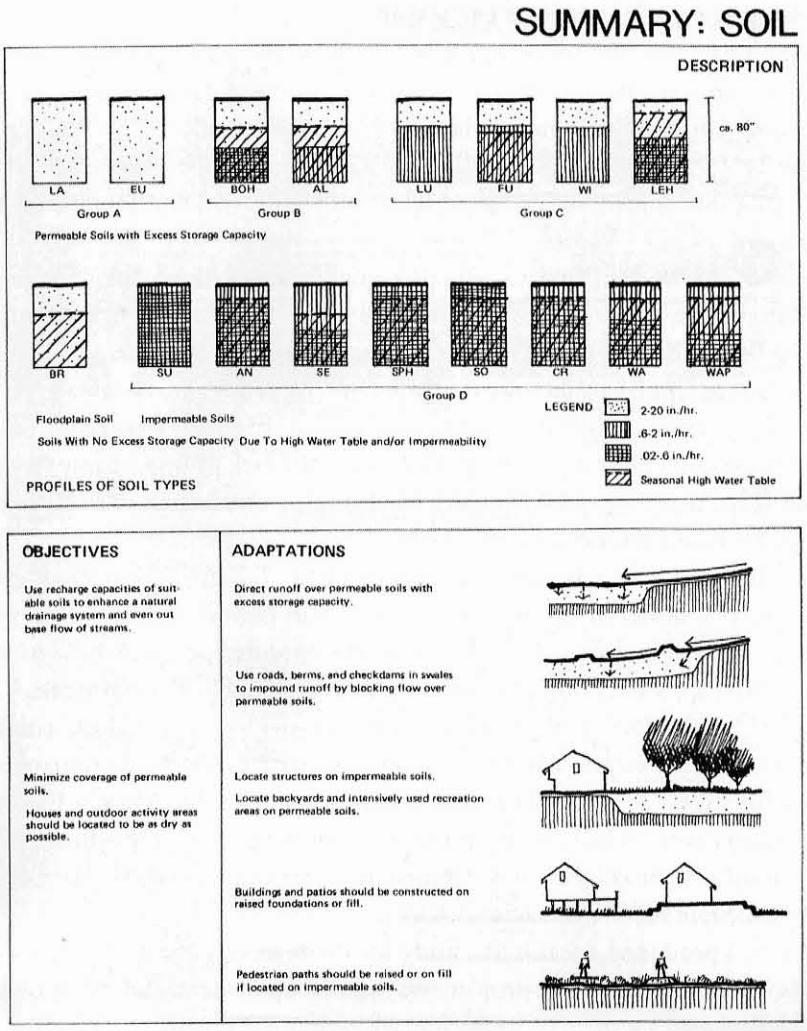
The inventory McHarg advocated and insisted upon in his teaching and professional projects "as a prerequisite for intelligent intervention and adaptation" has been attacked by some landscape architects for according too much weight to the insights of science as opposed to intuition. Others have criticized, even ridiculed, it for being unnecessarily comprehensive and too elaborate and expensive to undertake in most professional projects.[26] While these critics have a point, they lose sight of the most important aspects of the ecological inventory—its systematic comprehensiveness and the relation of different aspects of the environment. Such an inventory, applied consistently, is like the use of diagnostic gamuts in medicine, whereby the doctor is reminded, in examining patients and considering their symptoms, to check all their systems. The ecological inventory is also a diagnostic tool, a checklist of interrelated systems. In McHarg's practice, the inventory was adapted to the particular situation. It was used not only to understand how a place came to be, but also to identify problems and opportunities that might otherwise be missed and to focus not merely on what a landscape looks like but also how it functions and how it is evolving. In many instances, McHarg's systematic inventory of natural features and processes revealed important issues of which the client was unaware.

An ecological inventory by McHarg's firm, WMRT, for the site of Woodlands New Community, north of Houston, Texas, in the early 1970s, identified flooding, storm drainage, and groundwater recharge as overriding issues. The client wanted to build a new town in the midst of a pine and oak forest, but the site's soil and groundwater conditions were such that a conventional drainage system would have lowered the water table and destroyed the forest. It would also have caused flooding downstream and led to ground subsidence beneath Houston. These regional effects, in particular, would not have been identified with a less comprehensive approach to studying the site. McHarg and the staff at WMRT proposed a "natural drainage system" that would enhance groundwater recharge, abate flooding, protect water quality, and sustain the forest.[27] This innovative solution emerged from

[25] McHarg, "An Ecological Method for Landscape Architecture," 105–7.

[26] Carl Steinitz, in the course he taught at Harvard in the late 1970s and early 1980s, Methods in Landscape Architecture, often presented the most excessively detailed of McHarg's inventories for this criticism.

[27] See Ian McHarg and Jonathon Sutton, "Ecological Plumbing for the Texas Coastal Plain," *Landscape Architecture* 65, no. 1 (January 1975): 78–89; Anne Whiston Spirn, *Woodlands New Community: Guidelines for Site Planning* (Philadelphia: Wallace McHarg Roberts and Todd, 1973).



7. *Design recommendations linking goals and implementation were termed "adaptive strategies." (from Anne Whiston Spirn,* Woodlands New Community: Guidelines for Site Planning *[Philadelphia: Wallace McHarg Roberts and Todd, 1973])*

the situation of practice—the environmental challenges posed by the site, the pragmatic demands imposed by the client, and the values, theories, and methods of the landscape architects.

The plan for Woodlands provided the opportunity to link analysis and practice, planning and design, regional and local scales: to work from an ecological inventory of the eighteen-thousand-acre site, to a plan for the new town for 150,000 people, to devising strategies for its implementation in design (Fig. 7). Woodlands exemplifies McHarg's idea that planning and design are a tool of human evolution; WMRT staff invoke the language of evolution (e.g., "fit" and "adaptation") deliberately. Design recommendations linking goals

and implementation took the form of "adaptive strategies."[28] Much to the frustration of McHarg and his partners, the firm was not hired to produce ecological designs for individual developments within the new town. Though many aspects of the plan were innovative, and though the new community seems to have been a financial success, in many respects the design of the new community failed both aesthetically and environmentally. Plans alone do not ensure that goals are achieved, as they may be subverted by inconsistent landscape design and management.

By the early 1970s, McHarg was widely recognized as a successful ecological planner, but, as at Woodlands, he had been unable to expand his practice from the domain of planning into that of design. Clients tend to hire professionals who have successfully completed commissions similar to the one they are contemplating; thus McHarg continued to attract challenging environmental planning projects but, with one exception, failed to gain design commissions. Perhaps it was this frustration at the lack of opportunity to implement ideas in built form that prompted McHarg to champion and persist with a project in Iran despite his partners' misgivings and objections.

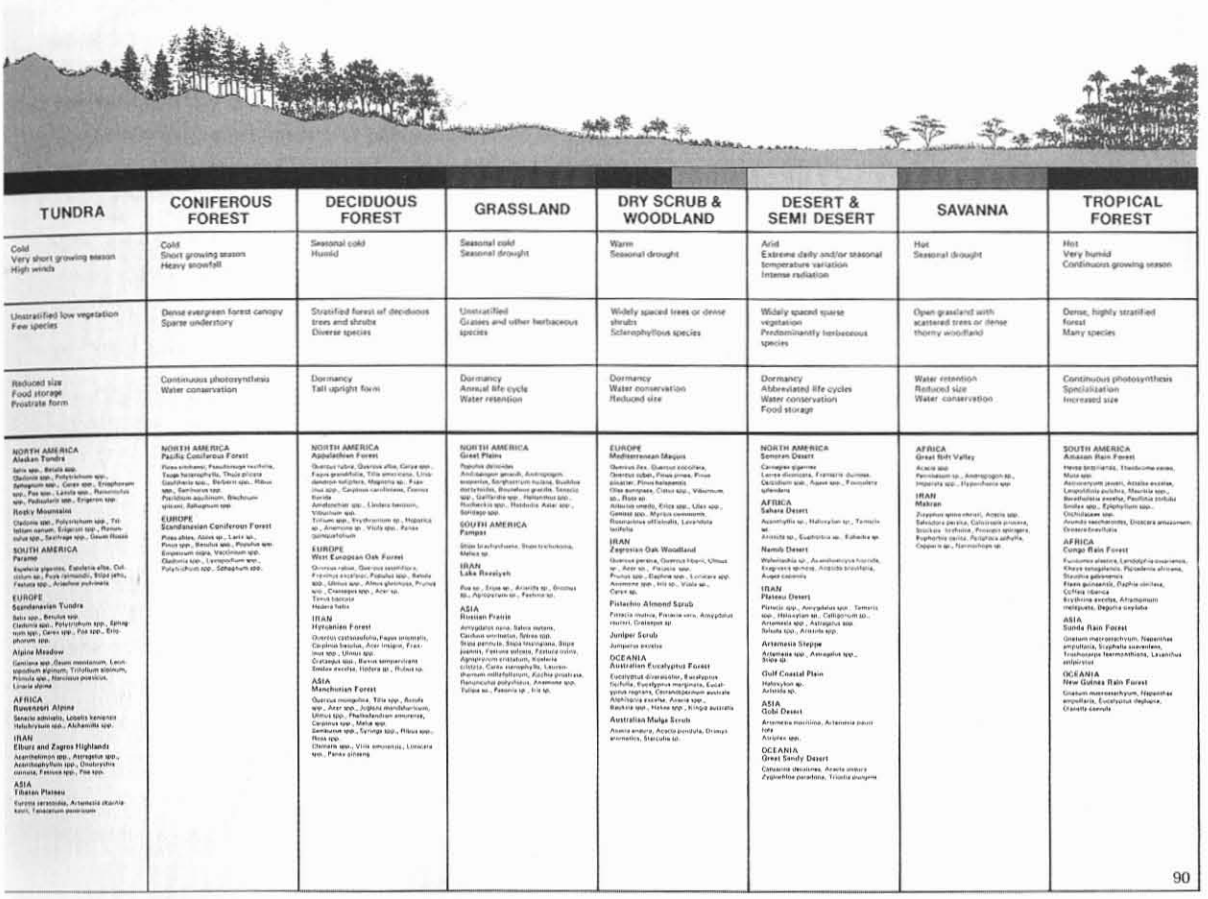
Pardisan was to be an environmental park outside Tehran—a botanical garden, zoo, and cultural history museum, all in one, in a very arid region. It was both professionally risky, given the turbulent political conditions in the Middle East, and open to intellectual challenge, given its apparent contradictions in relation to McHarg's own work. After the oil embargo of 1973 and OPEC's oil price hike in 1975 provided many OPEC countries with ample income and slowed the American economy, particularly new construction, many American architectural and planning offices started working for Middle Eastern clients. McHarg's partners were reluctant to undertake such projects and the financial commitments to open offices abroad that they entailed. In order to proceed, McHarg agreed to be personally responsible for the financial risk.

WMRT had produced a feasibility study for Pardisan in 1973 and published a master plan in 1975.[29] The client for the project was Iran's Department of Education; the park's theme was to illustrate the idea of evolution. The proposal was to exhibit all types of the worlds' biomes—from tundra to tropical forest—with their diversity across continents, as expressions of adaptive responses on the part of plants and animals (both species and communities) and human cultures to environmental conditions (Fig. 8). The exhibits would consist of animals and plant communities displayed as one would encounter them in their native habitat, with many examples of the same species. Though it is now common to have zoo exhibits of animals in habitats much like their native habitat and in social groups akin in size to those they might inhabit in the wild,[30] this was not so in the mid-1970s. The plan for Pardisan broke new ground.

[28] In 1970–71 Robert Hanna taught Form, a drawing course that emphasized the adaptive fit between form and natural and cultural processes. Anthropologists Yehudi Cohen and Setha Low, who taught landscape architects at Penn, were also influential. Cohen wrote about cultural processes as environmental adaptation, and Low led students and faculty to consider the relationship between the environment and human health.

[29] *Pardisan* (Philadelphia: Wallace McHarg Roberts and Todd, 1975).

[30] San Diego Zoo's wild animal park and the Arizona-Sonoran Desert Museum were models.



TUNDRA	CONIFEROUS FOREST	DECIDUOUS FOREST	GRASSLAND	DRY SCRUB & WOODLAND	DESERT & SEMI DESERT	SAVANNA	TROPICAL FOREST
Cold Very short growing season High winds	Cold Short growing season Heavy snowfall	Seasonal cold Humid	Seasonal cold Seasonal drought	Warm Seasonal drought	Arid Extreme daily and/or seasonal temperature variation Intense radiation	Hot Seasonal drought	Hot Very humid Continuous growing season
Unstratified low vegetation Few species	Dense evergreen forest canopy Sparse understory	Stratified forest of deciduous trees and shrubs Diverse species	Unstratified Grasses and other herbaceous species	Widely spaced trees or dense shrubs Sclerophyllous species	Widely spaced sparse vegetation Predominantly herbaceous species	Open grassland with scattered trees or dense thorny woodland	Dense, highly stratified forest Many species
Reduced size Food storage Prostrate form	Continuous photosynthesis Water conservation	Dormancy Tall upright form	Dormancy Annual life cycle Water retention	Dormancy Water conservation Reduced size	Dormancy Abbreviated life cycles Water conservation Food storage	Water retention Reduced size Water conservation	Continuous photosynthesis Specialization Increased size
NORTH AMERICA Alaskan Tundra SOUTH AMERICA Paramo EUROPE Scandinavian Tundra Alpine Meadow AFRICA Ruwenzori Alpine IRAN Elburs and Zagros Highlands ASIA Tibetan Plateau	NORTH AMERICA Pacific Coniferous Forest EUROPE Scandinavian Coniferous Forest	NORTH AMERICA Appalachian Forest EUROPE West European Oak Forest IRAN Hyrcanian Forest ASIA Manchurian Forest	NORTH AMERICA Great Plains SOUTH AMERICA Pampas IRAN Lake Rezaiyeh ASIA Russian Prairie	EUROPE Mediterranean Maquis IRAN Zagrosian Oak Woodland Pistachio Almond Scrub Juniper Scrub OCEANIA Australian Eucalyptus Forest Australian Mulga Scrub	NORTH AMERICA Sonoran Desert AFRICA Sahara Desert Namib Desert Plateau Desert IRAN Gobi Desert ASIA Gulf Coastal Plain OCEANIA Great Sandy Desert	AFRICA Great Rift Valley IRAN Mahran	SOUTH AMERICA Amazon Rain Forest AFRICA Congo Rain Forest ASIA Sunda Rain Forest OCEANIA New Guinea Rain Forest

90

8. Program for vegetation exhibits at Pardisan, organized by bio-climatic zone (2) and showing, for each, 1) relative water demand; 3) description of zone; 4) characteristics of plant community; 5) major adaptive strategies; 6) the vegetation exhibits and their constituent species. Programs for the exhibits of animals and human cultures are developed and presented in a similar, parallel format, which highlights environmental stresses, adaptive strategies, and the relationships among plant, animal, and human communities. (from Pardisan *[Philadelphia: Wallace McHarg Roberts and Todd, 1975])*

But innovation could not conceal a larger issue: however ambitious the project's scope and didactic goals, it was, in many ways, ecologically and socially perverse. All but some of the desert exhibits required irrigation, and the boreal and tropical forests needed to be in huge greenhouses, the boreal forest in an air-conditioned one. The human inhabitants of the park—those who were to live in the cultural exhibits and those who were visitors—raised further ethical and political issues. While Pardisan may have been *about* ecology, it certainly seemed at odds with McHarg's earlier work in ecological planning. Work on the design for Pardisan intensified in 1977 when Wallace McHarg Roberts and Todd opened an

office in Tehran. After the Shah of Iran fell in 1979, the Pardisan project was halted, and the office in Tehran was closed. The firm had incurred substantial debts and was unable to collect unpaid fees from the new government. McHarg was forced to resign. "When I lost my office," he said recently, "ecological planning lost one of its greatest practitioners."[31]

Critical Reaction and Legacy

For eighteen years, the creative tension between theory as developed at Penn and practice as pursued at McHarg's firm led to innovations in method. When McHarg's practice ended, his ideas and methods, as he articulated them, ossified. But the issues they raise and the challenges they pose are part of his legacy, and they continue to be worked out by others. Can science be the sole, or even the principal, source of authority for landscape design? Are natural and vernacular landscapes the sole standard of beauty? What *is* ecological design? What are its methods and historical precedents? And what about the city? What could urban ecological design be? These questions have been answered variously and still provoke debate, argued in verbal texts and in built projects and speculative proposals.[32]

In the 1960s and 1970s, McHarg's charismatic personality and polemical language captured the attention of the profession and public and persuaded a large following to accept ideas that had also been explored by others. Years later, many innovations once seen as radical are now common practice. The legacy of polemics has a less positive side, however.[33] The claim that science is the *only* defensible authority for landscape design has provoked equally dogmatic reactions from those who see landscape architecture as an art form.[34] When McHarg calls ecology "not only an explanation, but also a command," he conflates ecology as a science (a way of describing the world), ecology as a cause (a mandate for moral action), and ecology as an aesthetic (a norm for beauty). It is important to distinguish the insights ecology yields as a description of the world, on the one hand, from how these insights have served as a source of prescriptive principles and aesthetic values, on the other.

McHarg emphasized invention over precedent. For the most part, the curriculum in landscape architecture at Penn from the 1960s through the 1970s was ahistorical, offering no introduction to, or comparison among, alternative approaches to landscape design and

[31] McHarg, personal communication, 1998. When Narendra Juneja died a few years later, McHarg also lost his closest colleague in practice and teaching.

[32] Anne Whiston Spirn, "The Authority of Nature." See also George Thompson and Frederick Steiner, eds., *Ecological Design and Planning* (New York: John Wiley, 1997).

[33] I have discussed this at greater length in Spirn, "The Authority of Nature." This paragraph summarizes some points made in that essay.

[34] Provoked by such statements, many proponents of a new artistic thrust in landscape architecture chose to set this movement in opposition to "the ecological movement and its detrimental consequences for design." One article included gratuitous, unfounded attacks, some from critics who chose to remain anonymous, such as, "The so-called Penn School led by McHarg produced a generation of landscape graduates who did not build." Daralice Boles, "The New American Landscape," *Progressive Architecture* (July 1989): 53. Statements such as these were retracted by the editors in a subsequent issue of the journal in response to letters to the editor.

planning.[35] McHarg's claim to have invented the overlay method provoked Carl Steinitz, Paul Parker, and Lawrie Jordan to research the use of overlays as a planning method in the twentieth century, an original contribution to the literature, as was Steinitz's earlier comparative study of McHarg, Phil Lewis, and Angus Hill.[36]

"But, you say, all this may be very fine but landscape architects are finally designers—when will you speak to ecology and design?"[37] Thus McHarg acknowledged, in 1967, the question repeatedly posed to him by his students. By the mid-1970s, ecological design was an integral part of the landscape architecture curriculum at Penn, but, despite a few cases and persistent efforts to secure commissions, it was not practiced in the office. Much of the impetus for exploring ecological design came from McHarg's students, and some produced work that influenced projects at his firm, such as the investigation of stormwater management and design by Toby Tourbier and Richard Westmacott in the late 1960s, which inspired design solutions at Woodlands. Michael Hough's book of 1985, *City Form and Natural Process,* and my own of 1984, *The Granite Garden: Urban Nature and Human Design,* brought together ecological planning and design. Both were sympathetic to McHarg's approach but critical of his pessimism toward and neglect of cities.

The Landscape Development Plan for the University of Pennsylvania in 1977, an exploration of ecological design in the context of an urban campus, is a good example of a project informed by McHarg's teachings and carried out by his former students and colleagues. Peter Shepheard, Laurie Olin, Robert Hanna, Narendra Juneja, Carol Franklin, and Leslie Sauer, all faculty of Penn's Department of Landscape Architecture and Regional Planning, worked together with Colin Franklin and Rolf Sauer. Conceived as an instrument of growth and change, the plan gave priority to the history and identity of the campus, the university's prospective growth, and the needs of its inhabitants, human and nonhuman.[38] Carol and Colin Franklin, Leslie Sauer, and Narendra Juneja had all worked on Pardisan at WMRT. The last three were also responsible for most of the conceptual work on Woodlands, and in certain respects, the Penn plan represented the implementation of adaptive design strategies they developed for Woodlands.

[35] Anthony Walmsley taught two courses in the history of landscape architecture from the 1960s through the 1980s, but historical context was conspicuously absent from other courses, at least from the mid 1960s to the mid-1970s. Walmsley began to research the history of ecological design in the late 1980s.

[36] Carl Steinitz, Paul Parker, and Lawrie Jordan, "Hand-Drawn Overlays: Their History and Prospective Uses," *Landscape Architecture* 66 (September 1976): 444–55. The gap in Penn's history curriculum prompted me to trace precedents, track a genealogy of ideas and practices, and construct a pantheon of theorists and practitioners. This pantheon ranges from Hippocrates and Aristotle to Alberti and Leonardo; from John Evelyn and J. C. Loudon to Joseph Paxton, Frederick Law Olmsted, and Charles Eliot; from Frank Lloyd Wright to Kevin Lynch and Lawrence Halprin; and from Patrick Geddes to Lewis Mumford to Ian McHarg. See Spirn, "Urban Nature and Human Design"; eadem, "The Legacy of Frederick Law Olmsted"; eadem, "Architect of Landscape: Frank Lloyd Wright," in *Frank Lloyd Wright: Designs for an American Landscape,* ed. David De Long (New York: Harry N. Abrams, 1996); eadem, "The Authority of Nature."

[37] McHarg, "An Ecological Method for Landscape Architecture," 107.

[38] Peter Shepheard et al., *Landscape Development Plan: University of Pennsylvania* (Philadelphia: Center for Environmental Design, Graduate School of Fine Arts, 1977).

Members of this team went on to found two professional offices. Twenty years later, both firms are influential practices with international reputations. The Franklins and Sauers founded Andropogon Associates in 1974 to define ecological design through built work, as did Robert Hanna and Laurie Olin in 1976, when they founded Hanna/Olin. Though the goals and work of these two firms are distinctly different and may sometimes appear antithetical, both build upon McHarg's contributions and seek answers to issues unresolved in his ideas and projects—for example, how to reconcile environmental values and human needs, how to give material form to ecological processes and values, how to conceive of local actions within a regional context.[39]

McHarg's ideas—their success, failure, and promise—still inspire reactions from landscape architects, whether they see themselves as working within or against the tradition to which he has contributed so greatly. For three decades, he has provoked others to frame questions and pose answers concerning the relationship between landscape architecture and environmentalism. Landscape architects continue to address issues raised by McHarg's successes and failures, the goals and standards he set, and the inconsistencies embodied in his words and actions. It is difficult to imagine what landscape architecture would be like today without the presence of Ian McHarg, his publications, teaching, and professional projects.

[39] See, for example, Carol Franklin, "Allowing the Land to Live," in *Ecological Design and Planning,* ed. George F. Thompson and Frederick R. Steiner (New York: John Wiley, 1997); Laurie Olin, "Regionalism and the Practice of Hanna/Olin, Ltd.," in *Regional Garden Design in the United States,* ed. Therese O'Malley and Marc Trieb (Washington, D.C.: Dumbarton Oaks, 1995).

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