



Ian McHarg's confident skill

Danilo Palazzo¹ · Leah Hollstein¹

Received: 15 March 2019 / Accepted: 6 August 2019 / Published online: 13 September 2019
© Springer Nature Singapore Pte Ltd. 2019

Abstract

Fifty years has passed since the publication of Ian McHarg's *Design with Nature*. With “confident skill,” a quality that Mumford attributed to McHarg in the book's Introduction, the text intermingled autobiographical notes and philosophical thoughts with chapters on ecological planning case studies and the use of the map overlay technique. *Design with Nature* provided limited indications about the authors or books that inspired and supported McHarg. The paper, through a literature review, investigates the contingent circumstances that fed the social milieu of the 1960s and 1970s as well as the individuals and ideas preceding or contemporary with McHarg that backed, validated, or substantiated his book and ecological planning. The paper considers the multiple influences that McHarg gathered from scientists and philosophers in the time preceding the preparation of *Design with Nature* when he created and led his *Man and the Environment* course and hosted *The House We Live In*, a CBS television show. It also reflects the multiple ways in which McHarg's ideas influenced, and were influenced in return, by the development of academic ecology practice and education. McHarg recognized that the book borrowed from the thoughts and dreams of others and that his intention was to divulge his ideas to a wider audience than just academic insiders. The paper affirms that *Design with Nature* and its author catalyzed social, cultural, scholarly, and professional factors, started a chain reaction that had an undeniable impact on academia, practice, and government in the 50 years afterward, and became a central and fundamental academic reference for landscape architecture and planning.

Keywords Ecological planning · Landscape planning · Ian McHarg · Map overlay · Environmental planning · *Design with Nature* · Socio-ecological practice research

1 Introduction

The tone that McHarg adopted in *Design with Nature* can be explained by his “confident skill,” an attribute that Lewis Mumford, in the book's Introduction, ascribes to the author: “Without the passion and courage and confident skill of people like McHarg [...the] hope [for a better world] might fade and disappear forever” (Mumford 1969, p. viii). McHarg was extremely confident in himself and his capacities, as many of those who have met him in person testify: “McHarg's rangy mind, colorful mode of expression, and willingness to offend makes him rather unusual as landscape architects go. But behind the extravagant language hums a methodical brain and a fervent, highly developed philosophy about man's relationship to nature that has propelled him to the

forefront of landscape architecture in America” (Holden 1977, p. 379). McHarg himself described his boldness, his temper, and his self-assurance in several episodes of *A Quest for Life*, his autobiography (McHarg 1996, pp. 75, 111, 118, 166, 190, 238).

McHarg's self-confidence, his interdisciplinary strength in synthesizing and communicating (Holden 1977, p. 379), his acquired knowledge of the topics discussed in *Man and Environment* and *The House We Live In*—combined with the intention to “address larger problems and wider audiences” (McHarg 1996, p. 201)—prevailed over adopting a more traditional choice of paratextual parts in *Design with Nature*, such as bibliography, index, and further readings. The book, in fact, intermingles autobiographical notes and philosophical thoughts with chapters on ecological planning case studies and applications, while providing limited indication about the authors or books that inspired and supported McHarg's theoretical background. In *Design with Nature*, the nearest McHarg comes to acknowledging the inspirations of others is when he mentions that “a procession

✉ Danilo Palazzo
palazzdo@ucmail.uc.edu

¹ School of Planning, University of Cincinnati, Cincinnati, OH, USA

of great men have [sic] addressed my students and me during the past decade. It is their conceptions that constitutes [sic] the theory of this book” (1969, p. iv).

This paper investigates the development of some of the principles that matured just prior to the appearance of *Design with Nature*, as well as the general milieu that preceded and eventually supported and sustained the affirmation of ecological planning. The paper places *Design with Nature* within a scenario of thought-leaders, publications, and contributions on close topics published during the same period. It will show the way in which McHarg’s lifetime of experiences led him to write *Design with Nature* and how those same experiences influenced the style he chose to employ in its writing.

Finally, the paper tracks how McHarg recognized in papers, books, or interviews published in the years subsequent to *Design with Nature*’s publication, the gaps in his knowledge of what and who preceded him in the development of ecological planning. A thorough story of ecological planning has yet to be written; despite the relevant role that McHarg would have in it, we can certainly agree with Ervin Zube (1986a, p. 67) it was through an *uneven progress* that ecological planning systems and methods matured.

2 Fortune favors the bold

Throughout his life, McHarg thrust himself into position after position, always advancing (in the way of a former soldier) to higher aspirations. His bold, take-no-prisoners attitude knocked down walls that would have slowed or stopped others, enabling McHarg to place himself in the “right place” at the “right time” for many opportunities (McHarg 1996, p. 66).

After serving in WWII, and being introduced to the field of landscape architecture as a young man, McHarg enrolled in Harvard University’s Graduate School of Design (GSD). Despite not having a bachelor’s degree, or even a high-school certificate due to his having left school at age 16, McHarg brazenly sent a telegram to the chair of the Landscape Architecture Department, informing him of his intention to enroll, and asking him to “make necessary arrangements” (McHarg 1996, p. 66). On summer break in 1949, McHarg and his wife drove across the USA, exploring American landscapes, cities, and projects. They ended their trip in California. Taking advantage of letters of introduction given to them by the chairman of the GSD’s City Planning program, they met landscape architects Thomas Church, Garrett Eckbo, and Lawrence Halprin. Considered Modernist masters today, at the time they were seen as the new guard, the people reinventing the field. While these “young turks” (McHarg 1996, p. 72) were ignored in the GSD’s curriculum at the time, McHarg’s letter of introduction gave him special access to

their “revolutionary” (McHarg 1996, p. 80) work, enabling him to form relationships that later would lead to collaborations and exchanges.

As he began his academic career, McHarg also charged boldly, taking on momentous tasks, especially for one so new to academia. He tied his employment at the University of Pennsylvania’s Graduate School of Fine Arts (Penn) to the contemporaneous departure of Walter Gropius from the faculty, along with “massive sympathetic resignations” (McHarg 1996, p. 132). One of the resulting faculty openings was given by Penn’s Dean, and former Chair of city planning at the GSD, to a 34-year-old McHarg, along with the task to develop a landscape architecture program (Miller and Pardal 1992). The Dean then introduced him to the benefactor who provided scholarships that made it possible to attract outstanding candidates to this new program. This funding, along with a Rockefeller grant obtained in the program’s second year, and a subsequent million-dollar Ford Foundation grant (McHarg 1996, pp. 190–192), allowed McHarg to employ distinguished practitioners as visiting faculty and, most importantly, to hire natural scientists to accomplish his commitment to develop and teach *human ecological planning* (McHarg 1981, p. 109). McHarg’s meticulously choreographed convergence of talented students, faculty, funding, and the decision to tackle “current and conspicuous social problems” in courses, catapulted both a young McHarg and Penn’s landscape architecture program into national prominence at an early stage (McHarg 1996, p. 135).

McHarg’s development and organization of the course *Man and Environment* at the University of Pennsylvania in 1959 permitted him “to invite the most distinguished speakers in the environmental movement for the illumination of students and the development of my own knowledge” (1996, p. 157). The guests invited to talk represented a “Who’s Who of theology and science,” a flabbergasting list that encompasses almost three pages of McHarg’s autobiography (1996, pp. 159–161).

After only 1 year of offering his *Man and Environment* survey course at Penn, McHarg was contacted by the local CBS affiliate to turn the course into a twelve-part television series—*The House we Live In* (1960–1961). Despite his having no experience in television, McHarg was given free rein to select contributors and formulate the topic of each episode. As host, McHarg had the opportunity and privilege to meet and discuss topics with the brightest minds of his time. He invited the leading thinkers in theology, philosophy, and science to discuss the human role on earth—the *House* in the title is a reference to *Oikos*, the Greek word for house from which derives the English prefix *eco-* for ecology. The guest list, again, is long and contains the best and the brightest of that time. Among them were philosophers Erich Fromm and Paul Tillich, anthropologist Margaret Mead (the only woman

in a male-dominated group), astronomer Harlow Shapley, ecologist Frank Fraser Darling, psychiatrist Leonard Duhl (author of *The Urban Condition*, 1963), and sociologist and historian Lewis Mumford. McHarg's steadily increasing profile with cultural and environmental groups hurtled him into ever more elevated circles. Additionally, the lessons he learned from this media experience and the broad exposure it gave to his views on man's relationship with the environment influenced his evocative writing style in *Design with Nature*. McHarg acknowledges that when the environmental movement emerged, there were not many well-known people who could speak on its behalf, suggesting "that's one of the reasons I became conspicuous" (Miller and Pardal 1992, p. 47).

Just as McHarg's academic reputation influenced his professional contacts and responsibilities, these professional activities, in turn, influenced his academic research. In 1965, the American Institute of Architects (AIA) was invited, at the behest of US Interior Secretary Stewart Udall, to nominate members of a task force to make a model plan for the Potomac River basin. McHarg was confronted with the necessity of acquiring the data needed to investigate the region beyond the urban confines of Washington, DC. In a responding studio, McHarg and his landscape architecture students thus "developed the ecological planning method," using chronology to organize layers of data, revealing landscape structure, and determining suitability (McHarg 1996, p. 197).

McHarg's growing prominence and the revolutionary forces at work in the decade came together in 1966 when Russell Train, president of the Conservation Foundation, and his chief scientist Raymond Dasman (McHarg 1996, p. 199) suggested to McHarg that he should write a book on ecology, a book that would become *Design with Nature*. As discussed in the next section, this suggestion was based on the underlying judgment that the time was right for a book on this topic and that it would find an eager audience.

3 *Design with Nature*: supportive milieu in the USA

When McHarg was persuaded to write *Design with Nature*, he was professor at the University of Pennsylvania and co-founder of Wallace, McHarg, Roberts, and Todd, and was positioned at a confluence of international, domestic, academic, and disciplinary events that contributed to a milieu primed to receive his message. The 1966–1967 period was a propitious time to write *Design with Nature*, for a number of seminal ideas were surfacing simultaneously. The book offered the opportunity to assemble, integrate, and present these as a new way of looking at the earth (McHarg 1996, p. 201).

At the national level, McHarg was correct that the 1960s was the right time for *Design with Nature*. The period between WWII and 1969 was a time of turbulence in the US; cities were rocked by demographic changes, and many people were searching for new ways of living. Individual citizens were demanding increased responsiveness from their governments and wanted to have more influence over the great issues of the day. Common to many of the tendencies of the time was a growing recognition of the dangers facing our environment. This generated in many people within the environmental movement "an increased awareness of government as an environmental culprit. [...] Looked at closely, most of the agencies of the state [...] seemed driven more by economics than by ecology" (Sale 1993, pp. 12–13).

Between 1950 and 1960, more than three quarters of metropolitan growth in the USA took place outside of central cities. A common fear was that the increased development pressure on rural and suburban locations could lead to housing being developed in unsuitable or even dangerous locations without advanced planning (Heskin 1980). Even in areas where housing was not being developed, transportation routes and encroaching urbanization threatened the integrity of environmental resources. In *Design with Nature*, McHarg directly addresses these fears with in-depth case studies of urbanizing regions on the US east coast, at scales ranging from the area known as "The Valleys" near Baltimore and the Philadelphia and Washington, DC metro areas, to Staten Island, New York, and the entire Potomac River Basin. The inclusion of these case studies validates contemporary fears of uncontrolled, misplaced, and/or unplanned suburban growth on the landscape, showing the wisdom of McHarg's own sensible, alternative process protecting the environment while accommodating inevitable growth (McHarg 1969, p. 83).

The national exurban movement was largely facilitated by the Federal-Aid Highway Act of 1956, which allocated over \$16 billion dollars (in 2019 funds) to primary, secondary, and urban extensions of the federal highway system (United States Congress 1956). Promoted as a boon to both industry and national defense, it was criticized by many for what was seen as its racist, anti-environmental, and anti-urban orientations (Rose 2003). In fact, McHarg noted that he was lucky to have entered transportation planning in the 1960s: "my first encounter occurred at the peak of this situation. Given the prevailing ignorance, it was not difficult to reveal omissions and recommend improvements" (1996, p. 337). A prime example of this revelation and recommendation is shown in *Design with Nature*, as McHarg demonstrates how an alternative road design process, one that "provides the maximum social benefit at the least social cost" could be followed in a case study of Richmond Parkway in New York (McHarg 1969, p. 32).

Students and activists protested against perceived injustices, ranging from segregation and discrimination to the Vietnam War and the House Un-American Activities Committee. Protests were supported by a widespread awakening to fundamental inequalities in the USA regarding race (Dr. Martin Luther King, Jr.'s 1963 "I Have a Dream Speech"), gender (the 1963 publication of Betty Friedan's *The Feminine Mystique*), and the environment (Rachel Carson's 1962 release of *Silent Spring*). In response, a number of organizations were created and laws passed to work toward a more just country, including the 1964 Civil Rights Act, the 1966 creation of both the National Organization for Women and the Black Panther Party, and, in 1967, the Environmental Defense Fund.

In conjunction with the perceived need for environmental defense were actions indicating a more widespread awareness of the environment in many facets of public life. In 1964, the Ford Foundation invited prominent actors in ecology and resources, including McHarg, to a four-day conference in New York City to determine whether the field was worth funding (McHarg 1996, pp. 190–192). The next year saw the reprinting of George Perkins Marsh's *Man and Nature*, marking the 100-year anniversary of the initial 1864 printing of "the fountainhead of the conservation movement," as it was called by Mumford in Lowenthal's introduction to the book (Marsh 1965, p. ix). In 1968, Garrett Hardin published his *Tragedy of the Commons*, putting voice to concerns about environmental pollution as well as overpopulation based largely on environmental reasoning—a theory recently rejected from a scientific point of view and now controversial due to the author's racist, nativist, and anti-immigration ideas (Mildenberger 2019). McHarg and other leaders of the environmental movement, like Paul Ehrlich, Barry Commoner, Rene Dubos, and Ralph Nader, were "frontline troops [who] crisscrossed the country giving lectures to enormous and excited audiences" (McHarg 1996, p. 208). Their efforts culminated in the first Earth Day on April 21, 1970.

The 1960s and 1970s also represented a real breakthrough for ecological planning in the USA. The environmental crises that hit the country in those two decades caused the materialization and development of the *environmental movement* (Gottlieb 1993; Sale 1993; Shabecoff 1993; Dryzek 2003; Neimark and Rhoades Mott 2017) and the launch of a "sweeping and intensive array of regulatory regimes at all levels of government" (Ruhl et al. 2007, p. 167), stimulating the emergence of studies on the relationship between planning and the environment.

Ecological planning in the same period is marked by some significant changes, which, according to Steiner, Young, and Zube, can be summarized in three points:

1) the literature [...] has proliferated and its sources have become more broadly based, with more and more planners (and scholars from other disciplines) calling for the increased use of ecology in planning; 2) the movement, if it can be called that, has become more explicit, uses language that is more explicitly ecological and more clearly mandates that planning be ecological; and 3) more of the literature is now oriented toward planning as applied human ecology rather than just incorporating bio-ecology concepts into land-use or landscape planning. (1988, p. 33)

In parallel to the evolution toward ecological planning in society at large and in planning literature, regulations were adopted at both the federal and state level, particularly the National Environmental Policy Act of 1969 (United States Congress 1970), denoting an attitude of greater attention toward the impact of human actions on the environment and the emergence of a significant demand for planning.

3.1 *Design with Nature: academic ecology, practices, and methods*

The ecological development of landscape architecture and urban and regional planning also restarted in the postwar period. It was concentrated around the development of methodologies to assess landscapes and the impacts of transformations and was characterized by the attempt to combine—through methodologies applied to design and planning—interdisciplinary contributions and to inaugurate the use of computer processing and the first geographic information systems (GIS).

Raymond Belknap and John Furtado explain the reasons for the advancement of these methods in a famous document that compared the environmental resource analysis methods of McHarg, Philip H. Lewis Jr., and George Angus Hills:

One is the growing concern for the quality of our environment. [...] Over the next two or three decades, billions of dollars and countless man-hours will be spent to protect and develop resources that create and affect the quality of our physical environment. [...] Faced with immediate needs, there is no choice but to use existing approaches to resource analysis, planning and development, and to improve them as may be possible. (1967, p. 1)

In 1970, as a segue from the Belknap and Furtado report, Carl Steinitz confirmed the strong growth of this type of study comparing fifteen examples of landscape resource analysis to measure their effectiveness. Some of the studies he considered already made use of the first rudimentary computers, which gradually began to be used for the analysis and planning of the environment from the mid-1960s (Steinitz

1993). Throughout the 1960s, landscape architecture and planning were improved through the adoption of new tools, the establishing of new goals, and the recognition of new responsibilities. New tools included new methods (Hollstein 2019) and the introduction of the first computers (Carlsson 2017). New goals envisioned a less intrusive future (Landscape Architecture Ed. 1967). New responsibilities were recognized in the professional (Eckbo 1966; Gunn 1966), social (Grunwald 1966), historical (Brooks 1966), esthetic (Marx 1964), and ecological arenas (Odum and Davis 1969; Young 1974). In this climate, which was both supportive and complex, planning became explicitly and consciously ecological (Cain 1968). Hills, Lewis, and McHarg were the best-known authors among those who accepted the new challenges and new dimensions of responsibility to which planners were called. They provided a strong drive to both technical and ethical elaborations and to a deep reflection on their roles as ecological planners (Hills 1974; Lewis 1996; McHarg 1996).

McHarg's overlay process, as described in *Design with Nature*, is considered one of the foundational influences upon GIS, establishing a scientific process for land-use suitability analysis within the environmental design fields (Malczewski 2004). GIS, when used in conjunction with Steinitz' decision-making framework (Steinitz 1990), operates today as the field of geodesign. While the concept of spatial thinking and problem solving is not new, as Li and Milburn (2016) demonstrate in the field of landscape architecture, evolving sociocultural concerns within environmental design are changing the field. In common with broader trends away from the rational, positivist approach to planning and decision making, the application of GIS has undergone a transition through contextual, political approaches to communicative theories and on to shared-governance approaches to the use and implementation of spatial data and decision making (Malczewski 2004).

3.2 *Design with Nature*: environmental design education

Reflecting the increased attention being paid to the environment and ecology at large, and within the design professions in particular, university programs in landscape architecture and urban and regional planning began to pay more attention to ecological issues in the 1970s, with McHarg's own program leading the way. They started to incorporate disciplines related to environmental sciences, showed a maturing multidisciplinary attitude (Sanoff 1974; Erichsen and Goldenstein 2011), and experimented with interdisciplinary planning techniques (Appleyard 1971; Fein 1975; Gunn 1978; Lyle 1978; Heskin 1980; Lang 1983; Twiss 1986; Zube 1986b; Dalton 2001). Through the 1960s, with the rise of the environmental movement, "complex problems conceptualized as dynamic conflicts with geographical distribution entered the

agenda of the landscape architecture profession" (Carlsson 2017, p. 37). Consequently, landscape architecture began to assume the leading role in the field of ecological planning (Spirn 1997; Conan 2000; Spirn 2000; Meyer 2001; Lystra 2014; Weller 2015). In the same years, urban and regional planning programs began to evidence similar changes, supporting wide offerings in the field of environmental planning and management of natural resources (Niebanck 1993; Steinitz 1995) through the introduction of geodesign and GIS (Batty 1994; Muller and Flohr 2016; Li and Milburn 2016; Hollstein 2019.)

University programs showed contacts between landscape architecture and environmental sciences, first timidly in the 1950s (Walker and Simo 1994, pp. 261–263) and more openly a decade later. A survey of about twenty landscape architecture programs in US universities, carried out in 1953, showed that courses on plant ecology and geology were already present in at least two universities: Ohio State University and Texas A&M University (White 1953). Other programs already applied tools such as the topographic maps and aerial photographs overlay, an anticipation of the method of map overlay technique that became popular with McHarg fifteen years later (Steinitz et al. 1976; Walker and Simo 1994).

McHarg's explicit approach to landscape architecture and planning education at the University of Pennsylvania is described in his own address to a 1964 Ford Foundation conference on the field of ecology (as discussed earlier): "I was firmly committed to ecology as the scientific foundation for landscape architecture, but I also submitted that it could perform invaluable services if employed in environmental and regional planning" (1996, p. 191). Two years later, when a half-million-dollar grant was approved, McHarg used the money to recruit natural scientists to be integrated "into a holistic discipline applied to the solution of contemporary problems" (1996, p. 192). The grant, as McHarg said, "transformed education in environmental problems" (1996, p. 192) and the "evolution of the department [of Landscape Architecture and Regional Planning] over the past quarter century has been from a preoccupation with design in the absence of any scientific prerequisites or training to a continuous increase in the content of both physical and biological science, integrated by ecology" (McHarg 1981, p. 120).

4 The place of *Design with Nature* within the unwritten story of ecological planning

As demonstrated, *Design with Nature* was written at an inflection point in US history and arrived at a time of societal change, increasing environmental awareness, and disciplinary reinvention. McHarg was no less a product of the

time than was his work. He was influenced by the confluence of events that had brought him to landscape architecture, his professional position in Philadelphia, and his exposure to a diverse set of influential thinkers through his courses and television show. These inspirations, along with his “confident skill,” as succinctly characterized by Mumford (1969), led him to write a book that does not specifically acknowledge those contemporaries and predecessors who provided a wider, yet unrevealed, intellectual framework within the pages of *Design with Nature*. However, this has not prevented Mumford (1969), from placing the book on a literary shelf with similar or related authors. Mumford listed Hippocrates, Henry Thoreau, George Perkins Marsh, Patrick Geddes, Carl Sauer, and Rachel Carson as similarly influential authors, providing a peek at McHarg’s putative companions. Interestingly, Udall’s Forward to *A Quest for Life* (McHarg’s 1996 autobiography) also identified “three individuals who provided the philosophical foundation for this [ecological] revolution,” namely Aldo Leopold, Carson, and McHarg (p. xii). In naming these three in this order, Udall is identifying McHarg as a foundational contributor to the environmental revolution but also, in indicating that he came after the other two (*Sand County Almanac* finished 1948, *Silent Spring* published 1962), is suggesting that he is one part of a greater tradition, an inheritor of environmental interests spurred by others before him.

Steiner et al. (1988) identified a group of visionary thinkers and ideas to whom ecological planning (and presumably McHarg) owes a large debt. These include such figures as George Perkins Marsh, John Wesley Powell, and Patrick Geddes, but also the “Chicago School” so prominent in the history of ecology, and the first urban park planners, Frederick Law Olmsted, Charles Vaux, H.W.S. Cleveland, Charles Eliot, and Jens Jensen. Warren Manning is listed among these individuals for his early use of the overlay technique that involved “the use of ecological information in the planning and design of human communities” (Steiner et al. 1988, p. 32.) To the list Steiner, Young, and Zube also added Lewis Mumford and Benton MacKaye’s Regional Planning Association of America.

Palazzo, in a book published in Italian in 1997, speculated that the emergence of ecological planning in the 1960s in North America arose from three main origins. The first was that of landscape architecture, which derived from an original adaptation of English landscape gardening connected to an appreciation of the American landscape and nature, with protagonists such as Thomas Jefferson, Andrew Jackson Downing, Frederick Law Olmsted, Charles Eliot, and Warren Manning. A similar conclusion is reached by Forster Ndubisi (2002) who placed ecological planning in a historical perspective, confirming that “ecological planning in the United States evolved as a part of landscape architecture in the mid-nineteenth century” (2002, p. 9). Ndubisi extended

his exploration into ecological planning, collecting the main contributions to the field in *The Ecological Design and Planning Reader* (2014). Among the important contributors whose works appeared prior to *Design with Nature*’s 1969 publication, Ndubisi listed Henry David Thoreau, George Perkins Marsh, Ebenezer Howard, Patrick Geddes, Benton MacKaye, Aldo Leopold, and Rachel Carson.

Palazzo identified a second origin of ecological planning in the conservationist period and the management of the vast public domain by various federal land management agencies. Early proponents were George Perkins Marsh and John Wesley Powell. The third origin, as described by Palazzo (1997)—confirming the conclusion reached earlier by Steiner et al. (1988)—connects ecological planning to Lewis Mumford and Benton MacKaye’s Regional Planning Association of America, which ended up influencing some of the New Deal’s programs and initiatives and having a relevant ecological component (Luccarelli 1995). More recently, Palazzo has suggested that, to the three origins, a fourth should be added: that of utopian thinking. Most of these influential utopian thinkers, reacting to the effects of the Industrial Revolution, were of the view that

The unities of cities are intricately connected as a system that functions based on a balance among these unities. To achieve their visions, therefore, meant that these unities - cultural, economic, environmental, institutional, political, social, spiritual, and spatial - must work in harmony to achieve a society devoid of pollution, slums, and blights, where social justice is a key principle that underpins every action. (Palazzo 2016, p. 219)

Other authors have mapped the development of ecological thinking in planning and landscape architecture. A brief recounting follows. Steinitz et al. (1976) explore the origin of hand-drawn overlay mapping. Giliomee (1977) describes the ecological planning method taught and practiced in the Department of Landscape Architecture and Regional Planning, University of Pennsylvania, where McHarg was Chairman. Fabos (1979) shows the emergence of concerns with human impact on landscapes and the evolution of landscape planning principles and the techniques, methods, and procedures developed in planning. Steiner and Brooks (1981) offer an account of an ecological planning process that derives from McHarg and others after him. Steiner (1983) presents the “uneven history” of regional planning in the USA, exploring its evolution during the New Deal and its later development into two different orientations: one led by John Friedman and the other by McHarg. Spirn (1985) outlines the roots of historical precedents and traditions connecting nature, human purpose, and city design from Hippocrates to McHarg and Lynch. Seddon (1986) observes the conceptual—and semantic—relations among landscape planning,

landscape architecture, and town and regional planning, concluding that landscape planning should become more analytical, ecologically based, and a social and political activity. Zube (1986b) presents the history and development of landscape architecture and planning education in America, suggesting enhancement of curricula. Berger (1987) offers an insight into three landscape synthesis methods and models as they evolved from ecological landscape planning and design efforts by Geddes, MacKaye, Hills, Dansereau, and McHarg. Johnson (1990) lists and compares the literature on landscape architecture from the beginning of the twentieth century to McHarg—“lonely prophet of environmentalism” (p. 91)—and beyond. Olin (1990) provides portraits of a dozen figures, from Muir to Wright to Venturi, who brought “an ecological viewpoint to bear upon the physical, social, and ethical worlds about us” (p. 83). William Marsh (1991) briefly describes the milieu in which the environmental crisis of the 1960s and 1970s “paved the way for stronger and broader environmental legislation at all levels of government” (p. 3). Walker and Simo (1994) offer an understanding of the evolution of landscape architecture in the twentieth century from Olmsted to McHarg to corporate office design. Schott (2004) traces urban environmental history, starting from the 1990s in America and in Europe. Vasisht (2008) proposes an ecosystem approach to planning using cases from ecological science and social theory. Stephenson (2018) establishes a historical connection among John Nolen’s and Lewis Mumford’s common interests in utopia, garden cities, and the early unveiling of sustainability. These sources establish the existence of a past (or more than one) that led to the emergence of ecological planning in the 1960s and its further evolution.

5 McHarg’s later reflections on his position in ecological planning

After the publication of *Design with Nature*, McHarg became more willing in later papers to acknowledge ecologists, planners, landscape architects, and others whose earlier work contributed to his own. In 1970, he publicized an open space study of the Philadelphia Metro Region and specifically placed this work within a tradition of metropolitan open space planning, dating to Charles Eliot’s 1893 plan for Boston. At the same time, he noted other earlier, similar plans, including Benton MacKaye’s 1928 open space planning proposal and Patrick Abercrombie’s 1944 Greater London Plan, as well as his contemporary Philip Lewis’ statewide work in both Illinois and Wisconsin (McHarg 1970).

Another early influence that McHarg was prepared to credit later in his career was Patrick Geddes. Geddes was noted by McHarg as the first to identify that “each region is believed to comprise unique attributes of place-folk-work,”

which McHarg identified as a crucial preliminary step in the ecological planning process (1981, p. 147). Within the field of landscape architecture itself, McHarg credited Brian Hackett with introducing ecology to the field (McHarg 1996) and particularly noted his influence on McHarg’s own department at the University of Pennsylvania. In his own field of expertise, McHarg came to acknowledge earlier individuals who undertook studies of the sort he would come to include in his ecological planning method, including Neville M. Fenneman in the 1930s and Charles B. Hunt in the 1960s (1996, p. 327).

McHarg’s willingness to acknowledge the preeminence of others in his chosen field seemed to wax and wane. In the same year that he published an essay stating that “I invented *ecological planning* during the early 1960s,” (1997a, p. 194), he also wrote an essay for the American Society of Landscape Architects acknowledging that Charles Eliot conducted “the first ecological planning study in the United States or the world” in 1893 (1998, p. 190). Further, he had already acknowledged as much in his own autobiography, published a year earlier, as he complained of having to “reinvent the wheel” (1996, p. 82). Despite some admissions of this kind, McHarg remained largely reluctant to concede that anyone who conducted ecological design and/or planning before him did so in a manner that suggested they had a part in the invention process. A typical semi-acknowledgment along these lines was found in McHarg’s 1966 *Ecological Determinism*. Discussing the eighteenth-century English landscape artists William Kent, Capability Brown, and Humphry Repton, McHarg noted that while they and their followers were “lacking a science of ecology, they used native plant materials to create communities which so well reflected natural processes that their creations endured and are self-perpetuating” (1966, p. 528). McHarg admired their proto-ecological design ethos (Podolak et al. 2013) but carefully noted that their applied ecology was entirely rural and that a more modern ecology is needed as “the basis for modern interventions particularly at the scale of city, metropolis, and megalopolis” (1966, p. 528).

In *The Classic McHarg: An Interview*, McHarg again sets himself apart from the ecological planners who came before him. He notes that, before he undertakes a planning process, he first studies the process of a place, which includes all of the endemic natural and social factors. With the possible exception of Eliot, McHarg claims to be the first to insist on the “study then plan” process (Miller and Pardal 1992). McHarg was also clear about the limited influence of his contemporaries Angus Hills and Philip Lewis. While very effusive about Hills as a soil scientist and forester, McHarg notes that he “didn’t address himself really to planning” and remained relatively unknown in his native Canada (Miller and Pardal 1992, p. 88). He is again very complimentary of Lewis while simultaneously noting that Lewis was only

interested in his particular Midwestern region of the country and in river corridors, and not the environment as a whole. McHarg insists that his own, distinct, contribution to ecological planning was the uniting of various environmental scientists, the chronological arrangement of layers of information into a physical model, and the augmenting of this model with social science input (1981, 1992, 1997b; Miller and Pardal 1992, p. 89).

6 Conclusions

Despite McHarg's ongoing relationships with influential academics and researchers, resulting from his career as a professor and practitioner, the first edition of *Design with Nature* cites very few books or authors in the manner scientific and/or academic books were, and are, usually expected to do. *Design with Nature*, in fact, does not include a list of references, a bibliography, or an index. The book has 34 footnotes that refer to 14 books, 7 papers, 1 newspaper article, 1 TV show—McHarg's own *The House We Live In*—7 professional reports, 1 research study, and 4 case studies undertaken by graduate students at the University of Pennsylvania. In his autobiography, McHarg explains this unusual formatting choice as reflecting what he saw as a shifting audience for the book: "I had begun writing to landscape architects and planners, but the evidence was pushing me to address larger problems and wider audiences" (1996, p. 201). To reach a wider audience, McHarg embraced a tone that had already been adopted, with slight variations, by Carson's *Silent Spring* (first published in 1962), and Leopold's *Sand County Almanac* (first published in 1949). Both of these influential books provided the philosophical foundation for "the rise of environmentalism and the faltering of Big Technology," as Udall wrote in the *Foreword* of McHarg's autobiography (1996, p. xii). *Silent Spring's* complete absence of footnotes in the text (Carson clarified that she had "not wished to burden the text with footnotes" 1999, p. vi) was compensated for by a list of principal sources 55 pages long at the end of the book and a 14 page index. *Sand County Almanac* adopted a similar style—no footnotes and also no bibliography—to reach a more general audience and Leopold's message of conservation became popular in the 1960s when the book was reissued (Sale 1993).

In McHarg's format choice, we can see the influence of these earlier authors, as well as his strategic decision to target a wider audience. The juxtaposition of ecological science with case studies focused on contemporary topics of interest such as land use, conservation, and highway planning, as well as the inclusion of a rare photo of the earth from outer space, are part of this targeting. Additionally, we must remember that McHarg hosted a very successful television show, *The House We Live In*, which brought esoteric ideas

and topics into the mainstream for his audience. In hosting the show, he was exposed to the way his guests were able to communicate complicated subjects to a television audience. This was an education for McHarg in new communication modes and augmented his natural abilities.

Design with Nature also was a book that could only have come about, as it exists, at that period of time. There was a palpable desire for change in the USA in the late 1960s, a desire to upset the status quo and question given assumptions. Truisms about development, transportation, energy, and the environment were no longer accepted. Protests, environmental crises, and the impacts of past choices on development were inspiring new voices and actors. Within the environmental design and planning field, landscape architects and urban planners were becoming more aware of their responsibility to nature and were advocating more forcefully for it in their practice. Ecological values also were appearing within university education in the environmental design fields. The influential educational programs developed by universities eventually would infiltrate the entire discipline. This emerged very clearly in the World Conference on Education for Landscape Planning (Steinitz 1986): "Landscape architecture (and landscape planning) should have—must have—a biological base. This is why I believe it has a significant contribution to make in the future" (Seddon 1986, p. 337). More recent research conducted in 2004—35 years after the publication of *Design with Nature*—on the curricula of all 63 accredited, first-professional degree programs in North America (28 offering a BLA, 17 offering an MLA, and 18 offering both) suggests a widespread degree of required ecological literacy (Dalton 2004; Miller et al. 2004.) In 2008, the ASLA Council on Education (ASLA 2008) in a white paper on "Growing the Profession" notes that "sustainability or ecological design was listed by twenty of the twenty-seven (74%) responding master's programs" (p. 3).

While McHarg was reluctant to position his book within a larger arc of thought on ecology and ecological planning, it is clear that *Design with Nature* does, in fact, belong to that tradition. It has been recognized by other prominent ecologists as a foundational tome. It has also been recognized as the beneficiary of ideas generated by earlier theorists and practitioners. The authors of this paper are inclined to think that McHarg acted as an "enzyme," a catalytic force for the synthesis of ideas, theories, and realizations that took place in previous decades, as well as contemporaneously, to form what has been known, from that moment on, as ecological planning.

His book and larger-than-life personality worked to speed up, bring to maturity, and catalyze a specific reaction onto an existing, if scattered and not well known, heritage, supported by a sensitive and responsive society and by particular contingencies in the history of the

USA. McHarg was a mostly unconscious product of the proto-ecological and conservationist tradition—and the same can be said of Lewis and Hills. *Design with Nature* is an unconventional tome—its coffee-table size, its unusual academic language format, its use of the NASA earth image as a visual statement on the planet’s finite resources—that communicates to distinct audiences. Scholars, students, practitioners, public officers, environmental activists, laypeople—all were eager, for different reasons, to find a way to incorporate nature into human-made changes, to protect, through data-informed design, those most sensitive parts of the earth, to react to the greediness of speculators and urban renewal and highway proponents. This greediness has been perpetrated in spite of some of McHarg’s analysis and planning suggestions—as in Staten Island and The Woodlands—to the point that we can agree with Wei-Ning Xiang (2019) that “history voted many times in Ian McHarg’s favor.”

Support for this characterization lies in the reconstructions written in the aftermath of *Design with Nature*, which shed light on historical precedents that were unconsciously parts of the personal, disciplinary, and professional paths taken by McHarg, an obliviousness that he partially recognized later in his life. From 1969 onward, *Design with Nature* and its author started a pervasive and global disciplinary change due to a peculiar ability to catch readers’ attention, a dialectic-persuasive skill, a quite extensive professional experience to support his writings, and a particular sensitivity to and influence upon the zeitgeist. The reactions McHarg and *Design with Nature* started 50 years ago have not yet been completed (Steiner 2001; Yang and Li 2016; Wang et al. 2016; Yang and Young 2019) and *Design with Nature* still remains one of the most influential books on planning (Planetizen 2019; American Planning Association 2019).

The same words written in the early 1990s by Kirkpatrick Sale about Carson’s *Silent Spring* can be adapted perfectly to McHarg’s *Design with Nature* and its role in the ecological planning revolution: “Such a revolution was not created by a single book, to be sure, however influential forces that lay behind the movement were multiple and complex. [...] Hence when [...] the book] appeared, it found a ready audience, and that audience a cause” (1993, pp. 6–7).

Acknowledgements The authors would like to acknowledge Terry Grundy and Rhea Castrucci for their editorial assistance.

References

- APA (American Planning Association) (2019) 100 Essential books of planning. <https://www.planning.org/library/greatbooks/decade6.htm>. Accessed 11 May 2019
- Appleyard D (1971) The future of landscape architecture and environmental planning—a personal view. *Landsc Archit* 61(2)
- ASLA (American Society of Landscape Architects) (2008) Models of LA evolution. A White Paper prepared by the ASLA Council of Education. <https://www.asla.org/uploadedFiles/CMS/Education/COEModelsofEdSurvey05082008.pdf>. Accessed 20 May 2019
- Batty M (1994) A chronicle of scientific planning: the Anglo-American modeling experience. *J Am Plan Assoc* 60(1):7–16. <https://doi.org/10.1080/01944369408975546>
- Belknap RK, Furtado JG (1967) Three approaches to environmental resource analysis. The Conservation Foundation, Washington, DC
- Berger J (1987) Guidelines for landscape synthesis: some direction - old and new. *Landsc Urban Plan* 14(4):295–311. [https://doi.org/10.1016/0169-2046\(87\)90041-7](https://doi.org/10.1016/0169-2046(87)90041-7)
- Brooks P (1966) Critique 3: conservation and the conventional wisdom. *Landsc Archit* 56(4)
- Cain SA (1968) The importance of ecological studies as a basis for land-use planning. *Biol Conserv* 1(1):33–36. [https://doi.org/10.1016/0006-3207\(68\)90012-8](https://doi.org/10.1016/0006-3207(68)90012-8)
- Carlsson MK (2017) Environmental design, systems thinking, and human agency: McHarg’s Ecological Method and Steinitz and Rogers’ interdisciplinary education experiment. *Landsc J* 36(2):37–52. <https://doi.org/10.3368/lj.36.2.37>
- Carson R (1962) *Silent spring*. Houghton Mifflin, New York
- Carson R (1999) *Silent spring*. Penguin (e-book edition), London
- Conan M (ed) (2000) *Environmentalism in landscape architecture*. Dumbarton Oaks Research Library and Collection, Washington, DC
- Dalton LC (2001) Weaving the fabric of planning as education. *J Plan Educ Res* 20(4):423–436. <https://doi.org/10.1177/0739456X0102000404>
- Dalton DW (2004) Increasing ecological literacy and environmental citizenship in undergraduate landscape architecture programs. *Landsc Rev* 9(1):99–102
- Dryzek JS (2003) *Green States and social movements: environmentalism in the United States, United Kingdom, Germany, and Norway*. Oxford University Press, Oxford
- Duhl L (1963) *The urban condition: people and policy in the metropolis*. Basic Books, Oxford
- Eckbo G (1966) Critique 6: the link between man and nature. *Landsc Archit* 56(4)
- Erichsen EA, Goldenstein C (2011) Fostering collaborative and interdisciplinary research in adult education: interactive resource guides and tools. *SAGE Open* 1(1):215824401140380. <https://doi.org/10.1177/2158244011403804>
- Fabos JG (1979) *Planning the total landscape: a guide to intelligent land use*. Westview Press, Boulder
- Fein A (1975) The ‘New’ student of landscape architecture. *Landsc Archit* 65
- Friedan B (1963) *The feminine mystique*. W.W. Norton & Company Inc, New York
- Giliomee JH (1977) Ecological planning method and evaluation. *Landsc Plan* 4:185–191. [https://doi.org/10.1016/0304-3924\(77\)90017-X](https://doi.org/10.1016/0304-3924(77)90017-X)
- Gottlieb R (1993) *Forcing the spring. The transformation of the American environmental movement*. Island Press, Washington, DC
- Grunwald RE (1966) Critique 2: quality concern and decision-making. *Landsc Archit* 56(4)
- Gunn CA (1966) Critique 1: landscape morticians? *Landsc Archit* 56(4)
- Gunn CA (1978) Research: the new necessity. *Landsc Archit* 68(5)
- Hardin G (1968) The tragedy of the commons. *Science* 162(3859):1243–1248. <https://doi.org/10.1126/science.162.3859.1243>

- Heskin AD (1980) Crisis and response: a historical perspective on advocacy planning. *J Am Plan Assoc* 46(1):50–63. <https://doi.org/10.1080/01944368008977015>
- Hills GA (1974) Landscape planning: an overview. *Landsc Plan* 1:107–110. [https://doi.org/10.1016/0304-3924\(74\)90010-0](https://doi.org/10.1016/0304-3924(74)90010-0)
- Holden C (1977) Ian McHarg: champion for design with nature. *Science* 195(4276):379–382. <https://doi.org/10.1126/science.195.4276.379>
- Hollstein L (2019) Retrospective and reconsideration: the first 25 years of the Steinitz framework for landscape architecture education and environmental design. *Landsc Urban Plan* 186:56–66. <https://doi.org/10.1016/j.landurbplan.2019.02.020>
- Johnson J (1990) No real heroes. *Landsc Archit* 8(10)
- Landscape Architecture Editors (1967) Ecology as a Basis for 20th century planning and design: essays on man's intrusion into environment with hopeful suggestions for a less intrusive future. *Landsc Archit* 57(2)
- Lang J (1983) Teaching planning to city planning students. An argument for the studio/workshop approach. *J Plan Educ Res* 2(2):122–129. <https://doi.org/10.1177/0739456X8300200208>
- Leopold A (1949) *A sand county almanac and sketches here and there*. Oxford University Press, New York
- Lewis PH (1996) *Tomorrow by design: a regional design process for sustainability*. Wiley, New York
- Li W, Milburn L (2016) The evolution of geodesign as a design and planning tool. *Landsc Urban Plan* 156:5–8. <https://doi.org/10.1016/j.landurbplan.2016.09.009>
- Luccarelli M (1995) *Lewis Mumford and the ecological region: the politics of planning*. Guilford Press, New York
- Lyle JT (1978) The changing direction of graduate education. *Landsc Archit* 68(5)
- Lystra M (2014) McHarg's entropy, Halprin's chance: representations of cybernetic change in 1960s landscape architecture. *Stud Hist Gard Design Landsc* 34(1):71–84. <https://doi.org/10.1080/14601176.2013.850313>
- Malczewski J (2004) GIS-based land-use suitability analysis: a critical overview. *Prog Plan* 62:3–65. [https://doi.org/10.1016/S0305-9006\(03\)00079-5](https://doi.org/10.1016/S0305-9006(03)00079-5)
- Marsh GP (1965) *Man and nature*. Harvard University Press, Cambridge
- Marsh WM (1991) *Landscape planning: environmental applications*, 2nd edn. Addison-Wesley Publishing Company, Reading
- Marx L (1964) *The machine in the garden*. Oxford University Press, New York
- McHarg IL (1966) Ecological determinism. In: Fraser Darling J, Milton John P (eds) *Future environments of North America*. The Natural History Press, Garden City, pp 526–538
- McHarg IL (1969) *Design with nature*. The Natural History Press, Garden City
- McHarg IL (1970) Open spaces from natural processes. In: Wallace D (ed) *Metropolitan open space and natural process*. University of Pennsylvania Press, Philadelphia
- McHarg IL (1981) Human ecological planning at Pennsylvania. *Landsc Plan* 8(2):109–120. [https://doi.org/10.1016/0304-3924\(81\)90029-0](https://doi.org/10.1016/0304-3924(81)90029-0)
- McHarg IL, Radke J, Berger J, Wallace K (1992) A strategy for a national ecological inventory. In: McHarg IL, Steiner FR (eds) *To heal the earth: selected writings of Ian L. McHarg*. Island Press, Washington, DC, pp 341–356
- McHarg IL (1996) *A Quest for Life: an autobiography*. Wiley, New York
- McHarg IL (1997a) Ecology and design. In: Steiner Frederick R, Thompson George F (eds) *Ecological design and planning*. Wiley, New York, pp 321–332
- McHarg IL (1997b) Natural factors in planning. *J Soil Water Conserv* 52(1):13–17
- McHarg IL (1998) *Landscape architecture (1997)*. In: McHarg IL, Steiner FR (eds) *To heal the earth: selected writings of Ian L. McHarg*. Island Press, Washington, DC, pp 188–193
- Meyer EK (2001) The post-Earth Day conundrum: Translating environmental values into landscape design. In: Conan M (ed) *Environmentalism in landscape architecture*. Dumbarton Oaks- Harvard University Press, Washington, DC, pp 187–244
- Mildenberger M (2019) The tragedy of the tragedy of the commons. *Sci Am Blogs*. Accessed 12 May 2019
- Miller EL, Pardal S (1992) The classic McHarg: an interview. CESUR, Technical University of Lisbon, Lisbon
- Miller JR, Nelson R, Wagner M (2004) Ecology and education in landscape architecture. *Landsc Rev* 9(1):167–170
- Muller B, Flohr T (2016) A geodesign approach to environmental design education: framing the pedagogy, evaluating the results. *Landsc Urban Plan* 156:101–117. <https://doi.org/10.1016/j.landurbplan.2016.05.010>
- Mumford L (1969) Introduction. In: McHarg Ian (ed) *Design with Nature*. The Natural History Press, Garden City, NY
- Ndubisi F (2002) Ecological planning: a historical and comparative synthesis. The Johns Hopkins University Press, Baltimore
- Ndubisi F (2014) *The ecological design and planning reader*. Island Press, Washington
- Neimark P, Rhoades Mott P (eds) (2017) *The environmental debate: a documentary history with timeline, glossary, and appendices*, 3rd edn. Grey House Publishing, Amenia
- Niebanck P (1993) The shape of environmental planning education. *Environ Plan B: Urban Anal City Sci* 20(5):511–518. <https://doi.org/10.1068/b200511>
- Odum E, Davis S (1969) More birds in the bushes from shrubs in the plans. *Landsc Archit* 60(1):36
- Olin L (1990) Wide spaces & widening chaos. *Landsc Archit* 80(10)
- Orr D (2007) Preface. In: Lynn M, Corner J, Hawthorne B (eds) *Ian McHarg: conversations with students*. Princeton Architectural Press, New York
- Palazzo D (1997) *Sulle spalle di Giganti. Le matrici della pianificazione ambientale negli Stati Uniti*. Franco Angeli, Milano
- Palazzo D (2016) The Role of utopia in ecological planning and design. In: Thompson George F, Steiner Frederick R, Carbonell Armando (eds) *Nature and cities*. Lincoln Institute of Land Policy, Cambridge
- Planetizen (2019) Top 20 urban planning books (of all time). <https://www.planetizen.com/books/20>. Accessed 11 May 2019
- Podolak K, Kondolf GM, Mazingo LA, Bowhill K, Lovell M (2013) Designing with Nature? The persistence of Capability Brown's 18th century water features. *Landsc J* 32(1):51–64. <https://doi.org/10.3368/lj.32.1.51>
- Rose MH (2003) Reframing American highway politics, 1956–1995. *J Plan Hist* 2(3):212–236. <https://doi.org/10.1177/1538513203255260>
- Ruhl JB, Kraft SE, Lant CL (2007) *The law and policy of ecosystem services*. Island Press, Washington
- Sale K (1993) *The green revolution. The American environmental movement 1962–1992*. Hill and Wang, New York
- Sanoff H (1974) Community development group: a service learning program. *J Archit Educ* 28(sup 1):95–96. <https://doi.org/10.1080/10464883.1974.11102558>
- Schott D (2004) Urban environmental history: what lessons are there to be learnt? *Boreal Env Res* 9:519–528
- Seddon G (1986) Landscape planning: a conceptual perspective. *Landsc Urban Plan* 13:335–347. [https://doi.org/10.1016/0169-2046\(86\)90051-4](https://doi.org/10.1016/0169-2046(86)90051-4)
- Shabecoff P (1993) *A fierce green fire: the American environmental movement*. Hill and Wang, New York
- Spirn AW (1985) Urban nature and human design: renewing the great tradition. *J Plan Educ Res* 5(1):39–51

- Spirn AW (1997) The authority of nature: conflict and confusion in landscape architecture. In: Wolschke-Bulmahn Joachim (ed) *Nature and ideology: nature and garden design in the twentieth century*. Dumbarton Oaks Research Library and Collection, Washington, DC, pp 249–261
- Spirn AW (2000) Ian McHarg, landscape architecture, and environmentalism: ideas and methods in context. In: Conan Michael (ed) *Environmentalism in landscape architecture*. Dumbarton Oaks Research Library and Collection, Washington, DC, pp 97–114
- Steiner F (1983) Regional planning in the United States: historic and contemporary examples. *Landsc Plan* 10(4):297–315. [https://doi.org/10.1016/0304-3924\(83\)90038-2](https://doi.org/10.1016/0304-3924(83)90038-2)
- Steiner F (2001) *Human ecology: following nature's lead*. Island Press, Washington, DC
- Steiner F, Brooks K (1981) Ecological planning: a review. *Environ Manag* 5(6):495–505
- Steiner F, Young G, Zube E (1988) Ecological planning: retrospect and prospect. *Landsc J* 7(1):31–39
- Steinitz C (1986) World conference on education for landscape planning. *Landsc Urban Plan* 13:329–332. [https://doi.org/10.1016/0169-2046\(86\)90049-6](https://doi.org/10.1016/0169-2046(86)90049-6)
- Steinitz C (1990) A framework for theory applicable to the education of landscape architects (and other environmental design professionals). *Landsc J*. <https://doi.org/10.3368/lj.9.2.136>
- Steinitz C (1993) Geographical information systems: a personal historical perspective, the framework for recent project, and some questions for the future. In: Paper presented at the European conference on geographic information systems, Genoa, Italy, March 30
- Steinitz C (1995) The future of post-professional education in landscape architecture. In: *Proceedings of the Council of Educators in Landscape Architecture (CELA)*, Ames, Iowa
- Steinitz C, Parker P, Jordan L (1976) Hand-drawn overlays: their history and prospective uses. *Landsc Archit* 66
- Stephenson B (2018) Utopian plans for the modern world: John Nolen, Lewis Mumford, and the origins of sustainability. *J Plan Hist* 17(4):281–299. <https://doi.org/10.1177/1538513218755498>
- Twiss R (1986) Graduate education in landscape planning: the Berkeley model. *Landsc Urban Plan* 13:477–479. [https://doi.org/10.1016/0169-2046\(86\)90067-8](https://doi.org/10.1016/0169-2046(86)90067-8)
- Udall SL (1996) Foreword. In: McHarg IL (ed) *A Quest for Life*. Wiley, New York, pp 11–13
- United States Congress (1956) Federal-Aid Highway Act of 1956. June 29, 1956. <https://www.govinfo.gov/content/pkg/STATUTE-70/pdf/STATUTE-70-Pg374.pdf>. Accessed 24 May 2019
- United States Congress (1970) The National Environmental Policy Act of 1969, as amended. The National Environmental Policy Act of 1969, January 1. https://www.energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/Req-NEPA.pdf. Accessed 14 Mar 2019
- Vasisht A (2008) A scale-hierarchic ecosystem approach to integrative ecological planning. *Prog Plan* 70:99–132. <https://doi.org/10.1016/j.progress.2008.05.001>
- Walker P, Simo M (1994) *Invisible gardens: the search for modernism in the American landscape*. The MIT Press, Cambridge
- Wang X, Palazzo D, Carper M (2016) Ecological wisdom as an emerging field of scholarly inquiry in urban planning and design. *Landsc Urban Plan* 155:100–107. <https://doi.org/10.1016/j.landurbplan.2016.05.019>
- Weller R (2015) Stewardship now? Reflections on landscape architecture's raison d'être in the 21st century. *Landsc J* 33(2):85–108. <https://doi.org/10.3368/lj.33.2.85>
- White S (ed) (1953) *The teaching of landscape architecture*. Report to the NICLA, East Lansing, pp 70–89
- Xiang W (2019) History voted many times in Ian McHarg's favor. *Socio-Ecol Pract Res* 2019:1–5. <https://doi.org/10.1007/s42532-019-00013-7>
- Yang B, Li S (2016) Design with Nature: Ian McHarg's ecological wisdom as actionable and practical knowledge. *Landsc Urban Plan* 155:21–32. <https://doi.org/10.1016/j.landurbplan.2016.04.010>
- Yang B, Young RF (eds) (2019) *Ecological wisdom*. Springer Nature, Singapore
- Young GL (1974) Human ecology as an interdisciplinary concept: a critical inquiry. *Adv Ecol Res* 8:1–105. [https://doi.org/10.1016/S0065-2504\(08\)60277-9](https://doi.org/10.1016/S0065-2504(08)60277-9)
- Zube EH (1986a) The advance of ecology. *Landsc Archit* 76(2):58–67
- Zube EH (1986b) Landscape planning education in America: retrospect and prospect. *Landsc Urban Plan* 13:367–378. [https://doi.org/10.1016/0169-2046\(86\)90054-X](https://doi.org/10.1016/0169-2046(86)90054-X)



Danilo Palazzo Educated as architect and planner, is director of the School of Planning at the University of Cincinnati. Previously, he was at the Polytechnic University of Milan, Italy. He has authored books, books chapters, and papers on ecological planning, urbanism, urban ecological design, sustainable planning, design processes, and pedagogy.



Leah Hollstein is an assistant professor in the School of Planning at the College of Design, Architecture, Art and Planning at the University of Cincinnati. She holds a master of landscape architecture degree from the University of Michigan and Ph.D. in community and regional planning from the University of Texas at Austin.