

TECHNOLOGY AND LANDSCAPE IDENTIFICATION

Two fundamental issues pertaining to historic landscapes need to be addressed by investigators and managers: what was the landscape like during its prehistoric or historic period, and what is it like in the present? The answers are found in two sometimes quite different sources: information derived from documentary sources and information derived from the landscape itself.⁴⁰ As historian Thomas J. Schlereth has suggested in a study of the landscape along U.S. Route 40 in Indiana,

To know U.S. 40, and by inference any American "roadscape", one must embark on an intellectual and geographical odyssey. That is to say, one must confront the "roadscape" directly, by walking or riding over it as well as by exploring it vicariously in reading what others have written, photographed, mapped, sung or exhibited of it. One needs to do both reading and roaming . . .⁴¹

Various technologies can help make reading and roaming more cost-effective and time efficient.

Identifying and inventorying historic landscapes requires four basic steps:

1. identifying and accessing records of the known resources;
2. identifying previously unidentified historic landscapes and locating archival records, documents, and nondocumentary evidence concerning them;
3. recording, storing, and augmenting the newly acquired data; and
4. detailed ground survey and documentation.

Technologies that simplify and enhance the identification and documentation of landscapes range from such mundane, basic techniques as the use of volunteers wielding pencil and paper to sophisticated computer systems that can assimilate, manipulate, and store graphical information and generate complicated maps of a region. The following examples illustrate this range. In general, the various technologies and sources

of information are not exclusive, but may build upon one another.

Documentary and Nondocumentary Sources

The investigation of various kinds of documentary sources—manuscript materials, knowledgeable inhabitants, business and family records, local histories, novels, quilts, folksongs, newspapers, poems, photographs, paintings, drawings, diaries, letters, maps, advertisements, catalogs, films, surveyors' field notes and maps, or even types of plants—will help the investigator better understand what he or she sees in surveying a site.⁴² As one landscape historian has commented:

We need to know the persons involved—designers, clients, users; the means at hand—financial resources as well as natural ones, available technology, materials and labor supply; the design concepts and criteria that were at work as the landscape took form, whether the designer was conscious of them or not; and finally the chronology of events that either enhanced or disrupted the realization of the original scheme.⁴³

A historical survey is the first step in beginning to read a historic rural district. Such a survey includes information about broad settlement patterns of the region, including important people; regional demography of both the past and the present; social, political, economic and cultural trends, forces, and patterns. Known anthropological, historical, folkloric, and archaeological data also should be incorporated in a survey. This information forms the historical context within which to evaluate the natural as well as cultural resources of the district (table 7).⁴⁴

⁴⁰Melnick, *op. cit.*, 1984, p. 8.

⁴¹Thomas J. Schlereth, *US # A Roadscape of the American Experience* (Indianapolis, IN: Indiana Historical Society, 1985), p. 61.

⁴²Delores Hayden and Peter Morris, "The Quiltmaker's Landscape," *Landscape* 25, No. 3, 1981.

⁴³Catherine M. Howett, "Landscape Research: Keeping Faith With Today and Tomorrow," *The Yearbook of Landscape Architecture: Historic Preservation* (New York, NY: Van Nostrand Reinhold, 1983), p. 7.

⁴⁴Melnick, *op. cit.*, 1984, p. 16.

Table 7.—The Material Components of the Rural Historic Landscape

Overall patterns of landscape spatial organization
Land-use: categories and activities
Response to natural features
Circulation networks
Boundary demarcations
Vegetation related to land use, such as hedge-rows, orchards, or ornamental plantings
Cluster arrangement
Structure: type, function, materials, construction
Small-scale elements, such as cattle chutes, water troughs, or isolated grave markers
Historical views and other perceptual qualities

SOURCE: Robert Z. Melnick, *Cultural Landscapes: Rural Historic Districts in the National Park System* (Washington, DC: US. Department of the Interior, National Park Service Park Historic Architecture Division, 1984).

Archival Research

Archival research and interviewing (oral history) are important first steps in identifying historic sites, including landscapes. Preliminary research that is done with care and imagination can save time and money as well as provide a focus for field work and a broad basis for establishing historic significance. Developments in archival technology, such as optical disk storage and retrieval, and computerized databases can make the records search more efficient and even more cost-effective than it is now.⁴⁵ Such research may benefit from the assistance of professional historians who have been trained in archival methods.

The technical questions involved with this type of historical research specifically concern methods of access to information in the institutions that house it, and ways of arranging data to make them usable for preliminary analysis and in developing a research plan. Interviewing depends on the technologies for tape recording and archiving electronic storage media, if oral history materials are to be retained. It also depends on knowledge of good interviewing techniques.

Maps

A variety of historic and contemporary maps can be used to discover historic landscapes and other cultural features, such as archaeological sites and historic structures. Historic maps primarily depict natural and political boundaries and

⁴⁵*Technologies for prehistoric and Historic Preservation*, "Ch. 5: Preservation Information."

cultural features, such as growth patterns, place names, Indian trails, roads, railroads, structures, and fence lines. In addition to displaying such features, contemporary maps, often made from aerial photographs or images sensed from spacecraft, may reflect the topography of a region or its natural resources and geology. This additional information can be particularly useful for discovering and analyzing historic landscapes.

Because early mapmaking methods often introduced major systematic errors into maps, and tended to treat the earth's surface as if it were a plane, extracting useful historic information from very early maps can often be extremely difficult. However, methods developed by historical cartographers for determining the planometric accuracy of early maps can be applied to them to correct their systematic errors. The corrected version can then be used to locate historic features on current maps or in the field.⁴⁶

A comparative sequence of maps from different time periods can reveal cultural patterns and how the cultural components of an area change over time.⁴⁷ property survey maps and records, which are generally stored in county archives, as well as old tax records are also of use in interpreting land use patterns. Historic aerial photographs (see below) can also be used like maps to compare land use patterns over time.

Historic Photographs

Historic photographs, including aerial photographs, are an excellent source of landscape information and invaluable tools of identification and interpretation. Not only do they often capture a small slice of life in a landscape by showing people doing things, they show historic vegetation and structures, and may serve to document the changes in a landscape over time. Care and sophistication should be used in reading historic photographs because, like maps and other records, they are subject to a variety of distortions.

⁴⁶Thomas E. Davidson, "Computer-Correcting Historical Maps for Archaeological Use," Maryland Historical Trust, manuscript, n.d.

⁴⁷J.M. Hooke and R.J.P. Kain, *Historical Change in the Physical Environment: A Guide to Sources and Techniques* (London: Butterworth Scientific, 1982).

For example, "landscape photographs"⁴⁸ may present views selected according to aesthetic standards applicable to the era in which they were taken.⁴⁹

Photographs present the historian with a **visual record of a "moment in time" stopped indefinitely for his inspection. As such, it provides a direct record of how things and people looked, in a way that endless accounts of written records could never achieve. so**

For example, photographs from the late 19th and early 20th century document how the historic center of Annapolis, MD, has changed in the intervening years. They illustrate that certain areas of the city have experienced surprisingly little change over the years, while others have been altered to the point that they would be totally unrecognizable today to a visitor from the past.⁵¹ Because photographs of landscapes are often byproducts of other interests of the photographer, they also show aspects of landscapes that no one at the time thought were important to point out.

In historic designed landscapes, historic photographs may reveal vegetation and important elements of the landscape that do not appear in the original landscape drawings, either because the owner altered the plan, or because the available plans do not reveal the overall setting. Photographs are especially important for disclosing the surroundings of a formal garden. Among other things, such evidence may allow historians to discover the placement of an original garden now destroyed or buried.

Photographs may also provide valuable information about design intent. One example is a 1904 photograph of Olmsted's home, Fairsted (now Olmsted National Historic Site), which

shows the house covered with vines.⁵² A plan of the same year fails to indicate the vines at all. Thus, photographs and plans provided different information, and both are needed to present the total picture.

Historic photographs are available from State and local archives, museums, private collections, antique dealers, and individual families. Aerial photographs are of particular importance, as they can show broad-scale patterns of land use and disturbance (see section below on remote sensing.)

Historic photographs can be especially valuable in showing what plantings and landscape features existed around a historic structure whose gardens were not formally designed and thus for which no plans are available. For example, photographs taken of the Frederick Douglass Home, Cedar Hill, while Douglass lived there showed shade and cedar trees and plantings around out-buildings, as well as the location and materials of such features as fences and a grape arbor. These photographs enabled the "re-creation" of a plan of how the grounds appeared when Douglass lived there. References in correspondence and receipts of items purchased refine our knowledge of the kinds of plantings and construction materials used.⁵³

Historic Drawings and Plans

For historic gardens, parks, and other designed landscapes, the original plans or drawings of the landscape, if they exist, are of great importance in identifying and eventually restoring and preserving the designed landscape. These documents may be stored in various specialized archives, such as the Warren H. Manning Collection at Iowa State University,⁵⁴ and the Olmsted archives at the Frederick Law Olmsted National Historic Site, or more generalized archives such as the Library of Congress and National Archives and Records Administration.

⁴⁸John Szarkowski, *American Landscapes: Photographs From the Collection of the Museum of Modern Art* (New York: Museum of Modern Art, 1981).

⁴⁹John R. Stilgoe, "Popular Photography, Scenery Values, and Visual Assessment," *Land-cape Journal*, vol. 3, No. 2, 1984, pp. 111-121.

⁵⁰Arthur C. Townsend, "Interpreting the Historical Photograph," in Marion E. Warren and Mary Elizabeth Warren, *The Train's Done Been and Gone* (Boston, MA: David R. Godine, 1976), p. 13.

⁵¹Warren and Warren, *op. cit.*, 1976.

⁵²Shary Page Berg, personal communication, 1987.

⁵³Darwina Neal, National Park Service, personal communication, 1987.

⁵⁴William J. Grundmann, "Warren H. Manning Collection," Department of Landscape Architecture, College of Design, Iowa State University, 1985.

plans and drawings done by professional designers or design firms are often retained in the firm's archives if the firm still exists. More often, however, the landscape architects worked alone or had few employees, so that the office closed when they ceased to practice. Files from such an office may have been passed on to another firm, donated to State or local historic societies, or given to universities, especially those with schools of landscape architecture. In other cases, records of projects may have been given to the clients who commissioned them. Many such plans are simply destroyed.

In many cases, architectural and landscape architectural plans were generally intended for short-term use and little or no thought was given to the possibility that they might later be placed in an archive. As a result, plans and drawings were not always done on durable paper or properly stored. New conservation and copy technologies are needed. Computer technology for copying drawings, digitizing the information they contain, and reproducing them is already available.⁵⁵

Until recently, there has been no central listing of such records. The newly established Catalog of Landscape Records in the United States project (box B) is an attempt to remedy this. Few collections that do exist are cataloged in a systematic way, making access and retrieval particularly difficult. For example, the collection of records of the Olmsted firm, which NPS acquired in 1980 as part of the Olmsted National Historic Site, is one of the few collections of landscape architectural records under the care of a curator. It includes over 100,000 individual plans. Although they are generally organized according to design project, many have been misfiled over the years; no comprehensive inventory exists.⁵⁶ The lack of specific inventory makes it difficult for those carrying out a general inventory to answer such questions as: what plans exist for a particular property? or what projects did a particular member of the firm work on?

⁵⁵See OTA, *Technologies for Prehistoric and Historic Preservation*, op. cit., "Ch. 5: Preservation Information," for additional discussion of the conservation problem.

⁵⁶Shary Page Berg, "Rescuing Fairsted," *Landscape Architecture* 77, 1987, pp. 83-85.

Additional Documentary Evidence

Because landscapes change so rapidly, design intent is even more important, and more difficult, to establish. Therefore, correspondence, or design statements may provide important clues to understanding a landscape. Newspapers, manuscripts, family records, personal correspondence, local written folklore, even postcards,⁵⁷ may provide useful information concerning landscapes and the public's attitudes toward them.

Landscapes can also be captured and studied in media that may not immediately come to mind. For example, American music frequently has expressed the grandeur and specificity of the way the landscape looks and sounds. Such music demonstrates how people relate to and feel about the land. In fine-art expression, the sounds of landscapes create the Pennsylvania countryside in Aaron Copland's *Appalachian Spring* and western vistas in Ferde Grofe's *Grand Canyon Suite*.

The humorous folksong "Cumberland Gap" details some of the problems the mountainous landscape created for travelers. John Denver's "Country Roads" waxes with nostalgia, but evokes the West Virginia mountain landscape left behind. Although Steve Goodman's song, "The City of New Orleans," details the atmosphere of the inside rather than outside "train scapes", the place names alone put the trip and the sense of loss for a sort of transportation and a crucial piece of American history into the context of past and present.⁵⁸ The popular song "Route 66" describes a "roadscape" familiar to drivers before the advent of Interstate 40.

Even historic movies can be sources of information about landscapes and how they are perceived. Both documentaries and artistic movies provide images of the landscape and how they were used.⁵⁹ The silent movies of the early part

⁵⁷Hilary Lamber Renwick and Susan Cutter, "Wish you Were Here: Map Postcards and Images of Place," *Landscape*, vol. 27, No. 1, 1983, pp. 30-38.

⁵⁸For railroad landscapes, see John R. Stilgoe, "The Railroad Beautiful: Landscape Architecture and the Railroad Gardening Movement, 1867-1930," *Landscape Journal*, vol. 1, No. 2, 1982, pp. 57-65.

⁵⁹Gena Crandell, "Moving Pictures," *Landscape Architecture*, November 1985.

Box B.—Catalog of Landscape Records in the United States

The American Garden History Program at Wave Hill, Bronx, NY, has recently embarked on a project to develop a systematic inventory of American landscape documentation. The project's ultimate goal is to identify, locate, and disseminate information about all documents for American landscapes.

Because no other such catalog exists, the resulting *Catalog of Landscape Records in the United States* should be a valuable tool for planners, preservationists, landscape architects, designers, ecologists, gardeners, historians, and administrators. The catalog will be used for education. In the first phase of the project, the Catalog will emphasize the collection of information on designed, managed, or managed landscapes. However, the Catalog will accept information about any type of landscape or collection related to landscape, including rural, vernacular, or cultural landscapes.

Entries to the Catalog will be organized according to landscape location, designer or patron site, and repository of information. It will be available on a database using U.S. MARCIAMC format. The Catalog will submit to the Library of Congress, the National Archives and Manuscripts Cataloging Office, in order to facilitate the exchange of information.

The Catalog will also include a separate newsletter, available free of charge.

SOURCE: Wave Hill, Bronx, NY.

of this century provide an especially valuable record of the landscapes of California and New York.

Above-Ground Archaeology— Nondocumentary Evidence

Place names, buildings, markers, vegetation, road size, infrastructure elements, and other physical evidence contain important clues to the identification and analysis of landscapes.⁶⁰

⁶⁰John J. Stewart, "Historic Landscapes and Gardens," American Association for State and Local History Technical Leaflet 80, *History News* 29, No. 11, November 1974.

Vegetation.—Ecologists, folklorists, forest and agricultural historians, cultural and historical geographers, and landscape architects have all done important work in interpreting landscape vegetation patterns. However, the British "history on the ground movement" is far ahead of American historians in terms of reading the landscape for clues to historical events, as is the German tradition of Volksbotanik scholarship.⁶¹

The kinds and patterns of vegetation can reflect a design planned by someone who understands the relationships between light and shade, mass and clearings, plantings and structures—a famous landscape architect on one hand, a committed local gardener in a frontier wilderness on another, though their processes and patterns may be very different. Plants reveal patterns of settlement and use, protection of property, and environmental and aesthetic improvement in a landscape. Plantings may also be used to commemorate important life events such as marriage, birth of children, or death.⁶² Trace plantings such as daffodils, exotic flowering shrubs, or fruit trees can denote abandoned homesteads. Peach trees and lilac bushes were often planted around homes in the Cuyahoga Valley of Ohio. In the Southwest, four wing saltbush (*Atriplex canescens*) and wolfberry (*Solanum*, often indicate the presence of ruined Pueblo prehistoric dwellings.

Local folklore often reveals the importance of certain places to the local populace. Such information can often only be obtained by interviewing local residents.

Gathering and Analyzing Site Information

The survey of landscapes is a precursor to their eventual analysis and evaluation as part of a region's historic record. A considerable amount of the information necessary for understanding the history of an area is available in the survey records

⁶¹Thomas J. Schlereth, *Artifacts and the American Past* (Nashville, TN: American Association for State and Local History, 1980), p. 147.

⁶²For example, some North Carolina migrants brought "coffin" pines to the midwest to provide a soft wood for coffins. They were apparently sometimes planted in pairs, one for each partner. Thomas J. Schlereth, *Artifacts and the American Past* (Nashville, TN: American Association for State and Local History, 1980), 154.

alone. For example, the New Mexico Historic Landscape Survey has shown that merely examining the various landscapes defined by the original town centers of the cities of New Mexico enables the observer to glean important clues about the values of the individuals who designed them and settled there.⁶⁹

The following sections outline some of the techniques, methods, and equipment that can assist landscapes survey.

Volunteer Survey

This technique is commonly used for historic preservation, especially in cases where funding for general surveys is often highly limited, and where local lay knowledge of historic sites is high. The use of volunteers, using printed forms such as the ASLA Designed Historic Landscapes Na-

⁶⁹Baker H. Morrow, "Old Landscapes, New Ideas: New Mexico's Historic Landscape Architecture," *New Mexico Architecture*, September-October 1985.

tional Landscape Survey Form,⁶⁴ has the signal advantage that its use requires little special training beyond a knowledge of landscape values and the significance categories of the National Register. However, it is difficult to obtain uniform results from the efforts of many different volunteers, with varying knowledge, experience, and values, from many different regions of the United States. Volunteer efforts are generally most successful when the volunteers have received appropriate training from historic preservation professionals, where ongoing professional guidance is available to ensure consistency, and where the project is small or highly focused.

Measured Drawings

Documentation of a landscape after it has been identified as having historic significance, is an important part of the overall survey process.

⁶⁴OTA, *Technologies for Prehistoric and Historic Preservation*, op. cit., app. F.



Photo credit: National Park Service, Historic American Buildings Survey

Cascade area, Meridian Hill Park, Washington, DC

Measured drawings, employing techniques borrowed from the field of structural architecture, are an excellent means of thoroughly documenting a landscape.

In 1985, the Historic American Building Survey (HABS) undertook a measured drawings project at Meridian Hill Park, Washington, DC, which could serve as a useful model for such documentation. Meridian Hill Park designed and constructed from 1912 to 1936, was inspired by French and Italian Renaissance landscape designs.⁶⁵

At Meridian Hill, the documentation began with a complete set of architectural base maps. Five large HABS sheets linked by pinbar matchlines were covered by matching overlays with "graphic representations" of trees, shrubs, and vines, as well as tree diameters and canopy sizes. Though the drawings display where elements of the landscape are located, they are not able to capture the essential landscape spatial qualities of Meridian Hill Park. Therefore, the recorders used photography to supplement the base maps and provide a sense of the landscape. A complete set of standard 4x5 inch HABS photographs was taken of the whole park. Five views, chosen for their historic importance for design and extent of change, were printed at a large scale onto HABS Mylar. Some of the areas were then reconstructed on Mylar overlays, based on historic photographs and research. In addition, some resources of particular architectural interest were detailed in a standard HABS format.⁶⁶

The HABS survey of Texas missions⁶⁷ illustrates the recording of buildings that create spaces, such as courtyards or patios, which, though they are defined by the buildings, are historic landscapes in their own right. New Mexican plazas, courtyards, and courthouse squares have been docu-

mented by the State Historic Preservation Office as part of its survey of New Mexico landscapes. Ga

University Landscape Architecture Programs

Landscape architecture schools provide an important potential source of expertise and commitment to documenting significant historic landscapes. The University of Virginia's Architectural History Program offers a class in measured drawing, which has provided HABS documentation for hundreds of Virginia historic buildings over the years.⁶⁸ University of Delaware students have carried out much of the basic survey for the State of Delaware in a similar drawing program.

Computers

The computer is one of the most powerful tools available for identifying, analyzing, and evaluating historic landscapes. When used with other technologies, such as optical disks, graphics design and display software, or computerized databases, the computer can dramatically increase the preservation community's access to information and its ability to exploit information effectively.

Computer Aided Design (CAD) .-CAD software,⁷⁰ when used with the appropriate microcomputer, makes it possible to draw and store a given landscape and to manipulate and alter the drawing later without having to redraw unaltered elements. Various elements of the landscape, such as trees, fences, shrubs, other plantings, and structures, can also be independently generated and stored in memory for placement in appropriate parts of the landscape. Such software allows one to remove elements of the current landscape, such as contemporary structures or newer plantings, and render it both as it appeared in the historic era in which it was designed, and as it has evolved. In restoring an

⁶⁵Because structural architectural elements, such as retaining walls, steps, cascades, and fountains play a dominant role in the park's design, HABS recorded Antietam National Battlefield, a landscape with more natural components, in order to expand its guidelines for the documentation of landscapes in 1986.

⁶⁶Paul Dolinsky, "Landscape Recording: Expanding the Tradition," *CRM Bulletin*, vol. 9, June 1986, pp. 16-17.

⁶⁷Kenneth L. Anderson, "Mission Project Brings Praise from park and Region," *CRM Bulletin*, vol. 9, No. 3, June 1986, pp 11-15.

⁶⁸State of New Mexico, "First Annual Report, Registry of Historic Landscapes," *op. cit.*

⁶⁹Orlando Ridout V, Maryland Historical Society, personal communication, 1987.

⁷⁰One example is Landcadd, which operates with AutoCAD, a generalized computer drafting and design software package. See E. Bruce McDougall, *Microcomputers in Landscape Architecture* (New York, NY: Elsevier, 1983) for a general discussion of microcomputers for treating landscape design and management.

historic landscape, these design programs make it possible to predict the general "look" of a landscape after several years. High-quality plotters can produce accurate drawings in a fraction of the time required to do them by hand. Such systems can also vastly improve the speed and reliability of producing scaled drawings.

Computer-Aided Survey.—If possible, computers should be used from the very beginning of survey work, both to increase accuracy and to reduce overall labor. Inexpensive, small, portable (lap) computers now available make it possible to enter data in the field, reducing the total amount of effort in carrying out a survey, and ensuring greater uniformity. Forms can be entered and stored in the computer ahead of time for data entry in the field. Additional notes and other relevant information can also be entered and stored on the computer. Their relatively low price and the availability of word processing and database software make portable computers extremely attractive for such work.

Even if, for reasons of cost or other considerations, it proves infeasible to take computers into the field, it is possible to design survey forms for easy field recording of data and subsequent entry into a computer database.

Photography and Videogrammetry

Photography and videogrammetry are powerful methods for documenting a variety of historic resources, including landscapes. Stereophotogrammetric methods that use a photo-theodolite enable detailed landscape documentation in three dimensions.⁷¹ Advances in this technology that depend heavily on digital computer applications, rather than precision optics to achieve accuracy, promise to make documentation of material cultural resources much cheaper and more capable.

Architectural photogrammetry has not been developed in the United States at a level comparable to that found in countries such as Austria, France, the Federal Republic of Germany, and in other European countries. In the United States,

⁷¹OTA, *Technologies for Prehistoric and Historic Preservation*, op. cit., pp. 52-54.

the use of accurate measured drawings is given relatively low priority in the preservation of structures and landscapes. Yet, the use of architectural photogrammetry is cost-effective, as such methods lead to a marked increase in accuracy and productivity over the labor-intensive requirements for preparing measured drawings using traditional methods depending on direct measurements. For this reason, developing countries such as Indonesia, Peru, and Turkey now have their own photogrammetric services.

Video and optical disk technologies can both be powerful tools for survey and identification of landscapes. Video techniques have proved especially helpful in the survey of archaeological resources, and for rapid survey of city neighborhoods and historic structures.⁷² Optical disks can be used to store video, movies, and photographs or drawings of cultural resources for rapid retrieval and comparison.⁷³

Landscape Databases

Computerized databases of various kinds are crucial to the efficient use of information. As computers have become increasingly more capable and cheaper to acquire, individuals and small institutions have begun to develop their own powerful databases, and to communicate, by telephone and modem, with other databases around the world.

At present, no national database of historic landscapes exists, either in the form of a landscapes inventory or a list of records collections. An important first step in developing a national database will be to create a database listing locations and general contents of landscape records and collections throughout the country. A second step would be to establish a uniform database for an inventory of historic landscapes, using a standard survey form. State and local databases are highly incomplete and lack information on location of records and landscapes. In most cases,

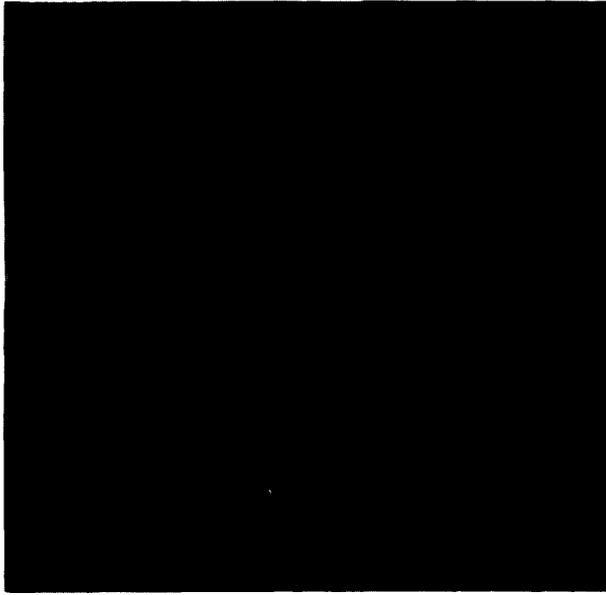
⁷²Andrew Lippman, "Movie-Maps: An Application of the Optical Videodisc to Computer Graphics," *Proceedings of SIGGRAPH '80: Seventh Annual Conference on Computer Graphics and Interactive Techniques*, Seattle, WA, July 14-18, 1980.

⁷³OTA, *Technologies for Prehistoric and Historic Preservation*, op. cit., ch. 5.

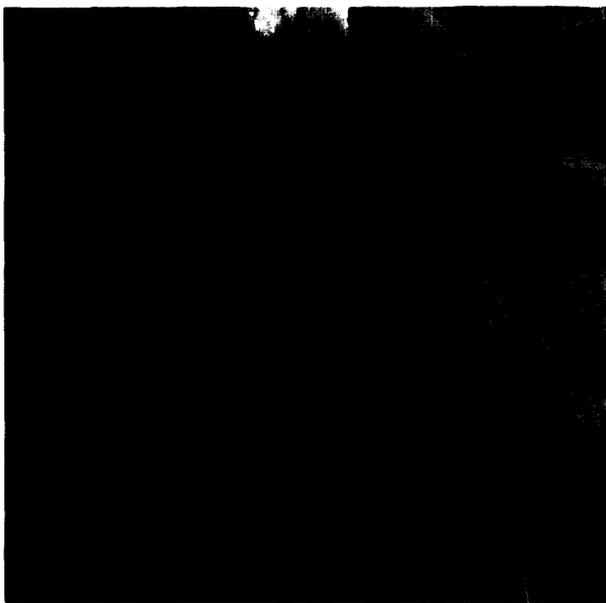
he u e ha m gh upport a da aba e ha e
no been done A na ona ng wou d gn
an a he den a on o h o and p e
h o and ape he fo ow ng da aba e on
a n ome nfo ma on abou h o and ape

The Library of Congress.—Its National Union Index to Architectural Records, which is only available at the Library, contains some information about landscapes. This database can be accessed by the name of the designer, architectural firm, partner, name or geographic location of a building or structure, and location of the repository of information. It cannot be searched by landscape type.

The National park Service.—The National Register Information System, maintained by the National Register of Historic Places, contains information on over 45,000 historic structures,

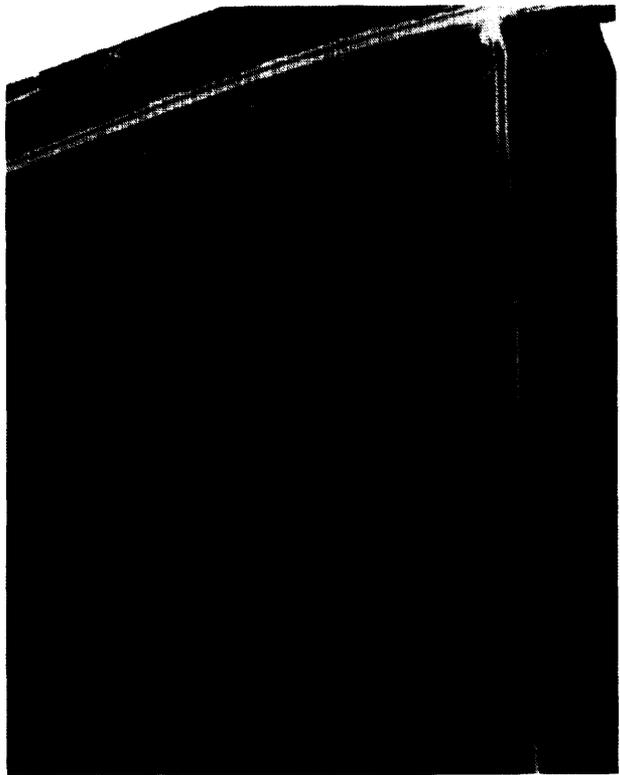


938



95

95 d 985 p g 9 8
p g p d m g g d
d p d m
p w g
pe
985 De



1985

objects, and sites in the United States, both listed and determined eligible for listing.

In addition, NPS maintains a database of all the landscapes within the National Park System. The Service is also employing interns to examine its published documents for substantial references to landscapes. This effort has yielded 200 items out of 6,000 publications to date.

Catalog of Landscape Records in America.—This recently developed program, begun by the American Garden History Program at Wave Hill, Bronx, NY, will eventually result in a major catalog of landscape information (see box B).

Other Databases

A number of different private or university organizations maintain specialized databases related to landscapes. For example, landscape architect Robert Harvey of Iowa State University has developed a small database of his library of 700 books.⁷⁴ By putting in the tables of contents, and using keywords in a search it is possible to generate a variety of bibliographies dealing with different topics. The State of New Mexico, which has completed the first phase of its historic landscape survey, plans to place its entire list of historic landscapes on a database.⁷⁵

Remote Sensing

Remote sensing⁷⁶ techniques, especially those used from the perspective of aircraft and spacecraft, hold great promise for the study of historic landscapes, because they are nondestructive and capable of analyzing vast areas quickly and ac-

curately.⁷⁷ Those that provide a broad, overall (synoptic) view and record data in digital form for direct computer processing (e.g., multispectral scanners on spacecraft or aircraft), will eventually prove important for improving landscape discovery, identification, and evaluation. However, for most applications today, aerial photographs are extremely valuable and much cheaper than data from multispectral scanners.

Many of the older aerial photographs (from files of the U.S. Department of Agriculture's Soil Conservation Service, housed in the Cartographic and Architectural Branch of the National Archives and Record Administration, for example) may provide useful historical information on landscapes, but they have not been fully exploited. Aerial photographs, which have been taken of most places in the United States many times since the early 1930s, provide a unique record of changes in the landscape over time.⁷⁸ Not only can such photos serve to alert managers about impending changes or destruction of landscapes from natural or human causes, they can also point the way to understanding a variety of natural processes, such as erosion, or vegetation growth, that affect them. However, such photographs have seen relatively little use by the landscape preservation community.

Geographic Information Systems (GIS)

These are computerized database systems in which the data are explicitly spatial in nature and organization. A complete GIS includes both computer software and hardware. Such systems are designed to integrate, manipulate, and analyze statistical, demographic, cultural, and natural resources data. They also have the capability to print maps and reports containing a wide variety of information.

⁷⁴ Robert Harvey, personal communication, 1986.

⁷⁵ State of New Mexico, "First Annual Report, Registry of Historic Landscapes," Historic Preservation Bureau, 1982, p. 7.

⁷⁶ In general terms, remote sensing is the art of obtaining information about objects, areas, or phenomena through analyzing data gathered by devices placed at a distance from the subjects of study. Remote sensing may refer to sensing over short distances, as in medical or laboratory research applications using lasers, or over long distances as in environmental monitoring from spacecraft using advanced electro-optical instruments. Once the initial data are sensed, they must be analyzed and interpreted either visually or through sophisticated computer analysis.

⁷⁷ See OIA, *Technologies for Prehistoric and Historic Preservation*, op. cit., ch. 3, for a more complete exposition of remote sensing as it applies to preservation requirements. See also Carole L. Crumley and William H. Marquardt, *Regional Dynamics: A Landscape History of Burgundy* (New York, NY: Academic Press, in press). This book analyzes the historical landscape of Burgundy, France from an interdisciplinary perspective.

⁷⁸ James I. Ebert, Eileen L. Camilli, and LuAnn Wandsnider, "Measurement of Bank Erosion at Archaeological Sites on Middle Missouri River Reservoirs Using Sequential Aerial Photographs," presented at the 52d Annual Meeting of the Society for American Archaeology, Toronto, May 9, 1987.

Originally, geographic information systems were developed for large mainframe computers and used by Federal or State agencies for resource management analysis and planning. For example, the State of Mississippi has used its Mississippi Automated Resource Information System (MARIS) to conduct studies on nuclear waste disposal and storage, Mississippi Delta ground water, and statewide land cover. More recently, the proliferation of powerful microcomputers and minicomputers has reduced the cost of such systems and made it possible for smaller organizations to acquire them.

In preservation, GIS have been employed in studies of historic settlement patterns. The Army, for example, has used existing GIS technologies to map vegetation, slopes, and archaeological sites across a landscape.⁸⁰ Its system can plot every known site.

Geographic information systems can also be used for identifying, mapping, and displaying

landscapes. * Army technicians, for example, can show how the landscape looks at different times of the day or season. Although the Army uses such information for planning military exercises, and other strictly military purposes, most of these techniques could be transferred into the civilian realm. The Army Corps of Engineers has developed a GIS called the Geographical Resources Analysis Support System (GRASS), which can run on a minicomputer or microcomputer and has four major subsystems:

1. *Grid Cell Analysis System (GRASS-GRID)*: Provides tools for overlaying, analyzing, and displaying grid cell databases within an area.
2. *Image Processing (GRASS-IMAGERY)*: Processes and interprets Landsat digital images and digitized aerial photographs.
3. *Digitizing and Map Development (GRASS-MAPDEV)*: Converts printed maps into digital data for manipulation by other GRASS subsystems.
4. *Polygon Display and Analysis*: Produces maps for the plotter from the database.⁸¹

*John Knoerl, "Managing Historic Preservation Information," presented at the 52d Annual Meeting of the Society for American Archaeology, Toronto, May 9, 1987.

⁸¹J. Westervelt, W. Goran, and M. Shapiro, "Development and Applications of GRASS: The Geographical Resources Analysis Support System," in Bruce K. Opitz (ed.), *Geographic Information Systems in Government* (Hampton, VA: A. Deepak Publishing, 1986), pp. 605-624. This book contains a comprehensive review of the many uses of GIS for land analysis and management.

⁷⁹U.S. Congress, Office of Technology Assessment, *Remote Sensing and the Private Sector: Issues for Discussion—A Technical Memorandum*, OTA-TM-ISC-20 (Springfield, VA: National Technical Information Service, March 1984), app. C.

⁸⁰Constance Ramirez, U.S. Department of the Army, personal communication, 1986.