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Conservation and Management
of Archaeological Sites



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Conservation and Management
of Archaeological Sites

A Select Annotated Bibliography

Compiled by Martha Demas

The Getty Conservation Institute

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GCI Project Bibliographies

Project bibliographies represent a distillation of many years of research by Getty Conservation Institute staff in support of a given project. The unique bibliographic resources available at the Getty Center and in the Los Angeles area make it possible for GCI staff to access and review literature that is not easily obtainable by many conservation practitioners. With this unique opportunity comes a responsibility to share the results of this research with the conservation community and other interested parties.

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Introduction to the Annotated Bibliography

The annotated bibliography on Conservation and Management of Archaeological Sites was compiled originally for the 1990 and 1993 courses, 'Conservation of Excavated Sites,' jointly organized by the Getty Conservation Institute and the Department of Antiquities, Cyprus. It has since grown (there are currently approximately 500 citations) and there have been some modifications in the initial subject categories. The purpose of the bibliography is to provide practitioners, as well as those new to the subject, with an overview of the literature related to the management and conservation of archaeological sites.

The bibliography is conceptually organized under two major headings. The first is *Conservation and Management of Archaeological Sites*, whose literature reflects the dual origins of archaeological site conservation in monument conservation and cultural resource management respectively. A second heading, *Methods and Techniques for Protection and Stabilization*, incorporates individual bibliographies on specific techniques or interventions used to control the deterioration of the site or its components.

The published literature on conservation and management has grown substantially in the last two decades and has become increasingly specialized. This bibliography is not intended to be exhaustive—either in the subject categories it covers or in the specific citations to those categories—but it is intended to reflect the full range of theory and practice in each subject category. Each of the bibliographies is selective and is current through 1999; any citations after that date are opportunistic rather than the result of a literature search.

While the present bibliography is based on database searches, it is more selective in its use of citations and more directed in its use of subject categories than typical database searches. Selection entails an editorial judgment, but it is primarily aimed at providing a closer fit between the citation and its subject category. Direction is achieved by using subject categories to outline a process (management), and the principles and practices that are specific to, or have been adapted to, archaeological sites and monuments. It is thus the aim of the bibliography to incorporate all the elements of management and conservation of archaeological sites in a format that makes the literature accessible and usable both for practitioners and those wishing to explore the parameters and breadth of the subject.

It is important to recognize that certain areas of specialized conservation are *not* covered in this bibliography. Rock art, mosaics, wall paintings, earthen architecture, treatment of stone, and chemical consolidation of materials are among the most important of these, each with its own extensive and specialized literature base. Only individual articles or monographs from this specialized literature base that illustrate general principles of conservation practice or have wider application have been selected for inclusion.

While the scope of the bibliography is intended to be global, it does reflect a distinct Euro-

American bias. This is a reflection in part of the origins of heritage management theory in English-speaking countries (Australia, the United States, and Britain) and the fact that most international conference proceedings are in English. The languages represented in the bibliography are limited to English, French, German, Italian, and Spanish; the geographical source of much of the literature is Europe, the Americas, and Australia.

All of the citations are annotated. Most annotations are simply indicative, summarizing the contents of the article or monograph; some provide analytical assessment; a few contain editorial comments. The annotations are especially critical for subject material that is buried within monographs or articles covering more comprehensive topics. These annotations are specific to the subject category under review (e.g., Reburial) and not to the citation per se. The annotator, or source of the annotation, is indicated in brackets; (aa) refers to an author abstract; other annotators, or sources of annotations, are identified by their initials or acronyms:

(AATA)	Art and Archaeology Technical Abstracts
(A.O.)	Anne Oliver
(A.B.R.)	Angelyn Bass Rivera
(J.S.)	Jane Sunderland (Protective Shelters section)
(J.St.)	John Stewart
(M.D.)	Martha Demas
(N.S.P.)	Nicholas Stanley-Price
Thorne 1989b	Archaeological Site Stabilization Bibliography

The following outline defines and justifies each of the twelve subject categories employed in the bibliography. It attempts to clarify what is meant by each subject category, why it is included in this bibliography, and how comprehensive the section it is intended to be.

Conservation and Management of Archaeological Sites

Archaeological Heritage Management (Bibliography I)*

Archaeological Heritage Management, also referred to as Archaeological Resource Management is a subset of what is widely known as Cultural Resource Management and encompasses a broad range of issues related to the protection, preservation, and use of archaeological resources. Archaeological Heritage Management developed in response to the many threats to archaeological resources and the means and methods of mitigating their impact by, for instance, the development and implementation of policy and legislation (both national and international); the survey, collection and management of data; the protection and/or salvage of archaeological resources in the face of modern development and illicit trafficking; and the education and training of professionals and the public.

Increasingly, other social, political, and economic concerns have given rise to new approaches

and perspectives and have brought Archaeological Heritage Management into greater discourse with academic archaeology, as well as with government agencies and non-governmental organizations, and allied disciplines. These concerns include the rights of indigenous peoples and their varied responses to their past, theoretical developments in academic archaeology, issues of development in the third world, the marketing and exploitation of heritage for tourism, and the integration of cultural and natural heritage. That all these issues are of global concern is well illustrated in the many publications of collected papers from international congresses.

For most of the themes that constitute Archaeological Heritage Management, one could generate individual bibliographies; this is particularly true of legislation, policy matters, issues, and approaches to rescue or salvage archaeology, which have been major areas of professional work since the 1960s. However, since the literature on these subjects is extensive, the bibliography tries to be inclusive with regard to issues, but selective in citations.

Archaeological Site Management (Bibliography II)*

Whereas Archaeological Heritage Management is policy oriented and principally played out at the regional and national level, the focus of Archaeological Site Management is the individual site, or classes or spatial groupings of sites that come under a single management scheme. Although all the issues that inform Archaeological Heritage Management are also part of managing the individual site, the literature on Site Management emphasizes the impact of these issues on a specific site or group of sites and how they have been addressed in the development of a management plan. Many issues become more prominent (e.g., presentation and interpretation) or focused in their solutions (e.g., visitor management) when they are addressed at the site level.

Both the process of site management and the resulting management plan are included, but the emphasis is on process. Site management plans are numerous, but they are as difficult to obtain as they appear to be to implement. A few examples are cited in order to call attention to these very important but largely ignored documents and to illustrate some of the approaches to site management. Critical parts of the management process, such as the assessments of significance and condition, are provided with separate bibliographies (see below); the assessment of the management context has generated no literature base to date. Selected articles on visitor management and interpretation—two increasingly important aspects of management planning and implementation—have been included in the Site Management bibliography.

Assessment of Significance (Bibliography III)*

Significance assessment is central to the values-based approach to planning increasingly advocated in the literature on management planning. The literature in the Significance bibliography covers both the process of evaluation and selection of sites for their preservation and protection, generally within the context of legal protection, and the role of values in

decision making and management planning for the individual site. Many of the assessment models and criteria have been devised as a tool of Cultural Resource Management, where the focus has been on criteria for determining scientific significance in order to establish priorities for research (especially as a part of rescue or contract archaeology). Nevertheless the approaches and criteria are applicable to decision making for the individual site.

Formulated as a statement of significance, the assessment of values becomes a critical component of the site management plan. The importance of assessment in the selection and management of individual resources and the difficulty of reaching a consensus on how this should be achieved account for the extensive literature on this topic, of which this bibliography provides only an overview.

Assessment of Physical Condition (Bibliography IV)

Assessing the physical condition of a site for purposes of planning and conservation requires a methodology and techniques for analyzing, monitoring, documenting, and diagnosing the causes of deterioration. The literature on this subject derives to a large extent from historic building conservation, although in recent years specialized areas of conservation have developed their own methodologies and techniques (e.g., mosaics and wall paintings). Rapid changes in the methods of recording sites and structures in response to technical innovations, ranging from satellite imagery to laser technology, require that the existing section be updated. The current bibliography on condition recording is brief and focuses on basic diagnostic tools and methodologies for recording and monitoring condition.

Conservation Principles and Practices (Bibliography V)

The general principles and the underlying philosophical premises that have guided the practice of conservation over the years—monument or building conservation in particular—are the focus of this literature. Central to any discussion of these principles and philosophies are the history, theory, and practice of restoration, reconstruction, anastylosis, and other intervention strategies. Also included under this category are the relatively few works that deal with a range of archaeological site conservation issues (notably, conference proceedings) and general works on approaches to the presentation of sites.

Implementation: Site-Specific Studies (Bibliography VI)

This bibliography incorporates published examples of preservation projects undertaken at specific sites. The emphasis may be on the conservation problems existing at a particular site, a specific intervention (e.g., anastylosis), or the general presentation of a site. The selected examples are intended as illustrations of the varied philosophical and technical approaches to site presentation, not as paradigms to be followed.

Methods and Techniques for Protection and Stabilization

Reburial of Archaeological Sites (Bibliography VII)

Reburial, or backfilling, refers to the practice of returning an excavated site to a buried environment in order to re-establish a state of equilibrium that existed prior to excavation. In the last decade or so, reburial has emerged as one of the most viable and flexible strategies for preserving excavated remains, both for the short and long term. Included under this rubric is the practice, especially prevalent with mosaics, of covering the substrate on a short-term basis for its protection, using a variety of materials other than soil. Despite a scarcity of literature, the growing importance of reburial as a conservation measure, the many obstacles to overcome in deciding to rebury and the demanding technical requirements warrant a separate bibliography.

Erosion Control and Site Stabilization (Bibliography VIII)

Erosion control and site stabilization refer to techniques, transferred or adapted from civil engineering and other fields, for the control of soil, wind, and water erosion. This can include everything from erosion of shorelines to erosion of excavated trenches. Methods and techniques range from highly engineered solutions, such as capping or 'burial' of unexcavated sites and the use of geosynthetic materials, to simple techniques, such as the use of vegetation to control soil or wind erosion.

Consolidation and Stabilization of Structures (Bibliography IX)

Methods of stabilizing archaeological structures, other than by chemical consolidation, are derived principally from the practice of architectural conservation. There have been considerable experimentation and research with the use of various mortars, the re-introduction of lime mortar technology, methods of capping or grouting walls, and the use of chemical consolidants aimed specifically at archaeological structures. This bibliography provides only a general overview of basic principles and techniques.

Vegetation Control (Bibliography X)

Vegetation control refers to techniques and materials employed for the management and control of vegetation destructive to archaeological structures and sites. This bibliography does not deal directly with the control of microflora, for which there exists a specialized literature. Standard manuals on the types and uses of herbicides are cited as reference sources.

Protective Roofing and Shelters (Bibliography XI)**

The use of shelters or roofs as a temporary or permanent measure to protect archaeological sites has become an increasingly popular response, especially for sites open to the public. It is also one of the most problematic and potentially controversial interventions to a site. Because relatively little has been published on this important subject, the bibliography aims to be as comprehensive as possible and includes many citations that contain only brief references to or documentation of shelters.

* *The bibliographies on Archaeological Heritage Management, Site Management, and Assessment of Significance were recently published in Gaetano Palumbo and Jeanne Marie Teutonico (eds). **Management Planning for Archaeological Sites**. (Proceedings of an International Workshop Organized by the Getty Conservation Institute and Loyola Marymount University. May 2000, Corinth, Greece). Los Angeles: The Getty Conservation Institute. 2002.*

** *The bibliography on Protective Shelters was recently published in **Conservation and Management of Archaeological Sites** (2001) volume 5, no. 1-2, 91-105.*

Martha Demas
September, 2003

Principal Charters and Documents Relating to the Conservation and Management of Cultural Sites and Tourism (in chronological order)

Recommendations of the Madrid Conference (1904)

These brief recommendations, the result of the Sixth International Congress of Architects, constitute an early attempt to set down principles of architectural conservation. The recommendations emphasize the importance of minimum intervention in dealing with ruined structures and of finding a functional use for historic buildings. The document sets forth the principle of unity of style, which encourages restoration according to a single stylistic expression.

Recommendations of the Athens Conference (1931)

The Conclusions of the Athens Conference were drafted at the end of the conference on restoration of historic buildings held in Athens in 1931 and organized by the International Museums Office. This document introduced such important conservation concepts and principles as the idea of a common world heritage, the importance of the setting of monuments, and the principle of reintegration of new materials. The recommendations were ahead of their time in calling for the reburial of archaeological remains when their conservation cannot be guaranteed, but were shortsighted in their recommendation of the use of reinforced concrete for consolidation of ancient monuments.

Carta del restauro italiana (1931)

*The principles set forth in the **Carta del Restauro** reflect Italian conservation theory and practice. They were established by the Advisory Council for Antiquities and Fine Arts in 1931 to guide restoration work carried out by private and public agencies in Italy. This document and Italian restoration theory generally were a major source of the ideas expressed in the Venice Charter.*

Recommendation on International Principles Applicable to Archaeological Excavations (1956)

This document, adopted by the General Conference of UNESCO in 1956, established international principles governing the protection and excavation of archaeological sites. With respect to conservation, the document recommends the provision of funds for site maintenance; the careful supervision of the restoration of archaeological remains; a prohibition against removal of monuments without consent; and a provision in the deed of concession to excavate for guarding, maintenance and conservation of the site and its associated objects. The Recommendation is not legally binding, but often has served as a model for national legislation governing excavation.

International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter, 1964)

The Venice Charter codifies the internationally accepted standards of conservation practice relating to architecture and sites. It sets forth principles of conservation based on the concept of authenticity and the importance of maintaining the historical and physical context of a site or building. The Venice Charter was the most influential international conservation document for 25 years.

Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972)

*The World Heritage Convention was adopted in 1972 by the General Conference of UNESCO. It promotes an international perspective on cultural heritage by inviting member states to nominate heritage places of outstanding universal value as World Heritage Sites. It is intended to encourage national efforts at protecting cultural and natural heritage and to promote international recognition and cooperation in safeguarding the heritage of the world. **Operational Guidelines for the Implementation of the World Heritage Convention** were issued in 1988. These outline the criteria for inclusion of a site on the World Heritage List.*

Charter of Cultural Tourism (1976)

The Charter of Cultural Tourism is the result of the ICOMOS Tourism Committee seminar on Contemporary Tourism and Humanism held in 1976. It outlines an approach to cultural tourism that recognizes sites and monuments as a source of economic benefit and cultural education. The approach encourages educating tourists about the value of monuments (including the tourists of the future—children) and training those responsible for developing and implementing tourist use of heritage sites.

Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (The Burra Charter, 1979)

The Burra Charter is a national charter that establishes principles for the management and conservation of cultural sites in Australia. The charter was adopted by Australia ICOMOS in 1979. The charter is particularly important for its definition of cultural significance and the process set forth for using cultural significance to manage and conserve cultural sites. It provides an example of how international principles can be adapted to the values and needs of a particular nation or particular cultural groups within that nation.

The Florence Charter (1982)

The Florence Charter sets forth principles and guidelines for the preservation of historic gardens. It was adopted in 1982 as an addendum to the Venice Charter, addressing the needs of a specific class of cultural property.

Charter for the Conservation of Historic Towns and Urban Areas (1987)

This charter, adopted by the ICOMOS General Assembly in 1987, establishes principles and guidelines for the protection and conservation of historic towns. The charter seeks to complement the Venice Charter, whose emphasis is on the individual monument. It addresses such issues as the integration of preservation objectives into planning policies; the qualities of historic towns that should be preserved; the participation of residents in the preservation process; and the social and economic aspects of historic town preservation.

Charter for the Protection and Management of the Archaeological Heritage (ICAHM Charter, 1990)

The ICAHM Charter is among the most recent of international charters. It was created in response to the increasing threats to archaeological sites worldwide, especially from looting and land development. The charter attempts to establish principles and guidelines of archaeological heritage management that have global validity and can be adapted to national policies and conditions. The charter is the work of the ICOMOS International Committee on Archaeological Heritage Management (ICAHM).

Nara Document on Authenticity (1994)

This declaration was drafted by the participants at the Nara Conference on Authenticity in Relation to the World Heritage Convention held in Nara, Japan, in 1994. The conference itself was in direct response to a recommendation made by the World Heritage Committee concerning the revision of criteria for authenticity and integrity, which were used to evaluate sites for inscription in the World Heritage List. In essence, the Nara Document recognizes the breadth and importance of cultural and heritage diversity in the world, and states that the authenticity and value of the cultural heritage "must be considered and judged within the cultural contexts to which it belongs." The document was intended to form the first part of an ongoing debate on the nature and role of authenticity in relation to the cultural heritage and suggestions for follow-up are included in an Appendix.

Charter for Sustainable Tourism (1995)

This charter emerged from the World Conference on Sustainable Tourism held in 1995. It holds that tourism development must be sustainable, that is, "ecologically bearable in the long term, as well as economically viable, and ethically and socially equitable for local communities." Achieving this requires respecting the fragility of the cultural and natural heritage, recognizing local interests and contributing to the local economy, accepting participation from all sectors and levels, and creating appropriate planning and management mechanisms. The charter also calls for diversifying opportunities and forms of tourism, reducing the impact on the environment by tourism, and adopting codes of conduct by the tourist industry.

Segesta Declaration (1996)

The use of ancient theaters for present-day performances was the subject of a colloquium organized by the Council of Europe in September 1995, which gave rise to the Segesta Declaration concerning the protection and proper use of ancient places of performance. These include theaters, amphitheaters, stadia, hippodromes, and arenas with origins in the Greek and Roman periods. This article draws upon a summary of the colloquium and reproduces the text of the recommendations of the Segesta Declaration.

Declaration of San Antonio (1996)

In response to the call issued by the Secretary General of ICOMOS for regional participation in the international debate on authenticity, the Declaration of San Antonio was drafted by participants at a symposium on Authenticity in the Conservation and Management of the Cultural Heritage of the Americas. The declaration discusses authenticity in relation to cultural identity, site history, the material fabric of the site, the social value of the site, the differences between dynamic (actively used) and static (archaeological) sites, stewardship, and economics.

[Bib. I: 43 ref.]

ANNOTATED BIBLIOGRAPHY I: Archaeological Heritage Management

Antiquity. 1993. 67, no. 255, 400–45

In this issue, a special section is devoted to “Heritage and the ICAHM Charter.” The charter was developed by the ICOMOS International Committee on Archaeological Heritage Management. Following an introduction by Henry Cleere, the text of the charter is presented, followed by two commentaries on the charter, its creation, and its legal implications. Several articles on the state of archaeological heritage management in Great Britain and the United States are also included. See also Elia 1993. (A.O.)

Ashworth, Gregory, and Peter Howard (eds.). 1999. **European Heritage: Planning and Management.** Exeter: Intellect Books.

This textbook is the result of cooperation among seven European Union universities and was developed for use in postgraduate courses offered at the institutions involved. The geographical scope of the book is Europe, with topics ranging from an historical overview of policy on and interest in the preservation of the past to identity issues and uses of heritage, with case studies on eco-museums, “heritage gem cities,” gardens, theme parks, and heritage centers. Throughout the text are exercises and discussion questions for students. An appendix offers a review of the historical development of national policies in selected European countries. This is heritage management for the heritage industry. (M.D.)

Barnes, Mark R. 1994. *Preservation of Archaeological Sites through Acquisition.* **American Antiquity** 46, no. 3, 610–18.

While the focus of this article is the history and role of the various governmental agencies in the United States engaged in the acquisition of archaeological sites for long-term preservation, the author also includes a section on private sector acquisition of sites—an important tool for the preservation of sites that is rarely discussed. The Nature Conservancy, established in 1951, is dedicated to the preservation through acquisition of natural areas, but takes into consideration the cultural resources that exist within these areas. The Archaeological Conservancy, modelled on the Nature Conservancy but dedicated to preserving archaeological sites through acquisition, was newly established when this article was written. Other private foundations and initiatives, such as agreements with landowners, are also briefly mentioned. (M.D.)

Bourke, Max, Miles Lewis, and Bal Saini (eds.). 1983. **Protecting the Past for the Future: Proceedings of the UNESCO Regional Conference on Historic Places** (Sydney, Australia, 22–28 May 1983). Canberra: Australian Government Publishing Service.

This collection of articles from a UNESCO conference provides an overview of the state of cultural heritage preservation in the Asia-Pacific region in the early 1980s. The papers included in the sections Regional Overview and Protection discuss the legislation and management policies of many

of the nations of this region (for example, Australia, China, India, Japan, Korea, Malaysia, New Zealand, and Thailand). (M.D.)

Castillo Ruiz, José. 1997. *El Entorno de los Bienes Inmuebles de Interés Cultural: Concepto, Legislación y Metodologías para su Delimitación: Evolución Histórica y Situación Actual*. Granada: Universidad de Granada.

Spanish. A comprehensive examination of the issues that relate to the surroundings or physical contexts of cultural properties, with a full account of the development of legislation to define and protect them in Spain, France, and Italy. Case studies of existing cultural properties and their surroundings are given, and a new methodology is proposed for the definition, delimitation, and regulation of surroundings in the future. (A.O.)

Chapelot, Jean, and Alain Schnapp. 1984. **La Politique de l'Archéologie en Europe**. Paris: Centre National de la Recherche Scientifique.

English, French and Italian. The results of a roundtable held in Paris in 1978, these collected papers explore the status and health of archaeology in Europe in the 1970s by investigating national institutions and governmental organizations responsible for guiding policy. (M.D.)

Cleere, Henry (ed.). 1984. *Approaches to the Archaeological Heritage: A Comparative Study of World Cultural Resource Management Systems*. Cambridge: Cambridge University Press.

A collection of essays on the national cultural resource management policies of twelve countries, mostly in Europe but also including Mexico, Peru, Japan, India, and the United States. Individual essays describe the legislative framework and organizational structure for protecting archaeological resources and explore such issues as public attitudes and archaeological training and education. (M.D.)

Cleere, Henry (ed.). 1989. **Archaeological Heritage Management in the Modern World**. London: Unwin Hyman.

This volume constitutes the published results of one of the sessions of the First World Archaeological Congress (WAC) held in Southampton, England, in 1986. It also includes a few commissioned papers. The book is international in scope (with contributions from eighteen countries) and covers a broad range of issues relating to cultural resource management such as its history and legislation, training, and data management. It also provides a series of case studies. For the proceedings from the Third WAC, see McManamon and Hatton 2000. (Those from the Second Congress have not been published.) (M.D.)

Cooper, Malcolm A. et al. (eds.) 1995. **Managing Archaeology**. London: Routledge.

This publication brings together papers from the Theoretical Archaeology Group (TAG) conference held in Southampton, England, in 1992. The editors convened the conference with the intention of exploring divergent ideas and perspectives on management and archaeology. While the emphasis of the essays is on the United Kingdom, their ideas have international relevance. Of particular interest are the discussions of the philosophy and nature of management and its relationship to the theory and practice of archaeology. The sequence of papers attempts to bridge the gap between

management theory and practical management, with topics ranging from ways of valuing archaeological resources through marketing strategies for archaeology. (M.D.)

Council of Europe. 1987. *Archaeology and Planning* (An international colloquy organized jointly by the Council of Europe and the Region of Tuscany, Florence, Italy, 22-25 October 1984). **Architectural Heritage Reports and Studies**, no. 5. Strasbourg: Council of Europe.

Council of Europe. 1987. **Architectural Heritage Reports and Studies**, no. 5 (Archaeology and Planning: An international colloquy organized jointly by the Council of Europe and the Region of Tuscany at Florence, Italy, 22-25 October 1984). Strasbourg: Council of Europe

This wide-ranging series of articles comprises the published results of a colloquy held in Florence, Italy, on the theme of archaeology and planning in Europe. A major emphasis is on strategies for conserving archaeological resources in the face of rural and urban development. Planning techniques, developing cooperative relationships between archaeologists and planners, the integration of archaeological resources into the urban fabric, and computerized documentation and cartography are highlighted. (M.D.)

Cultural Resource Management. Australian Heritage Commission Bibliographic Series, no. 3. 1990. Canberra: Australian Government Publishing Service.

This annotated bibliography on cultural resource management was produced from the Australian bibliographic database HERA. It covers all aspects of cultural resource management, focusing on Australian literature in particular, and including some United States literature. (M.D.)

Darvill, Timothy. 1987. *Ancient Monuments in the Countryside: An Archaeological Management Review.* **English Heritage Archaeological Report**, no. 5, 25-31.

The theme in this article is management of archaeological resources in the larger context of their related countryside and landscape. The three main aspects of management are curatorial management (conservation and protection); exploitation (use of sites by the public and researchers); and rescue excavation. Integration with other land-use demands, especially in the realm of private ownership, and drawing up a management plan and communicating it to those who may be impacted are emphasized; a schematic is provided outlining the stages of management planning. (M.D.)

Darvill, Timothy, and Geoffrey Wainwright. 1995. *The Monuments at Risk Survey: An Introduction.* **Conservation and Management of Archaeological Sites** 1, no. 1, 59-62.

This brief article summarizes the aims, methodology, and management of the MARS (Monuments at Risk Survey) Project, an initiative designed to provide a systematic quantification of the current state of England's archaeological resource. The MARS project will examine levels of documentation for single monuments, landscapes, and districts; the scale and rate of physical impact on the sites over time; the present condition of the sites; the effectiveness of different management techniques; and the relation between the state of preservation of a monument and the information it preserves. (A.O.)

Davis, Hester A. 1989. *Public Archaeology Forum*. **Journal of Field Archaeology** 16, 233–36.

The full text of the British Code of Practice for developers and archaeologists is presented with background information and commentary. The code attempts to foster mutual understanding and cooperation between developers and archaeologists, and to reduce the conflicts that arise between these two groups. Publication and review of the code can also be found in *British Archaeological News* 1, no. 1 (June 1986) and *British Archaeological News* 1, no. 6 (August 1986). (M.D.)

Economic Development and Archaeology in the Middle East. 1982. Amman: Department of Antiquities of the Hashemite Kingdom of Jordan and the American Schools of Oriental Research.

This booklet, published by the American School of Oriental Research in Jordan in conjunction with the Jordanian Department of Antiquities, addresses cultural resource issues in the country and represents an unusual and welcome departure from the standard activities and concerns of foreign archaeological schools. A further development in this direction is the Cultural Resource Management Project begun in 1987 by the Antiquities Department of Jordan and the American Center of Oriental Research, described in *ACOR Newsletter* no. 3 (November 1990). (M.D.)

Elia, Ricardo J. 1993. United States Cultural Resource Management and the ICAHM Charter. **Antiquity** 67, no. 255, 426–38.

In a critical comparison of the practice of archaeological heritage management in the United States with the principles and standards expressed in the ICAHM Charter, the author concludes that philosophy and legislation are in accord with the Charter but that the United States falls short in practice. This is ascribed to the nature and predominance of contract archaeology, the lack of consistent enforcement of standards, and a shortage of professional training programs. (A.O.)

Frankel, David. 1993. *The Excavator: Creator or Destroyer?* **Antiquity** 67, 875–77.

While acknowledging the destruction inherent in excavation, the author argues that archaeologists also create sites by establishing a context for what they unearth and constructing a history through comparative analysis. The trend of cultural resource managers to equate archaeology only with destruction, and thus to limit or forbid excavation, also limits the discovery and interpretation of our history. (A.O.)

Gay, Honor. 1995. *Integrated Conservation of Natural and Historical Aspects of the Countryside*. **Journal of Architectural Conservation** 1, no. 3, 70–88.

Historically, the conservation of historic (including archaeological) and natural environments have developed independently, resulting in an artificial division between two allied fields of endeavor. The author explores this division in Britain and argues for the necessity of integrating these two strands of conservation. The first part of the article analyzes whether the separation of these fields is justified. Of particular interest for archaeological sites is the discussion on the impacts and potential benefits of colonization on structures ruined by plants. The second part of the article examines the development of legislation on the historic and natural environment in Britain. The case

for better communication and a much stronger link between conservation of nature and culture is well made. (M.D.)

Greenberg, Ronald M. (ed.). 1994. *Archaeology and the Federal Government*. **Cultural Resource Management** 17, no. 6, 36.

This thematic issue defines the roles of the numerous federal agencies and private organizations involved in archaeology in the United States, outlines the legislation that guides them, and contains descriptions and commentary on archaeological activities occurring under Federal jurisdiction. These include excavation, database management, site stabilization, site protection, public outreach, and education. While the articles are brief and expository, they present a good cross-section of federal activities and the organizations and people involved. (A.O.)

———. 1997. *Parks Canada: Archaeology and Aboriginal Partners*. **Cultural Resource Management** 20, no. 4, 64.

This thematic issue presents the experiences of Parks Canada (the federal agency equivalent to the National Park Service in the United States) in managing its archaeological resources. The relevant agencies and legislation are described, followed by articles on ecosystem management, cultural landscape studies, monitoring, inventory and database management, rescue archaeology, cooperative management strategies (particularly with aboriginal partners), and site-specific studies. (A.O.)

Greene, Joseph A. 1999. Preserving Which Past for Whose Future? The Dilemma of Cultural Resource Management in Case Studies from Tunisia, Cyprus, and Jordan. **Conservation and Management of Archaeological Sites** 3, nos. 1-2, 43-60.

The author examines how three countries in the Mediterranean region—Tunisia, Cyprus, and Jordan—have approached the demands of preserving sites in the face of major development pressures. The responses include a UNESCO campaign involving multiple funding sources and allocation of concessions to international teams (Tunisia); a reliance on foreign expeditions and the national antiquities service to respond to rescue excavations (Cyprus); and the establishment of a cooperative program among government and private organizations and universities to address preservation of antiquities in the face of economic development (the Jordan Cultural Resource Management Project). (M.D.)

Greeves, Tom. 1989. Archaeology and the Green Movement: A Case for Perestroika. **Antiquity** 63, no. 241, 59-66.

The relationships between archaeological sites or features and their landscape, and archaeological and nature conservation are explored. The author argues that archaeologists must share the blame for the destruction of resources through the practice of excavation. Neither archaeologists nor society understand the role of conservation, which is associated exclusively with nature conservation. Archaeological conservation can make a significant cultural contribution to the conservation or green movement and would also benefit from such an association. (M.D.)

Healy, Paul F. 1984. *Archaeology Abroad: Ethical Considerations of Fieldwork in Foreign Countries*. In Ernestene L. Green (ed.), **Ethics and Values in Archaeology**. New York: The Free Press.

The author explores the ethics and etiquette of excavating in foreign countries. In a section entitled "Cultural Resource Management and the Foreign Archaeologist," the very important question of the responsibility of foreign archaeologists for the protection, restoration, and preservation of sites is raised. The critical role of funding agencies, the need for clarification of responsibilities by the host government, and the moral and professional obligation of developed nations to assist in protecting and preserving resources of less developed nations are discussed. (M.D.)

King, Thomas F. 1987. *Prehistory and Beyond: The Place of Archaeology*. In Robert E. Stipe and Antoinette J. Lee (eds.), **The American Mosaic: Preserving a Nation's Heritage**, 236–64. Washington, D.C.: US/ICOMOS.

This article is a historical overview of archaeology's role in the United States National Historic Preservation program, especially since the passage of the National Historic Preservation Act of 1966 and the growth of the historic preservation movement. Such issues as academic vs. public archaeology, the emergence of a conservation ethic, and the interchange of ideas and methods between archaeology and historic preservation are discussed. (M.D.)

Lambrick, George (ed.). 1985. **Archaeology and Nature Conservation**. Oxford: Oxford University Department for External Studies.

These conference papers explore the "mutual interests, problems and experiences of nature conservationists and archaeologists in protecting Britain's countryside heritage." The management of natural and archaeologically important areas for their mutual benefit is emphasized. Papers are grouped under the following categories: the relationship between archaeology and ecology; statutory provisions and the role of government agencies; the role of nonstatutory organizations; conservation management policies; and case studies. (M.D.)

Lipe, William D. 1974. *A Conservation Model for American Archaeology*. **The Kiva** 39, nos. 3–4, 213–45.

The author of this seminal article proposes a conservation model to replace the current exploitative model of archaeology, which emphasizes excavation rather than conservation of resources. Conservation strategies, including education, integration of archaeology and planning, and the establishment of archaeological preserves, are discussed. In the latter context, the author deals with the question of significance and the need for representative sampling. (M.D.)

McIntosh, Susan Keech. 1994. *Archaeological Heritage Management and Site Inventory Systems in Africa: The Role of Development*. In Ismail Serageldin and June Taboroff (eds.), **Culture and Development in Africa** (Proceedings of an International Conference held at the World Bank, Washington, D.C., April 23, 1992), 387–409. Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank.

Based on her experiences in West Africa, the author argues that in order to promote effective archaeological heritage management in the region, basic site inventory methods must be restructured and African archaeologists must be trained in the use of computerized information systems, air photo interpretation, management theory, and conservation practice and methods.

Policy recommendations to international development agencies are to fund long-term national site inventory work and database management, and to fund an intensive training program in archaeological heritage management for Africans. (A sample course outline is provided.) (A.O.)

McManamon, Francis P., and Alf Hatton (eds.). 2000. *Cultural Resource Management in Contemporary Society: Perspectives on Managing and Presenting the Past*. London: Routledge.

This collection of papers derives from the sessions of the Third World Archaeological Congress, held in New Delhi in 1994. The papers were updated through 1999 and new contributions were commissioned. The scope is international, with contributions from Africa, the Americas, Asia, and Europe. The issues covered are equally broad, representing a spectrum of concerns in archaeological heritage management, including impact from modern development, policy and legislative issues, education and interpretation, rescue archaeology, and illegal trafficking. For the proceedings from the First World Archaeological Congress, see Cleere 1989. (Those of the Second Congress have not been published.) (M.D.)

Morales Juarez, Roberto. 1996. *In Central America: Archaeological Heritage and Sustainable Development Planning*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11-15 October 1994), 235-41. Ottawa: Publications de l'ICAHM.

The author discusses the relationship between cultural heritage conservation in Central America and issues of sustainable development and cultural identities. Heritage conservation has received little attention and is not highly valued in Central America, except where tourism can be exploited. In the context of a United Nations Development Program project to support sustainable development, a land-use planning model is proposed to integrate heritage conservation with economic development and public participation. The planning model is briefly described. (M.D.)

O'Keefe, P. J., and L. V. Prott. 1984. **Law and the Cultural Heritage**. Abingdon: Professional Books Ltd.

Five volumes are envisioned for this series, entitled *Law and the Cultural Heritage*; two of which (vols. 1 and 3) have been published to date. The series is comprehensive and comparative in scope, covering legislation from all parts of the world. *Discovery and Excavation* (vol. 1) focuses on moveable archaeological heritage and discusses the need to protect antiquities and the historical development of legislation. *Creation and Preservation* (vol. 2) deals with the creation of cultural objects and the legal rights associated with them. *Movement* (vol. 3) deals with the legal control of trade in cultural objects. *Monuments and Sites* (vol. 4) is a survey of the law on immoveable cultural heritage. *Principles* (vol. 5) will assess the changes in the law brought on by development of special regulations to protect the cultural heritage. (M.D.)

Prinke, Andrzej. 1996. *Landscape Parks in Poland: A Multidisciplinary Approach to Natural and Cultural Resources*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montreal, Quebec, Canada, 11-15 October 1994), 369-74. Ottawa: Publications de l'ICAHM.

The author describes an initiative in Poland to create a series of landscape parks with natural and cultural values in an attempt to break down the barriers between the disciplines. The parks selected are located near urban areas so they are easily accessible to the public and are included in the

Regional Development Plan for the area. The cultural resources in the parks are historical and archaeological sites and are interpreted in conjunction with the natural values in an integrated way to the public. (M.D.)

Rotroff, Susan I. 2001. Archaeologists on Conservation: How Codes of Archaeological Ethics and Professional Standards Treat Conservation. **Journal of the American Institute for Conservation** 40, 13746.

This article provides an historical overview and current status of codes of practice and professional standards developed by archaeological societies in the United States as they relate to conservation. While the emphasis is on the conservation of objects, the various codes and the author's discussion of them elucidate the evolution of issues and concerns of archaeologists. Although there has been progress in making a conservation ethic more central to the archaeological community, the author argues that a holistic approach (on the model of an ecosystem) has yet to be achieved. (M.D.)

Schiffer, Michael B., and George J. Gumerman (eds.). 1977. **Conservation Archaeology: A Guide for Cultural Resource Management Studies**. New York: Academic Press.

This is an early and very influential collection of articles on cultural resource management in the United States. Individual papers are grouped into nine topics: cultural resource management, conservation archaeology and research orientations, research designs, acquisition of survey data, estimating the nature and extent of the resource base, assessing significance, forecasting impacts, mitigation, and research contributions. (M.D.)

Schmidt, Peter R., and Roderick J. McIntosh (eds.). 1996. **Plundering Africa's Past**. Bloomington: Indiana University Press.

While this publication emphasizes the problem of the looting of cultural heritage sites (particularly archaeological sites), the wide range of articles provides a good overview of important issues in cultural resource management in Africa, including interpretation of cultural heritage and conflict of values. (M.D.)

Serageldin, Ismail, and June Taboroff (eds.). 1994. **Culture and Development in Africa** (Proceedings of an International Conference held at the World Bank, Washington, D.C., April 23, 1992). Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank.

This compilation of papers from 1992, explores many issues directly relevant to archaeological resource management in Africa. The papers provide an overview of the role and relationship of culture to economic development within the social and political context of sub-Saharan Africa. Of particular interest are the themes on cultural institutions, conservation of the built historic environment, and development, archaeology, and the environment. (M.D.)

Silva, Roland. 1993. *The Cultural Triangle: International Safeguarding Campaign*. In **The Cultural Triangle of Sri Lanka**. Paris: UNESCO.

The author narrates the efforts to have the Cultural Triangle, which encompasses seven major sites across Sri Lanka, adopted by UNESCO as the focus of an international campaign for funding and

technical support. Once this was achieved, an autonomous management structure was created from within the existing government to oversee the work, and a cultural resource management plan was developed. This includes guidelines that govern excavation and conservation at the sites. (A.O.)

Smith, Laurajane. 1994. *Heritage Management as Postprocessual Archaeology?* *Antiquity* 68, no. 259, 300309.

Postmodern, or “postprocessual,” archaeology is a theoretical movement that recognizes the place and seeks the integration of archaeology in a social, cultural, and political context. The author articulates the divide between theory, which is espoused by academics but not practiced, and practice, which is employed by heritage managers without benefit of a coherent theory. Heritage management is often discounted as the commercial bastardization of academic archaeology, and the field has been hindered by this approach. As the author concludes, however, “unlike postprocessual archaeology . . . it is heritage management and its position within the state that is actively impacting upon and defining the political uses of archaeology.” (A.O.)

Society for American Archaeology. 1995. **Save the Past for the Future II: Report of the Working Conference** (Breckenridge, Colorado, September 922, 1994). Washington, D.C.: Society for American Archaeology.

The goals of the conference were to assess the state of archaeological site protection and the prevention of archaeological looting on public lands in the United States and to develop strategies to improve and implement protection. In this special report, the conference proceedings are presented and include general papers summarizing the history of resource protection in the United States, legislation and recent legal actions in support of protection, the need to integrate agencies and efforts, and the need to educate both professionals and the public. Of greater importance are the workshop proceedings, which discuss the issues of education, integrated resource management, and law enforcement and present recommendations for future actions. (A.O.)

Tilley, Christopher. 1989. *Excavation as Theatre*. *Antiquity* 63, no. 239, 27580.

This is a revision of a paper originally delivered at an ICAHM conference in 1988. The author questions and challenges the notion that rescue excavation is a means of preservation in the face of development, arguing that archaeologists have emphasized excavation and the concomitant compilation of data to the detriment of developing conceptual structures and actively engaging in the interpretation of the past. The solution proposed is large-scale excavation conceived as an experiment in interpretive activity involving the public. It is a provocative challenge to what the author sees as a trend among cultural resource management professionals and the heritage industry to move archaeology toward a “form of production and marketing of the past.” (M.D.)

Wainwright, G. J. 1989. *The Management of the Archaeological Resource in England*. In **Archaeology and Society: Large-Scale Rescue Operations—Their Possibilities and Problems** (Papers presented at the symposium in Stockholm, Sweden, 1216 September 1988). ICAHM Report No. 1, 32130. Stockholm: ICAHM,.

The author presents management of archaeological resources as generally practiced by English Heritage. The management cycle is defined in the following three stages, which are fully discussed: identification and recording, deciding on the management option (curatorial or exploitative management), and excavation and recording, where preservation is not possible. Criteria for

allocation of limited funds for rescue operations are defined; these are the same criteria used for scheduling sites. (M.D.)

Wildesen, Leslie E. 1982. *The Study of Impacts on Archaeological Sites*. **Advances in Archaeological Method and Theory** 5, 51–96.

This study of impacts—defined as measurable change in the characteristic or property of an archaeological site—looks at types of impacts, how they are measured, and how a better understanding of their cumulative effects can be used to manage archaeological resources. The author puts forth a “value conservation” approach, which represents a middle course between site exploitation (removal of the resource) and site conservation (removal of the impact). A review of the studies undertaken to date and an extensive bibliography make this article particularly valuable. (M.D.)

Wilson, Rex L. (ed.). 1987. **Rescue Archeology** (Proceedings of the Second New World Conference on Rescue Archeology, Dallas, Texas, 1984). Dallas: Southern Methodist University.

Published under the same title are the papers from the First New World Conference (1982); those of the Third New World Conference, held in Venezuela in 1987, are in Spanish (*Arqueología de Rescate*). The focus of the proceedings is the Western Hemisphere. All the important issues associated with rescue archaeology are covered and include perspectives from both developed and developing countries. The papers cover the philosophy and principles of rescue archaeology; legislative, economic, social, and political issues; the interface between archaeology and engineering; current practice and strategies; and professional standards; the recommendations and resolutions of the conference are also published. (M.D.)

[Bib. II: 62 ref.]

ANNOTATED BIBLIOGRAPHY II: Archaeological Site Management

Adam, Jean-Pierre. 1987. *Dégradation naturelle et érosion touristique à Pompéi*. In **Denkmalpflege und Tourismus** (Vorträge und Diskussionsergebnisse des Internationalen Symposiums vom 26–29.11.1986 in Trier), 189–221. Trier: Geographische Gesellschaft (Materialien zur Fremdenverkehrsgeographie, Heft 15).

French and German. Apart from the ever-present threat of earthquake damage, tourism and uncontrolled vegetation are the most serious causes of deterioration at Pompeii. The excessive number of visitors is destroying the fabric of the place; recommendations are made for keeping visitors off of and away from the original fabric, especially mosaics and wall paintings. In addition to walkways, an on-site presence is required. The recommendations for vegetation control are discussed more fully by the author in Adam 1983/ Bibliography X. (M.D.)

Addyman, Peter V. .1989. *The Stonehenge We Deserve*. In H. F. Cleere (ed.), **Archaeological Heritage Management in the Modern World**, 265–74. London: Unwin Hyman.

Perhaps Britain's most famous archaeological monument, Stonehenge has long been in need of a management policy; however, it has been difficult to reach a consensus on how the site should be presented to the public. The author discusses two conflicting presentation philosophies for the site. The Historic Buildings and Monuments Commission is attempting to attract the serious visitor by requiring a real investment of time and intellectual commitment. The philosophy of Heritage Projects Ltd., a private company, assumes a degree of self-selection among visitors and believes that visitation should be encouraged by making the experience physically and intellectually appealing. (M.D.)

Aguilar Piedra, Carlos. 1982. *Archaeological Parks: Guayabo de Turrialba and El Caño*. In **Rescue Archaeology** (Papers from the First New World Conference on Rescue Archaeology), 163–71. Washington, D.C.: The Preservation Press.

The author discusses the challenges and problems involved in the establishment of archaeological parks based on his experience with parks in Costa Rica and Panama. The lack of financial support and the absence of a national park service tradition hamper the establishment of archaeological parks in Central America. Emphasized are the importance of establishing the boundaries of the park for its legal protection, integration with the community, and the role of research. (M.D.)

Australian National Parks and Wildlife Service. 1986. **Australian Ranger Bulletin** 4, no. 1.

This issue of the bulletin is devoted to cultural resource management in Australia. Many of the articles are case studies of rock art sites. A broad range of issues is addressed—education, tourism, vandalism, erosion, and more. The management principles and many of the specific strategies developed to deal with these problems are generally applicable to archaeological sites. (M.D.)

Bahçeci, Müge. 1996. *The Pamukkale's Preservation and Development Plan*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11-15 October 1994), 45-53. Ottawa: Publications de l'ICAHM.

Pamukkale, Hierapolis, a site on the World Heritage List, combines white travertine formations produced by thermal springs with archaeological deposits from different historical periods. In 1990 a preservation and development plan was created in order to define and address the problems confronting the site, particularly in relation to regulating and accommodating tourism. The author outlines the plan, which is in the implementation stage. (A.O.)

Bertaux, Jean-Paul. 1998. *The Gallo-Roman sanctuary at Grand, France. I: Its development and management for tourism*. **Conservation and Management of Archaeological Sites** 2, no. 4, 207-215.

To accommodate increasing visitor numbers and to promote even greater visitation, a development and management plan was implemented for the site, which is located within and around a small village. New facilities were constructed, including reception buildings and parking areas. Interpretive facilities and programs are also described; these include a museum, a permanent exhibit, models, an audiovisual presentation, publications, guided tours, and cultural classes. (A.O.)

Binks, Gillian, John Dyke, and Philip Gagnall. 1988. (In association with Dai Morgan Evans and Geoff Wainwright). **Visitors Welcome. A Manual on the Presentation and Interpretation of Archaeological Excavations**. London: English Heritage.

This manual produced by English Heritage is designed to provide practical advice on a whole range of issues related to site presentation and visitor management (e.g., interpretation, public relations, generating income, and infrastructure requirements), both during and after the excavation of a site. Although created for sites in England, much of the information is applicable to all archaeological sites. (M.D.)

Bonnici, Antonia, JoAnn Cassar, Patrick J. Schembri, and Frank Ventura. 1993. *Visitor impact on an underground prehistoric monument - the Hal Saflieni Hypogeum, Malta*. In **ICOM Committee for Conservation** (Tenth Triennial Meeting, Washington, DC, 22-27 August 1993: Preprints), vol. 2, 825-830. Paris: International Council of Museums Committee for Conservation.

The environment of the underground temple was monitored for three years, the results were correlated with contemporaneous external meteorological conditions and visitor numbers, and the data was analyzed in an attempt to establish the relative impacts of external conditions and visitors on the microclimate. The authors conclude that visitors have the greatest impact on the otherwise stable environment, and describe remedial measures taken to mitigate negative effects. (A.O.)

Clark, Kate (ed.). 1999. *Conservation Plans in Action: Proceedings of the Oxford Conference*. London: English Heritage.

This publication includes the papers, with selected discussion, of a major conference on conservation planning in Britain, entitled "Conservation Plans for Historic Places" and held in March 1998. Papers include an overview of the conservation plan and planning process by the editor of the

volume, examples of conservation planning by various practitioners, the role of conservation planning in the Heritage Lottery Fund, and sage advice from such long-time practitioners as James Semple Kerr. The planning process advocated is essentially that of the Australian Burra Charter, adapted to the experience and needs in England. The epilogue, written one year later, is an interesting assessment of problems encountered in the development of conservation plans. (M.D.)

Deacon, Janette. 1995. *Promotion of a neglected heritage at Stone Age sites in the Western Cape, South Africa*. **Conservation and Management of Archaeological Sites** 1, no. 2, 75-86.

Describes the postcolonial development of tourism at three Stone Age sites in South Africa to promote neglected aspects of the country's prehistory. Also describes the stabilization and protection of the sites prior to their opening to the public. (A.O.)

Dorozynski, Alexander. *Computers bring back a long-lost French abbey*. **Science** 261, no., 544-545.

The Abbey of Cluny was steadily pillaged and destroyed after its deconsecration in 1790. To provide visitors with an experience of the lost church, a computer model was developed from archaeological data and used to create an interpretive film and virtual reality simulation. (A.O.)

Doumas, Christos. 1993. Archaeological sites as alternative exhibitions: the case of Akrotiri, Thera. **European Review** 1, no. 3, 279-284.

The author argues for the creation and incorporation of museums within archaeological sites, where moveable finds can be presented in their original context. The interpretive value of both site and objects increases, and a greater understanding of the culture is possible. He cites past attempts to integrate sites and museums, and notes that at Akrotiri, where the existing shelter is scheduled for replacement, there exists a remarkable opportunity to reorganize the site and incorporate an alternative museum under a new shelter. (A.O.)

Dragovich, Deirdre. 1986. A plague of locusts, or Manna from heaven? Tourists and conservation of cave art in southern France. **Rock Art Research** 3, no. 2, 141-158.

English with French and German abstract. "Rock art tourism" was examined in relation to cave management at two sites in southern France. The risk of cave art deterioration has been addressed by a variety of measures aimed at preventing visitors from touching the art: supervising and guiding them in the cave, encouraging visitors to consider cave art as important to the cultural heritage, and by excluding visitors or limiting their numbers when adverse effects on art become apparent. Large numbers of fee-paying tourists can generate substantial funds for site management and conservation, but their simple presence can often lead to accelerated art deterioration in caves. (aa)

Feilden, Bernard, and Jukka Jokilehto. 1993. **Management Guidelines for World Cultural Heritage Sites**. Rome: ICCROM.

These guidelines for the management of World Heritage sites originated in a meeting of ICCROM and ICOMOS in 1983 under the auspices of the cultural heritage division of UNESCO. The aim of the guidelines is to "provide advice and suggestions for implementing the intentions of the World

Heritage Conventions.” Beginning with a review of the policies of the convention, Management Guidelines includes chapters on assessment of values, management planning, staying and personnel considerations, physical interventions and the concept of authenticity, planning for historic towns, and visitor management and interpretation. A summary article of the main issues can be found in Jukka Jokilehto, “Conservation Management of World Heritage Sites.” In *The Safeguard of the Rock-Hewn Churches of the Göreme Valley (Proceedings of an International Seminar, Ürgüp, Cappadocia, Turkey, 5–10 September 1993)*, 49–56. Rome: ICCROM, 1995. (M.D.)

Flood, Josephine. 1979. *Cultural resource management and tourism*. In J.R. McKinlay and K.L. Jones (eds.), **Archaeological Resource Management in Australia and Oceania**, 72–77. Wellington: New Zealand Historic Places Trust.

This article reviews the policy and initiatives of the Australian Heritage Commission and the results of national conferences on tourism at cultural sites during the decade of the 1970s. Distilling this experience, the author puts forth twelve principles of cultural resource management, with special reference to development and presentation of sites for tourism. These principles address such issues as the adverse effects of tourism on local inhabitants, education and interpretation, establishing carrying capacities at sites, and vandalism. (M.D.)

Gale, Fay, and Jane Jacobs. 1986. *Identifying high-risk visitors at Aboriginal art sites in Australia*. **Rock Art Research** 3, no. 1, 3–18.

English with French and German abstract. The growth of tourism in Australia has meant that many aboriginal rock art sites are now facing a scale of visitor pressure previously unknown. It is now clear that management strategies designed to preserve these sites must deal with this problem. If management programs are to be effective, systematic and scientific studies of visitor pressure are needed to provide guidelines for management. This paper discusses some of the findings of the authors' survey work on visitor pressure. They found that the visitor population and the pressure placed on art sites is far from uniform and that certain sections of the visitor population place the art at greater risk than others. Effective management depends on identifying such risk groups and tailoring management strategies to deal with the specific pressures they present. Discussions by R.G. Gunn and Grahame L. Walsh, and a reply by Gale and Jacobs, conclude the article. (aa abridged/M.D.)

Gutiérrez, María de la Luz et al. 1996. *The Management of World Heritage Sites in Remote Areas: The Sierra de San Francisco, Baja California, Mexico*. **Conservation and Management of Archaeological Sites** 1, no. 4, 209–25.

The creation of a management plan for a remote area presents special problems and demands thoughtful solutions. In this article, the authors describe the development and implementation of a management plan for a group of World Heritage rock art sites in Baja California, Mexico, using a participatory and collaborative approach; their experiences and conclusions will be valuable to those seeking to create effective plans for similar sites. (A.O.)

Hawass, Zahi. 2000. *Site Management at Giza Plateau: Master Plan for the Conservation of the Site*. **International Journal of Cultural Property** 9, no. 1, 1–22.

The development of a Master Plan for the Giza pyramids is the focus of this article. The author, with long experience of the Giza plateau, describes in some detail the threats to the site (including development pressures, rise of the water table, tourism, pollution, and inappropriate past interventions), then outlines the implementation of the plan for management. Phase four of this plan—the development of a Master Plan—concludes the article. (M.D.)

Hughes, Mike, and Linda Rowley (eds.). 1986. **The Management and Presentation of Field Monuments**. Oxford: Oxford University Department of External Studies.

These published proceedings of a conference held in Oxford in 1985 are concerned with the management and presentation of field monuments in England. The papers are grouped under the following headings: “The Role of Historic Buildings and Monuments Commission,” “Ancient Monuments and the Landowner,” “The Preservation and Integration of Monuments,” “The Management of Monuments,” “The Regional Approach,” and “Case Studies.” (M.D.)

International Perspectives on Cultural Parks. 1989. (Proceedings of the First World Conference, Mesa Verde National Park, Colorado, 1984). U.S. National Park Service in association with the Colorado Historical Society.

Under theme two (“tourism and use”) of this conference on cultural parks, are seventeen papers that consider the impacts of national consciousness on approaches to the management of cultural parks; interpretation of cultural parks; the economics of attracting, supporting, and profiting from tourism; and visitor impact on cultural resources. (M.D.)

Johnson, Stephen, and Christopher Young. 1994. *A Management Plan for the Hadrian’s Wall World Heritage Site*. **Conservation Bulletin (English Heritage)** (March 1994), 4–5.

Johnson, Stephen, and Christopher Young. 1995. *Managing Hadrian’s Wall*. **Conservation Bulletin (English Heritage)** (July 1995), 5–8.

Johnson, Stephen, and Christopher Young. 1996. *Hadrian’s Wall Management Plan*. **Conservation Bulletin (English Heritage)** (July 1996), 1–3.

This series of three articles provides a continuous overview of the process of creating a comprehensive management plan for Hadrian’s Wall. The plan is based on a clear articulation of the values of the resource and extensive consultation with the multiple private and public bodies that own, manage, or have an interest in parts of the wall. The first article of 1994 reviews the challenges and the need for a comprehensive plan, and the general approach to be taken in developing a plan. Short-term (five-year) and long-term (thirty-year) objectives are set forth in the articles of 1995 and 1996, with a review of the consultation process in 1996. The process is intended to be a model for management of World Heritage sites in Britain. (M.D.)

Jones, Rhys. 1985. *Recommendations for Archaeological Site Management in Kakadu National Park*. In idem (ed.), **Archaeological Research in Kakadu National Park**. Canberra: Australian National Parks and Wildlife Service.

These recommendations for the management of archaeological sites in Kakadu evolved from three major considerations: the attitude of the Aboriginal owners toward the park; the impact of visitors on the physical fabric of the rock shelters; and the immense scale of the archaeological resource, especially with respect to research potential. Specific recommendations for the management of the sites are set forth following a brief statement of strategy that emphasizes the need to restrict access to sites. (M.D.)

Kerr, James Semple. 1996. *The Conservation Plan: A Guide to the Preparation of Conservation Plans for Places of European Cultural Significance*. Sydney: National Trust of Australia (NSW).

This is the fourth revised edition (the first was published in 1982) of a manual describing the process of preparing a conservation (management) plan for cultural sites. This process, involving assessment of significance and development of policies and strategies, reflects Australian practice, based on the Australian Burra Charter for the conservation of places of cultural significance. The emphasis in this manual is on historic sites, but the principles are applicable to all types of cultural sites, including archaeological sites. (M.D.)

Killebrew, Ann E. 1999. *From Canaanites to crusaders: the presentation of archaeological sites in Israel*. **Conservation and Management of Archaeological Sites** 3, nos. 1 and 2, 17–32.

This paper reviews trends in archaeological site interpretation during the last fifty years, since the establishment of the State of Israel. A brief description of the different bodies involved in site management and development is presented, and the types of sites selected for presentation to the public during this period are examined. Six case studies illustrate the various issues that have had to be addressed in light of the changing approaches and goals, over time, of governments, local authorities, and private organizations. (aa abridged)

Kimball Brown, Margaret. 1983. *Mothballing Albany Mounds*. **American Archaeology** 3, no. 3, 214–16. The author outlines a management plan for this North American Indian village and mound site that will be appropriate to the existing constraints (no personnel, budget, or facilities available). Given these constraints, it was decided to “mothball” the site in order to preserve it in a stable condition for the future. Mothballing consisted primarily of returning the site to a prairie ground cover, using a herbicide to destroy the existing hay crop. (M.D.)

Klok, R. H. J. 1987. *Managing Megalithic Tombs as a National Resource in the Netherlands*. In **ICOMOS Eighth General Assembly and International Symposium, vol. 2, Old Cultures in New Worlds**, 938–44. Washington, D.C.: US/ICOMOS.

The author describes the management scheme for a class of monuments—the fifty-four surviving megalithic tombs of the Netherlands, which are of exceptional scientific and public value and were being threatened by natural erosion, vegetation, development, and vandalism. The management process consisted of establishing a central documentation system; safeguarding the tombs from vandalism by installing glass tiles to seal the chamber floor; establishing a protected archaeological zone around each monument, either by land acquisition or land management contracts with owners;

and the designation of eighteen representative tombs that would be open to the public and interpreted. (M.D.)

Kwas, Mary L., (ed.) 1986. **Archaeological Parks: Integrating Preservation, Interpretation, and Recreation**. Nashville: Department of Conservation, Division of Parks and Recreation.

This series of papers, the result of a symposium on archaeological parks in the United States, describes the experience of park managers in dealing with problems of education, interpretation, resource protection, land management, and facility development. There are seven case studies of specific sites, focusing on a wide range of issues, and five more general contributions. A preeminent concern in all the papers is the public use aspect of cultural parks and the development of education and interpretive programs. (M.D.)

Lambert, Dave. 1989. **Conserving Australian Rock Art: A Manual for Site Managers**. Canberra: Australian Institute of Aboriginal Studies.

This manual is designed for rock art sites in Australia, but the approach and many of the specific recommendations are applicable to archaeological sites in general. The first half deals with deterioration of the resource (from water, salts, vegetation, microflora, and animals), and the second half includes chapters on managing sites to reduce adverse impacts from visitors and site vandalism. (M.D.)

Leay, Martin J., Janet Rowe, and John D. Young. 1986. **Management Plans: A Guide to Their Preparation and Use (Prepared for the Countryside Commission)**. Cheltenham: Countryside Commission.

This manual outlines the principles and practice of preparing management plans for natural and cultural heritage sites. The stages of the process are as follows: aims, survey, analysis, objectives, prescription, implementation, and monitor and review. The process is clarified in examples of management plans for the following categories: whole-farm, woodland, estate (a cultural site managed by the National Trust), and recreation. (M.D.)

Leconte, Dominique. 1996. *De la fouille au projet*. In **Vestiges Archéologiques, la Conservation *In Situ*** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11-15 octobre 1994), 211-218. Ottawa: Publications de l'ICAHM.

French with English summary. The author discusses not only the complexities of opening an archaeological site to the public but the creative possibilities as well. The author stresses that, in order to arrive at the best interpretive solution, the project must be a collaborative effort and should be planned even before excavation. Various French sites are used to illustrate the arguments. (A.O.)

Lertrit, Sawang. 1997. *Who Owns the Past? A Perspective from Chiang Saen, Thailand*. **Conservation and Management of Archaeological Sites** 2, no. 2, 81-92.

A preservation plan for the fourteenth-century Buddhist community of Chiang Saen has been administered by the Thai government since 1957; however, problems of site looting, damage, deterioration, and encroachment persist. Research was conducted to determine local attitudes

toward the site; the results indicate that these problems stem from the disassociation of the local population from the process of preservation and management. The author describes the methodology and results of the research project and suggests ways to gain the concern and cooperation of the local population. (A.O.)

Maekawa, Shin. 1994. *Preventive strategies for reducing the impact of visitors on the microenvironment of caves at the Mogao Grottoes*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 76–79. London: International Institute for Conservation of Historic and Artistic Works (IIC).

The number of visitors to the Mogao Grottoes is steadily increasing, and deterioration of the artifacts has accelerated. Since 1991, environmental monitoring has been conducted inside and outside the caves. Air temperature, relative humidity, carbon dioxide, wall temperature and number of visitors were monitored for over a year in two similar caves, one open to the public and the other closed. The entry of visitors produced transitory rapid changes in the microenvironment, caused by the ingress of outside air. The stability can be improved by evenly distributing visitor numbers during opening hours, and by restricting air exchange between the cave and the exterior. (aa abridged)

Marquis–Kyle, Peter, and Meredith Walker. 1992. *The Illustrated Burra Charter: Making Good Decisions about the Care of Important Places*. Sydney: Australia ICOMOS.

A step-by-step explication of the Burra Charter, the Australia ICOMOS charter on conservation and management of heritage sites. Commentary on each article is provided, and concepts are clearly explained with the aid of photographs and informative captions. The full text of the charter, as well as guidelines for establishing cultural significance, developing conservation policy, and undertaking studies and reports, are appended. The utility of this publication has not been diminished by the revisions to the Burra Charter in November 1999, for which, see Marilyn Truscott and David Young, "Revising the Burra Charter: Australia ICOMOS Updates Its Guidelines for Conservation Practice," *Conservation and Management of Archaeological Sites* (2000), 4, 101–16. (A.O./M.D.)

Miller, Hugh. 1987. *International Technical Assistance: Park Planning in Jordan*. **Cultural Resource Management Bulletin** 10, 7–9.

The author reviews the history and accomplishments of the international park-planning project in Jordan. The project began in 1965 as part of a USAID economic development program, with the intention of developing and enhancing the tourism industry as a foreign currency earner for Jordan. Master plans were prepared for three antiquity sites (including Jerash and Petra). The sites were to be developed as parks, administered by a newly established National Park Service of Jordan, and managed according to the park master planning process developed over many years by the United States National Park Service for their parks. (M.D.)

Mora, Paolo, Giorgio Torraca, Paul Schwartzbaum, and Elizabeth Smith. 1981. *Luxor West Bank Visitor Management Study: Possible Impact of Increased Tourist Numbers on the Tombs of the West Bank at Luxor* (ICCROM Mission Report). Rome: ICCROM.

In 1981 an ICCROM mission was sent to Egypt to study the impact of increased visitation to the tombs of the West Bank at Luxor. Study of deterioration to the tombs concentrated on mechanical, environmental, biological, and visitor facility effects. The authors of the report concluded that physical contact, dust, improper maintenance, and excessive lighting in the tombs represented the most serious threats. Long- and short-term recommendations were made to reduce these risks to the monuments from visitor use. (M.D.)

Ndoro, Webber. 1994. *The Preservation and Presentation of Great Zimbabwe*. **Antiquity** 68, no. 260, 616–23.

The author presents the history of preservation at the site, including the most recent strategies and interventions. Of greater importance are the discussions on site presentation (reconciling the needs of the site, the indigenous population, and the foreign tourist) and on the justification of conservation in a developing country. See also Pwiti 1996. (A.O.)

Ndoro, Webber and Gilbert Pwiti. 1997. *Marketing the past. The 'Shona village' at Great Zimbabwe*. **Conservation and Management of Archaeological Sites** 2, no. 1, 3–8.

A model of a nineteenth-century Shona village was constructed within the Great Zimbabwe World Heritage site; the village was intended to function as a living museum and increase tourism. While the authors recognize the potential interpretive value of a living museum, they point to the confusion caused by locating the village in a site which dates between 1100 and 1450 AD, and by the anachronisms and misleading generalizations about the Shona culture embodied in the village itself. (A.O.)

Palumbo, Gaetano and Jeanne Marie Teutonico (eds.). **Management Planning for Archaeological Sites**. (Proceedings of an International Workshop Organized by the Getty Conservation Institute and Loyola Marymount University. May 2000, Corinth, Greece). Los Angeles: The Getty Conservation Institute. 2002.

The papers from this workshop explore a values-based approach to management planning for archaeological sites, especially within the Mediterranean region. The threats to archaeological sites, the role of values in planning, and an overview of the values-based approach to management planning form background papers. These are followed by international case studies of planning at the sites of Hadrian's Wall, England, and Chan Chan, Peru, and regional studies at Masada, Israel; Petra, Jordan; and Corinth, Greece. (M.D.)

Park Planning Team. 1971. *Troy Historical National Park, Master Plan for Protection and Use*.

This master plan is one of fourteen plans developed by the United States National Park Service (NPS) in cooperation with local planning teams; eleven of the plans were developed for sites in Turkey (1969–71) and three for those in Jordan. The guiding themes of all NPS plans are protection, development, and interpretation of the resource. The plans usually contain the following sections: an historical review of the resource; background information (for example, geology, climate, and

existing facilities); development and management proposals (visitor use, infrastructure development of facilities and utilities, and administration and staff); interpretive program; and conservation. See also Miller 1987 for a contextual review of NPS planning in Jordan. (M.D.)

Pearson, Michael, and Sharon Sullivan. 1995. *Looking after Heritage Places: The Basics of Heritage Planning for Managers, Landowners and Administrators*. Carlton: Melbourne University Press.

A detailed explication of site management planning as practiced in Australia according to the process in the Burra Charter and the Australia ICOMOS charter on conservation and management of heritage places. Each step delineated in the Burra Charter is explained, with numerous examples from real-life practice in Australia by professionals with extensive experience. (M.D.)

Pedersen, Arthur. 2002. *Managing Tourism at World Heritage Sites. A Practical Manual for World Heritage Site Managers*. World Heritage Manuals. Paris: UNESCO World Heritage Center:

This manual for site managers provides an accessible overview of the issues surrounding tourism at cultural (and natural) sites. It puts forth practical advice and information about establishing carrying capacities, dealing with visitor management problems, and promoting a site for tourism, and includes targeted activities for site managers and examples of surveys that can be undertaken to better understand the visitors to a site. (M.D.)

Pessis, Anne-Marie. 1995. *Parque Nacional Sierra de Capivara (Brasil): Políticas y acciones de preservación*. In Matthias Strecker and Freddy Taboada Tellez (eds.), *Administración y Conservación de Sitios de Arte Rupestre* (Contribuciones al Estudio del Arte Rupestre Sudamericano, no. 4), 82–91. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Spanish. The author describes the process of creating and managing a large cultural and natural park containing numerous rock art sites in northeast Brazil. Topics include the recruitment of appropriate personnel and organizations to protect, preserve, and manage the cultural and natural resources; the development of visitor infrastructure appropriate to each site within the park; and scientific investigations into the deterioration and conservation of the pictographs and petroglyphs. (A.O.)

Pitts, Michael. 1990. *What Future for Avebury?* *Antiquity* 64, no. 243, 259–74.

Avebury is a World Heritage Site incorporating a unique complex of prehistoric features, which include megaliths, settlement, and barrows. The site's protection, preservation, and presentation are complicated by the presence of a village situated in the midst of these features and plans for the development of the site for tourism. The author reviews efforts to document, excavate, protect, preserve, and develop the Avebury monuments—both historic and prehistoric—during the last four centuries. This review highlights changing philosophies for preserving the site from complete removal of the village in favor of the prehistoric monuments to an equal appreciation of the historic values of the village. In the context of the most recent development pressures on Avebury, the author urges archaeologists to become more actively involved in the long-term planning and development of the site. (M.D.)

Pwiti, Gilbert. 1996. *Let the Ancestors Rest in Peace? New Challenges for Cultural Heritage Management in Zimbabwe. Conservation and Management of Archaeological Sites* 1, no. 3, 151–60.

The current management of Great Zimbabwe is explored through the lens of the history and politics of Zimbabwe. The central theme is the evolving role of the local community in the postcolonial management of the site. The community continues to relate to the site as a religious center, resulting in conflicts with intervention needs. The challenges presented by growing tourism to the site are also explored. The author discusses how the current management is attempting to reconcile these conflicts (developing a “corporate strategy” for conservation, which links cultural heritage and economic benefits; and “adopt-a-site” approach to directly involve the local community as custodians). See also Ndoro 1994. (M.D.)

Rauch, M., and C. Weber. 1994. *The Rapa Nui National Park: Management and Maintenance of the Archaeological Heritage of Easter Island*. In A. Elena Charola, Robert J. Koestler, and Gianni Lombardi (eds.), **Lavas and Volcanic Tuffs** (Proceedings of the International Meeting, Easter Island, Chile, 25–31 October 1990), 259–67. Rome: ICCROM.

The authors review the history of Rapa Nui National Park and its management since its creation in 1935. The changing issues and problems confronting management and the current aims and objectives of the park and its management plan are described. Some of the problems that management is addressing are the need for long-term maintenance of the site, lack of understanding and awareness by researchers of postexcavation/investigation needs, and the impact of increasing visitation to the island. The importance of planning and coordination among government agencies, research institutions, the local population, and the tourist industry is emphasized. (M.D.)

Second International Congress on Architectural Conservation and Town Planning. (Conservation and Tourism, Basel, 1–4 April 1985). London: Heritage Trust. 1986.

English, French, and German. The published papers from this international conference are divided according to three major themes: conservation of historic monuments; urban conservation; and conservation of archaeological sites. Each paper is a site- or region-specific study. The four papers dealing with archaeological sites examine the sites of Sigiriya (Sri Lanka), Petra and Jerash (Jordan), Stonehenge (England), and the Acropolis (Greece) with respect to their management policies and facilities for tourism. (M.D.)

Sivan, Renée. 1997. *The presentation of archaeological sites*. In Marta de la Torre (ed.), **The Conservation of Archaeological Sites in the Mediterranean Region** (Proceedings of an International Conference organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995), 51–59. Los Angeles: The Getty Conservation Institute.

The author states that “the presentation of a site... should make it attractive, visually stimulating, and thought provoking while maintaining historical accuracy and respecting the integrity of the ruins.” She discusses the principles of site presentation and then illustrates and discusses a range of innovative approaches, which have been employed at Avdat and Tel Dan, Israel. (A.O.)

Sullivan, Hilary (ed.). 1984. **Visitors to Aboriginal Sites: Access, Control and Management** (Proceedings of the 1983 Kakadu workshop). Canberra: Australian National Parks and Wildlife Service.

This collection of articles on visitor management at Australian Aboriginal sites is grouped under four headings: Case Studies in Site Management; Visitor Behaviour; Aboriginal People's Perspective; and Interpretation. (M.D.)

Sullivan, K.M. 1979. *Management of Aboriginal relic sites in the Sydney area. Rock engravings and visitor impact.* In J.R. McKinlay and K.L Jones (eds.), **Archaeological Resource Management in Australia and Oceania**. Wellington: New Zealand Historic Places Trust.

The first part of this article describes problems in rock art management in the Sydney area. The second part looks more generally at the assumptions about visitor use and behavior at cultural sites that have informed management practices in Australia. The author recommends testing these assumptions, outlines possible testing programs, and describes a pilot study for Sydney. (M.D.)

Sullivan, Sharon. 1985. *Aboriginal Site Interpretation: Some Considerations.* **ACT Heritage Seminars** 3, 11–22.

This author's considerable experience with site management enables her to discuss the issues involved in interpreting Aboriginal sites for the general public. The process of establishing the site's significance—the cornerstone of management—is outlined. The importance of understanding the values of Aboriginal sites to the Aboriginal community is underscored and must form the basis of an interpretive plan. Interpretive themes and strategies for implementing them are discussed. (M.D.)

Sullivan, Sharon. 1997. *A Planning Model for the Management of Archaeological Sites.* In Marta de la Torre (ed.), **The Conservation of Archaeological Sites in the Mediterranean Region** (Proceedings of an International Conference organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995), 15–26. Los Angeles: The Getty Conservation Institute.

In Australia, the principles of the Burra Charter have been used to create a simple and logical planning model for the management of archaeological sites. The model is presented and discussed in detail, and with appropriate adaptations, it can be implemented at sites worldwide. (A.O.)

Thorn, Andrew, and Andrew Piper. 1996. *The Isle of the Dead: An Integrated Approach to the Management and Natural Protection of an Archaeological Site.* In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and Its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 149–52. London: International Institute for Conservation of Historic and Artistic Works.

The Isle of the Dead retains an historic cemetery, an aboriginal shell midden, and an internationally significant high-water mark. With careful management and accurate environmental impact assessment, the site has been protected through natural means requiring minimal intervention. The natural isolation of the island has been used to control visitor access, and tree plantings have been used to stabilize the environment around the headstones. (A.O.)

de la Torre, Marta (ed.). 1997. **The Conservation of Archaeological Sites in the Mediterranean Region** (Proceedings of an International Conference organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995). Los Angeles: The Getty Conservation Institute.

This publication of a conference is focused on conservation and management of archaeological sites in the Mediterranean, with papers on the planning process (see Sullivan 1997), issues of reconstruction, and presentation of archaeological sites and management considerations at the site of Akrotiri, Thera. In a series of case studies, the history of excavation, conservation, and management at three major Mediterranean sites is thoroughly considered: the late Roman villa of Piazza Armerina, Italy; the Minoan palace at Knossos, Crete; and the Hellenistic–Roman city of Ephesus, Turkey. (A.O./M.D.)

U.S. Department of the Interior. National Park Service. **Director's Order #28: Cultural Resource Management**. (<http://www.nps.gov/refdesk>). Web page, 2003 [accessed 9 July 2003].

This is the manual used by managers of National Park Service (NPS) cultural properties. In addition to establishing NPS policy with respect to the management of cultural resources, it outlines the planning process, including documentation of the resource, and sets forth the standards for the management of historic and prehistoric structures, with specific chapters on management of archaeological resources, cultural landscapes, historic and prehistoric structures, and museum and ethnographic resources. Appendices include a glossary, bibliographies, and relevant laws, guidelines, and standards. (M.D.)

Uzzell, David L. 1989. **Heritage Interpretation**. Volumes 1 and 2. London: Belhaven Press.

In volume 1, *The Natural and Built Environment*, the interpretation of the natural and cultural heritage is broadly explored from interpretation in developing countries to the training of interpreters. In volume 2, the *Visitor Experience* is explored with reference to the interpretation of heritage sites. These articles thus represent the interface between visitor management and heritage interpretation. (M.D.)

Valiente Cánovas, Santiago. 1994. *Parques y excavaciones arqueológicas: experiencias en el Yucatán, México*. In **Cuadernos 3 Conservación Arqueológica: Reflexión y debate sobre teoría y práctica** (Contenido del Curso–Debate realizado en Sevilla del 30 de noviembre al 4 de diciembre de 1992), 50–57. Sevilla: Consejería de cultura y medio ambiente.

Spanish. The author presents a very general survey of the current state of Maya sites in the Puuc area, Mexico, and makes broad suggestions for the creation of archaeological parks to attract visitors and make the sites economically viable. (A.O.)

Vander Stoep, Gail. 1989. *Time-lapse photography: advantages and disadvantages of its application as a research and visitor behaviour monitoring tool*. In David L. Uzzell (ed.), **Heritage Interpretation**. Vol. 2, 179–190. London: Belhaven Press.

Field research on visitor behavior was undertaken at a U.S. national military park. Three unobtrusive research strategies were considered: analysis of the physical traces of visitor behavior, personal observation, and mechanical observation. Mechanical observation—in this case, time-lapse photography—was selected. The pros and cons of each technique, as well as the ethical issues involved in recording visitors without their knowledge, are discussed. The author concludes that time-lapse photography can provide useful information about the 'real-world' effects of management strategies. (M.D.)

Veliz, Vito, John W. Bright, and James R. Barborak. 1989. Planning and Managing Honduras's Copán Ruins World Heritage Site: The Role of Cultural Parks in Contributing to Education and Economic Development. In **International Perspectives on Cultural Parks** (Proceedings of the First World Conference, Mesa Verde National Park, Colorado, 1984). Denver: United States National Park Service in association with the Colorado Historical Society.

This paper affords an unusual look at the international, national, and regional institutions and agencies that provided material, financial, and training support for the development and management of Copán. Also discussed are the lessons learned from the development and implementation of a master plan: the need for high-level government commitment and quality planning documents; the inclusion of rural development of adjacent areas; the suitability of labor-intensive development rather than high-tech solutions for developing countries; the upgrading of existing infrastructure over new development; and the regional exchanges of personnel and cooperative training programs. (M.D.)

Wager, Jonathan. 1995. *Zoning and Environmental Management Plan (ZEMP) for the Angkor World Cultural Heritage Site, Cambodia—A Case Study*. In **The Safeguard of the Rock-Hewn Churches of the Göreme Valley** (Proceedings of an International Seminar, Ürgüp, Cappadocia, Turkey, 5–10 September 1993), 57–75. Rome: ICCROM.

This paper describes the work of the Zoning and Environmental Management Plan for Angkor (ZEMP), undertaken by UNESCO from 1992 to 1994. The author reviews the history of Angkor, UNESCO's involvement at the site, and the ZEMP process. The objective of the process was to produce a comprehensive zoning plan for Angkor to address and reconcile the main planning issues at the site—cultural conservation, tourism, and rural development. Guiding principles for sustainable development are outlined. The article ends with a useful summary of the main lessons learned from carrying out the process. (M.D.)

Wood, J. B., and A. Warren. 1978. **A Handbook for the Preparation of Management Plans** (Discussion Papers in Conservation 18). London: University College London.

This handbook, commissioned by the Nature Conservancy Council to the Conservation Course at University College London, describes the process of preparing a management plan for natural reserves. Although the focus of this manual is natural reserves, the process is equally applicable to

the management of cultural resources. The three main stages of the process are defined as the collation of descriptive information, a description of policies, and a prescription for action. (M.D.)

Zilhão, João. 1998. *The Rock Art of the Côa Valley, Portugal*. **Conservation and Management of Archaeological Sites** 2, no. 4, 193–206.

The author provides a full description of the efforts to create and manage the Côa Valley Archaeological Park (inaugurated in 1996), which contains numerous rock art sites dating from paleolithic to historic times. In many ways, these efforts represent the state of the art in conservation and management of a heritage site, including research and scientific dating to determine the significance of the site; documentation and information management; legal protection of both the cultural heritage and its natural context; involvement of local, national, and international groups in all aspects of the process; interpretation; and development of a well-considered visitor and site management plan. (A.O.)

[Bib. III: 40 ref.]

ANNOTATED BIBLIOGRAPHY III: Assessment of Significance

Attenbrow, Val, and Tia Negerevich. 1984. *The Assessment of Sites: Lucas Heights Waste Disposal Depot: A Case Study*. In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 136–37.

Described in this case study is an assessment of the scientific significance of a group of prehistoric sites in Australia. Assessment was undertaken within a regional context and in terms of criteria such as size, contents, preservation, representativeness, as well as the site's potential contribution to research questions. (M.D.)

Australian Heritage Commission. 1990. *What Do We Want to Pass On to Future Generations? An Overview of Criteria and Assessment Procedures for the Register of the National Estate*. Australian Heritage Commission.

This study constitutes a full review of the process and criteria for assessing the significance of Australia's natural and cultural heritage. (M.D.)

Avrami, Erica, Randall Mason, and Marta de la Torre (eds.). 2000. **Values and Heritage Conservation** (Research Report, The Getty Conservation Institute). Los Angeles: The J. Paul Getty Trust.

This is a report on the results of a research initiative undertaken by the Getty Conservation Institute to explore the role of values in the conservation of cultural heritage. The aims and initial results and an overview of the meaning and practice of conservation, values and valorization, and the need for a conceptual framework constitute the first part of the report. A series of commissioned essays in the second part explore these issues from diverse perspectives. An extensive annotated bibliography related to values completes the report. Economic values in the context of cultural heritage are the focus of another report emerging from this research initiative (Randall Mason, ed. *Economics and Heritage Conservation* [a meeting organized by the Getty Conservation Institute, December 1998]). Los Angeles: The J. Paul Getty Trust, 1998). (M.D.)

Bickford, Anne, and Sharon Sullivan. 1984. *Assessing the Research Significance of Historic Sites*. In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 19–33.

The criteria of the Australian Heritage Commission regarding historic sites stress historic and public values and do not take into account scientific and research values. The authors devised three general questions to guide the assessment of the scientific significance of historic sites: Can the site contribute knowledge that no other resource or no other site can? Is this knowledge relevant to general questions about human history or other substantive problems? Does this knowledge contribute to other major research questions? (M.D.)

Bowdler, Sandra. 1981. Unconsidered Trifles? Cultural Resource Management, Environmental Impact Statements, and Archaeological Research in New South Wales. **Australian Archaeology** 12, 123–33.

In the context of Australian legislation to protect archaeological resources, the author discusses the question of significance as the justification for deciding which resources should be preserved. The American experience with defining scientific significance is reviewed. Assessment based on both research questions and representativeness is recommended, but the issue of who should undertake research and assessment needs to be addressed. Research consultants may provide the answer. (M.D.)

----- 1984. *Archaeological Significance as a Mutable Quality*. In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 1–9.

The author illustrates with case studies the changeability and relativity of significance as it applies to archaeological sites. As the level of research and the nature of research questions change, so will an assessment of a site's scientific significance. The important point is made that is only implicit in most discussions of scientific significance as research potential; namely, once a site is excavated, the "focus of [its] significance has moved elsewhere." (M.D.)

Cleere, Henry. 1995. *Cultural Landscapes as World Heritage*. **Conservation and Management of Archaeological Sites** 1, no. 1, 63–68.

In the context of the UNESCO World Heritage Convention of 1972, the author explores the concept of cultural landscapes as a distinct category of heritage and traces the attempts to establish criteria to assess these landscapes. The discussion is useful in thinking through the values attributed to cultural landscapes. (M.D.)

Clegg, John. 1984. *The Evaluation of Archaeological Significance: Prehistoric Pictures and/or Rock Art*. In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 10–18.

Groube's model (see Groube 1978) for significance assessment utilizing three levels of research design—initial, integrative, and theoretical—is adapted to the assessment of Australian rock art. (M.D.)

Coster, John. 1979. *Exotic Forestry and Site Management in the Auckland Region*. In J. R. McKinlay and K. L. Jones (eds.), **Archaeological Resource Management in Australia and Oceania**, 89–94. Wellington: New Zealand Historic Places Trust.

The author critically examines two systems that have been used in the forestry service for selecting sites for protection and preservation. One of the systems comprises three sets of guidelines: scientific criteria (with emphasis on a representative sample, intact sites, and unique sites);

management criteria (in this case, the forestry service requirements and needs); and secular criteria (for example, aesthetics, educational value, and traditional importance). A second, more utilitarian system is based on management criteria: sites to be permanently preserved (in practice, this refers to sites that are intact and whose preservation is viable); sites that require further investigation; and sites that require no further management. (M.D.)

Crosby, Anthony. 1989. *Ruins Stabilization—the Value Implied*. In **International Perspectives on Cultural Parks** (Proceedings of the First World Conference, Mesa Verde National Park, Colorado, 1984), 101–6. Denver: United States National Park Service in association with the Colorado Historical Society.

Explored in this text are the values of archaeological resources and how they are affected by preservation actions. Values can be broadly classified as symbolic or religious, economic or functional, educational or informational, and aesthetic, but they are inevitably relative, dependent on time, place, and culture. Physical interventions undertaken to preserve a site will respond to different values and may well result in a conflict of values. Compromise is inevitable, but one must always ask whether a preservation action will complement or detract from the important values of a site. (M.D.)

Darvill, Timothy. *Value Systems in Archaeology*. In Malcolm A. Cooper et al. (eds.), **Managing Archaeology**, 41–50. London: Routledge.

The author looks at the origins, formation, and evolving nature of value systems, and relates this to the ways in which society values archaeological resources. Three categories, or gradients, of values are defined and explored: use value (the exploitation of the resource for some kind of tangible return in the present, such as archaeological research, education, recreation, social solidarity, and economic gain); option value (the potential of the resource for use in the future); and existence value (the feeling of well-being that comes from knowing the resource exists). This value system is also discussed by the author in “Value Systems and the Archaeological Resource.” *International Journal of Heritage Studies* 1, no. 1 (1994): 52–64. (M.D.)

Darvill, Timothy, Andrew Saunders, and Bill Startin. 1987. A Question of National Importance: Approaches to the Evaluation of Ancient Monuments for the Monuments Protection Programme in England. **Antiquity** 61, no. 233, 393–408.

The evaluation system for archaeological sites and monuments established as part of English Heritage’s Monuments Protection Programme is set forth in some detail. The aim of the program, begun in 1986, was to identify sites of national importance for statutory protection. Procedures to evaluate monuments on a systematic and nationwide basis were developed. Selection criteria, based on earlier nonstatutory criteria (see Saunders 1984), are applied at three levels of evaluation: characterization, discrimination, and assessment of resources. (M.D.)

Davis, Hester. 1989. *Is an Archaeological Site Important to Science or to the Public, and Is There a Difference?* In Davis L. Uzzell (ed.), *Heritage Interpretation. Volume 1, The Natural and Built Environment*, 96–99. London: Belhaven Press.

In North America, the significance debate has arisen largely in the context of expenditures of public money and the federal mandates to assess significance. The use of public money has implications for how we assess whether sites are important. The author explores the importance of sites from the perspective of the general public, and the conflict among the public, archaeologists, and Native American interests in archaeological resources. (M.D.)

Dunnell, Robert C. 1984. *The Ethics of Archaeological Significance Decisions*. In Ernestene L. Green (ed.), **Ethics and Values in Archaeology**, 62–74. New York: The Free Press.

Significance assessment is a moral and ethical issue due to the non-renewable nature of archaeological resources. The author argues against problem-oriented assessments since they restrict the value of the archaeological record to contemporary problems. A representative sample is the only way to ensure future research needs. (M.D.)

Flood, Josephine. 1984. *More or Less Significant*. In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 55–60.

The criteria used by the Australian Heritage Commission for listing Aboriginal sites include “outstanding quality” and “representativeness.” The emphasis in assessment has now shifted to “representativeness,” as the most outstanding sites have already been listed. Representativeness is defined as characteristic examples of each type of site by biophysical region. (M.D.)

Fowler, Peter J. 1981. *Archaeology, the Public, and the Sense of the Past*. In David Lowenthal and Marcus Binney (eds.), **Our Past Before Us: Why Do We Save It?**, 56–69. London: Temple Smith.

The author explores the meanings of a “sense of the past” for educators, academics, and the public, particularly as they relate to the conflict between preserving the past for archaeological/academic purposes and for public consumption. The criteria for preservation will differ: archaeology requires preservation of its resources for its own survival but the public’s expectations will not always correspond with this scholarly need. (M.D.)

Francis, Peter D., and Eric C. Poplin (eds.). 1981. **Directions in Archaeology: A Question of Goals** (Proceedings of the Fourteenth Annual Conference, The Archaeological Association of the University of Calgary, November 12–14, 1981). Calgary: The University of Calgary.

Part six of these conference proceedings, *Approaches to the Evaluation of Cultural Resources: Canadian Perspectives*, includes seven papers and a final review paper on evaluation and significance assessment in the context of cultural resource management issues. The major arguments are similar to those in the literature of the United States: problem-oriented research vs.

representative sampling and the use of humanistic vs. scientific criteria as the means of assessment. Both historic and prehistoric resources are considered. (M.D.)

Glassow, M. 1977. Issues in Evaluating the Significance of Archaeological Resources. **American Antiquity** 42, no.3, 413–20.

The author argues for assessment based on categories of significance that will reflect a quantitative analysis of site attributes or properties: variety, quantity, clarity, integrity, and environmental context. (M.D.)

Groube, L. M. *Priorities and Problems in Dorset Archaeology*. In **New Approaches to Our Past** (Proceedings of the Southampton University Archaeological Society, 1978). Monograph Series, University of Southampton, no. 2, 29–52.

This is an earlier version of what was more fully set forth in Groube and Bowden 1982, in which the author develops the method of ranking archaeological problems in order to establish priorities for protection and excavation. Delivered at a conference, the author notes in a postscript the hostile reaction of some in the audience, which he attributes in part to “square–root phobia.” This remark refers to the rather complex mathematics that informs this particular approach to site ranking. (M.D.)

Groube, L. M., and M. C. B. Bowden. 1982. **The Archaeology of Rural Dorset: Past, Present and Future** (Dorset Natural History and Archaeological Society, Monograph 4).

This report on Dorset archaeology investigates the causes of destruction to resources and the role of legislation and other measures to protect them. It also focuses on establishing priorities for future archaeological work and protection of resources in the region. A cumbersome ranking of archaeological problems as initial, integrative, and theoretical is proposed as the basis for assessing priorities. Initial archaeological problems are of the lowest level, requiring basic data gathering; integrative problems involve correlations, relationships, and patterns among sites and artifacts; theoretical problems encompass the broad issues of cultural change, social and economic structures, relationships among man, culture, the environment, and so on. These three levels of problems are applied to the main archaeological periods. In addition to the ranking of problems, a flow and feedback score is applied, which attempts to compensate for the inevitable feedback between the problem levels. A third scale of assessment is based on the importance of the problem to local Dorset archaeology. (M.D.)

Johnston, Chris. 1994. **What Is Social Value? A Discussion Paper** (Technical Publication Series, Number 3. Australian Heritage Commission). Canberra: Australian Government Publishing Service.

This brief publication explores social value—the meanings attached to heritage places by groups of people—through a thoughtful analysis of its many facets and manifestations, its connections and differences with other values, and its transitory nature. Approaches to assessing social value are discussed, and issues such as whether social value needs to be protected, the conflicts between protecting fabric and function of a place as expressed in social values, and the tensions between economic growth and community identity are raised. (M.D.)

Kalman, Harold. 1976. *An Evaluation System for Architectural Surveys?* **Association for Preservation Technology Bulletin** 8, no. 3, 3–23.

The use of evaluation systems, selection criteria, and scoring systems for evaluating historic resources in the United States is explored as background to the presentation of the author's evaluation of historic buildings in Vancouver, Canada, undertaken in the early 1970s. Appendices include criteria established for the United States National Register and National Trust and the Historic Sites and Monuments Board of Canada. (M.D.)

Lancaster, Osbert. 1976. *What Should We Preserve?* In Jane Fawcett (ed.), **The Future of the Past**, 65–74. London: Thames & Hudson.

In the context of historic preservation, the author allows for only three grounds for preserving a building: intrinsic aesthetic merit, pietas, and scenic usefulness. While this narrow approach does not reflect current trends, it is typical of the visual and symbolic approach to cultural heritage. (M.D.)

Lipe, William. 1984. *Value and Meaning in Cultural Resources.* In Henry Cleere (ed.), **Approaches to the Archaeological Heritage**, 1–11. Cambridge: Cambridge University Press.

This article defines four types of values that may be assigned to cultural resources: economic, informational, associative, and aesthetic. These values are fully explored as a means of understanding how cultural resources can be of use and benefit to society. The author does not formulate a system whereby these values can be assessed but recognizes that they can be used for selecting which resources should be preserved. (M.D.)

Moratto, M. J., and R. E. Kelly. 1976. *Significance in Archaeology.* **The Kiva** 42, no. 2, 193–202.

Traditionally, significance has been measured in terms of size, condition, depth, richness, age, uniqueness, or presumed scientific value. A broadly based system that will address all the relevant issues (governmental and archaeological) is needed. The authors propose an interrelated set of criteria: historical, scientific, geographic, ethnic, public, monetary, legal, and managerial. These criteria are each briefly explored in the context of assessing significance. (M.D.)

———. 1978. *Optimizing Strategies for Evaluation of Archaeological Significance.* In **Advances in Archaeological Method and Theory**, vol. 1, 1–30. New York: Academic Press.

In an amplification of Moratto and Kelly 1976, the problems and concepts associated with resource assessments are clearly reviewed, and criteria for evaluating cultural resources are set forth in some detail. These criteria are historic, scientific, ethnic, public, legal, and monetary. "Specious" criteria, such as egocentrism and sensationalism, are usefully explored. The extensive bibliography includes additional sources not cited herein. (M.D.)

O'Keefe, P. J., and L. V. Prott. 1984. **Law and the Cultural Heritage**, vol. 1. Abingdon: Professional Books Ltd.

The question of significance is discussed within the legal framework of site protection. The authors point out the ambiguity surrounding the use of such terms as significance, interest, and value in legislation designed to protect cultural resources. (M.D.)

Plog, Fred. 1984. *The Ethics of Excavation: Site Selection*. In E. L. Green (ed.), **Ethics and Values in Archaeology**, 89–96. New York: The Free Press.

This article addresses the specific question of how to select sites for excavation. The author singles out the following seven questions that must be addressed to justify excavation: Has a research question been identified to which the site is pertinent? Does the research design specify the minimal amount of work necessary? Are the archaeological techniques available adequate to address the problem? Can the problem be addressed using existing data? Can a less well-protected site be used? Can a partially disturbed site be used? Can a site with greater interpretive potential be used? The author also sets forth standards for the evaluation process. (M.D.)

Raab, L. Mark, and Timothy C. Klinger. 1977. *A Critical Appraisal of 'Significance' in Contract Archaeology*. **American Antiquity** 42, no. 4, 629–34.

The authors critically evaluate four current strategies for assessing significance, as measured by the National Register criteria, a consideration of monetary values, unique characteristics, and problem-oriented research. This type of research is judged to be the best approach. (M.D.)

Saunders, Andrew. 1984. *Integrated Conservation*. In **Interchange of Experience Concerning the Care of Archaeological Remains** (Seminar in Stockholm, Sweden, 7–9 November 1983), 15–18. Stockholm: Central Board of National Antiquities.

The inventory and legal protective systems in Britain are reviewed. The proposed criteria for selection of scheduled monuments are set forth and briefly defined: survival and condition, period, rarity, fragility and vulnerability, diversity, documentation, group value, and potential. (M.D.)

Schiffer, Michael B., and George J. Gumerman. 1977. **Conservation Archaeology**. New York: Academic Press.

Part IV, "Assessing Significance," includes an introductory statement and four papers devoted to the problems of significance assessment of cultural resources management from the American perspective. This volume, one of the most frequently cited in cultural resource management literature, is a good starting point for exploring these issues. (M.D.)

Sharrock, Floyd W., and Donald K. Grayson. 1979. *'Significance' in Contract Archaeology*. **American Antiquity** 44, no. 2, 327–28.

The limitation of problem-oriented strategies for assessing archaeological resources must be recognized. They are inevitably biased toward current research problems; sites that may be important for future research will not be properly represented. The author points out that the

National Register criteria at least have the virtue of being broad and recognizing potential values. (M.D.)

Stanley Price, Nicholas. 1990. "*Conservation and Information in the Display of Prehistoric Sites.*" In Peter Gathercole and David Lowenthal (eds.), **The Politics of the Past**, 284–90. London: Unwin Hyman.

The decision to conserve an archaeological site for public presentation raises questions of interpretation and legibility. The three well-accepted conservation principles of reversibility, minimum intervention, and compatibility of materials should guide every intervention, but the type of intervention will depend on the values ascribed to a site: aesthetic and artistic, economic and utilitarian, associative and symbolic, and historic and informational. The author discusses the conflict of values in the light of conservation theory, public vs. professional interests, and types of interventions. (M.D.)

Stehberg, Rubén. 1982. In Chile the National Museum of Natural History Develops Archaeological Sites. **Museum** 34, no. 2, 114–16.

Criteria were developed specifically for selecting prehistoric archaeological sites for excavation and public presentation around Santiago, Chile. The criteria chosen were representativeness, significance, variety, geographical situation, ease of access, preservation, monumentality, and location on state property. (M.D.)

Sullivan, Hilary. 1984. *Mornington Peninsula Archaeological Survey: Assessing Significance in a Local Context.* In S. Sullivan and S. Bowdler (eds.), **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra), 119–26.

In this case study, scientific significance of prehistoric sites was evaluated within a survey area for the management and protection of sites. Criteria were designed to determine research potential and provide a representative sample of sites; these included preservation, structure, and contents of sites. (M.D.)

Sullivan, S., and S. Bowdler (eds.). 1984. **Site Surveys and Significance Assessment in Australian Archaeology** (Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra).

This series of conference papers focuses on defining the scientific significance of sites. The adaptation of the concept of scientific significance as research potential was the main theme of the conference. The papers deal with both historic and prehistoric sites and are equally divided between general discussions and case studies. Selected papers are annotated herein. (M.D.)

Tainter, Joseph A., and G. John Lucas. 1983. *Epistemology of the Significance Concept.* **Antiquity** 48, no. 4, 707–19.

The concept of significance as articulated in United States legislation and regulations is explored from an historical and philosophical perspective. This concept is traced to the Western tradition of empiricism or positivism, in which the meaning perceived in phenomena does not vary or change.

The authors argue that this is epistemologically unsound; significance is not a quality inherent in cultural resources but is assigned to them and will change. (M.D.)

Thompson, Raymond H. 1982. *Archaeological Triage: Determining the Significance of Cultural Properties*. In Rex L. Wilson and Gloria Loyola (eds.), **Rescue Archaeology** (Papers from the First New World Conference on Rescue Archaeology), 40–46. Washington, D.C.: The Preservation Press.

The United States needs a national system of archaeological “triage” to save its resources. The author suggests a regional evaluation system and the use of commonly recognized categories of archaeological information. The categories can be used as the basis for a statement of significance, for comparison, and as a justification for decisions. Categories include chronology, ethnic identity, rich assemblage, degree of disturbance, uniqueness of cultural expression, and more. (M.D.)

Titchen, Sarah M. 1996. On the Construction of ‘Outstanding Universal Value.’ Some Comments on the Implementation of the 1972 UNESCO World Heritage Convention. **Conservation and Management of Archaeological Sites** 1, no. 4, 235–42.

The criteria for nominating a World Heritage site center on the concept of “outstanding universal value.” This article traces the changing perceptions of the meaning of that phrase, and the subsequent modification of the criteria as embodied in the Operational Guidelines for the Implementation of the World Heritage Convention. The ambiguity of the phrase, while presenting some difficulties, also accommodates changing attitudes toward the cultural and natural heritage. The author argues that as the criteria continue to be modified, they will allow for the inscription of a continuum of sites from cultural to natural and thus help to balance the World Heritage List. In the same volume, see also Henry Cleere, “The Concept of ‘Outstanding Universal Value’ in the World Heritage Convention,” 227–33. (A.O.)

Weinland, Marcia. 1980. *Archaeological Significance: A Ten-Year Review of Nominations from Kentucky*. **American Society for Conservation Archaeology Newsletter** 7, no. 1, 12–19.

A brief review of the earlier literature on significance assessment precedes this overview of the specific criteria that were actually used for justifying National Register listings in Kentucky. Of the thirty-seven criteria identified, those most frequently cited as justifications were impact and integrity, but this must be seen in the context of contract projects and damaged sites. Other criteria were rarity of culture or site type, subsistence pattern, stratified deposits, local chronology, intensity of occupation, and visual impression. (M.D.)

[Bib. IV 18 ref.]

ANNOTATED BIBLIOGRAPHY IV: Assessment of Physical Condition

Addleson, L. 1982/89. *Building Failures. A Guide to Diagnosis, Remedy and Prevention*. London: Architectural Press.

Study 2: Investigation Kits: an itemization of tools and instruments required for a basic and specialized building survey.

Study 3: Diagnosis: principles and procedures: describes the procedure of a building survey, its scope, and the compilation of relevant documentary and analytical data. (J.St.)

Adler, Isidore, Sheldon E. Sommer, Raphael Gershon, and Jacob I. Trombka. 1982. *Analytical methods related to building and monument preservation*. In **Conservation of Historic Stone Buildings and Monuments** (Report of the Committee on Conservation of Historic Stone Buildings and Monuments), 163–182. Washington, D.C.: National Academy Press.

Explanation of destructive and non-destructive techniques of analysis: x-ray fluorescence spectroscopy, x-ray diffraction, electron microprobe and scanning electron microscope, electron spectroscopy, infrared reflectance radiometry, and neutron-gamma techniques. (J.St.)

Alva, Alejandro. 1989. *Structural Monitoring*. In **Building Conservation 88 Symposium** (Helsinki, 22–26 August 1988. Organized by Helsinki University of Technology, National Board of Antiquities, and ICCROM).

This article provides a succinct review of structural monitoring. The author summarizes the causes of movement in a structure; describes the instruments that are used to monitor structural movement (e.g., fissure gauge, mortar and glass tell-tales, crack micrometer, LVDT system, etc.); and outlines the most common interpretations that result from an evaluation of the data. (M.D.)

Burland, J.B. and J.R. Standing. 1997. *Geotechnical monitoring of historic monuments*. In Carlo Viggiani (ed.), **Geotechnical Engineering for the Preservation of Monuments and Historic Sites** (Proceedings of the International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, Naples, Italy, 3–4 October 1996), 321–341. Rotterdam/Brookfield: A.A. Balkema.

This paper discusses the role of monitoring in the geotechnical stabilization and protection of historic monuments. Attention is drawn to two important types of monitoring: long-term monitoring, which can be invaluable in determining the need for and deciding upon the most appropriate stabilization measures, and real-time monitoring, which can be used to monitor a structure during nearby construction activity or during stabilization of the monument itself. Measurements of movement of the Leaning Tower of Pisa and the Palace of Westminster, London, are used to illustrate both types of monitoring. (aa edited)

Croci, G. 1993. *Structural behaviour of monuments: knowledge and improvement*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 423–430. London: E. and F.N. Spon.

To evaluate the safety of monuments, which is the basis of every decision for intervention, it is necessary to follow three simultaneous routes: historical survey, direct observation (eventually integrated with monitoring and investigation); and mathematical modeling. It is only from a synthesis of these sources of information that we can make a good judgement. This procedure is applied to the study of the Colosseum and several standing buildings. (aa edited and abridged)

Crosby, Anthony. 1983. *A conservation survey of adobe buildings*. In **Adobe. International Symposium and Training Workshop on the Conservation of Adobe** (Lima–Cusco, 10–22 September 1983), 65–67. Lima: UNDP/UNESCO.

A point outline of the principal causes of adobe erosion, relating sources, and processes. (J.St.)

Fidler, John. 1980. *Non-destructive surveying techniques for the analysis of historic buildings*. **Association for Studies in the Conservation of Historic Buildings. Transactions V**, 3–10.

A review of the applications and limitations of radiography, infrared detection, ultrasonics, microwave analysis, magnetometry, fibre-optic prospecting, and structural movement monitoring. (J.St.)

Ginell, W.S. 1994. *The nature of changes caused by physical factors*. In W.E. Krumbein, P. Brimblecombe, D.E. Cosgrove, and S. Staniforth, **The Science, Responsibility, and Cost of Sustaining Cultural Heritage**, 81–94. John Wiley and Sons.

Artifacts [and archaeological remains] that constitute our cultural heritage are subject to relentless, inevitable decay that results from stress induced by exposure to our environment. In this chapter, the nature of some of the more important physical interactions is discussed. The degradation of artifacts is related to disruptive mechanical stresses caused by water, thermal energy, soluble salts, vibration and shock, and disasters. The role of cyclic stress in initiating and accelerating artifact degradation is emphasized. (aa edited)

van Hees, Rob P.J. and Silvia Naldini. 1995. *The masonry damage diagnostic system*. **Internationale Zeitschrift für Bauinstandsetzen** 1, no. 6, 461–473.

English with German summary. The MDDS (Masonry Damage Diagnostic System) is an expert system for the evaluation of the deterioration of ancient brick masonry structures. A demo version was developed in an EC–Environment project. The system is centered on damage related to the interaction between materials (brick masonry, brick, mortars, plaster/renderings) and environmental factors. In order to meet the needs of the users MDDS can be further developed, including for example a system for natural stone. The system is meant for user groups like national bodies in charge or the conservation of the cultural heritage, universities, and restoration architects. An example of a complete diagnosis is given and discussed. (aa edited)

Hollis, M. 1983. **Surveying Buildings**. London: Surveyor Publications.

Manual for the surveyor of occupied structures of relevance to monuments is the description and critique of equipment to measure and diagnose rising damp and relative humidity, with U.K. lists of equipment suppliers. (J.St.)

Maekawa, Shin, and Neville H. Agnew. 1996. *Investigations of environmentally driven deterioration of the Great Sphinx and concepts for protection*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 116–120. London: International Institute for Conservation of Historic and Artistic Works (IIC).

The micro-environment of the Great Sphinx was quantified by continuously monitoring the site climate and the relative humidity and temperature within the stone of the monument over a three-year period. Thermal cycling, wind, nightly dew-fall, and rainfall were recorded, and the role of these factors in weathering is discussed. The use of a night-time shelter for temporary protection from dew condensation and wind erosion is presented as an alternative to consolidation or desalination of the stone. (aa abridged)

Mora, Paolo, Laura Mora, and Paul Philippot. 1984. **Conservation of Wall Paintings**. London: Butterworths.

Includes a chapter entitled *Examination and Documentation* [of wall paintings], whose general principles are applicable to archaeological site survey: archaeological examination, technological examination, methods of examining deterioration; documentation purpose, and scope. (J.St.)

Rossi, P. P. 1997. *Experimental techniques for the structural analysis of historical buildings*. In Carlo Viggiani (ed.), **Geotechnical Engineering for the Preservation of Monuments and Historic Sites** (Proceedings of the International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, Naples, Italy, 3–4 October 1996), 275–286. Rotterdam/Brookfield: A.A. Balkema.

The most important testing techniques used for a non-destructive evaluation of the static conditions of masonry structures are presented. The preliminary phase of an investigation should include a geometric survey, crack pattern investigation and an historical analysis. Attention is then given to determining the mechanical parameters of the masonry structures by using non-destructive or slightly destructive tests. The information obtained using these tests is presented with critical remarks. The important role of mathematical models, dynamic analysis, and monitoring is also discussed. (aa edited)

Schmid, Werner (ed.). **GraDoc. Graphic Documentation Systems in Mural Painting Conservation**. Research Seminar. Rome 16–20 November 1999. ICCROM: Rome 2000.

These proceedings of a seminar on documentation of mural paintings held at ICCROM in 1999 provide a holistic investigation of documentation issues that are applicable to all categories of cultural heritage. The papers address questions of why, to what extent, and to what purpose documentation is carried out, the process of documentation, including planning and data collection and organization, and the technical and technological methods, emphasizing recent innovations and use of computer-aided graphics for documentation. The publication also presents the results of

working groups set up prior to the seminar, discussions following presentations, and a glossary of terms. The volume is well illustrated and includes a CD-ROM with additional information and visual materials and demos. (M.D.)

Smith, Scot E. 1986. An assessment of structural deterioration of ancient Egyptian monuments and tombs in Thebes. **Journal of Field Archaeology** 13, 503–510.

The author describes in some detail the causes and effects of deterioration to the monuments in the area of Luxor. The major sources of problems today are high ground water levels, increased salinity of the soil, and higher humidity levels due directly or indirectly to the construction of the Aswan Dam; and increased visitation to the monuments. (M.D.)

Stewart, John D. 1986. *Written documentation and analysis of historical architecture*. **Heritage and Conservation**. **The Journal of the Regional Centre for Conservation, Baghdad** 8–9, 67–76.

A summary of materials, principles, and methodology employed in written descriptions of historical structures, with a synopsis of analytical techniques for identification of building materials (wood, stone, mortar, paint). (J.St.)

Tassios, T.P., and M. Mamillan. 1985. **Valutazione Strutturale dei Monumenti Antichi**. Rome: Edizione Kappa.

Italian and English. Description of non-destructive methods for determination of structural material properties and investigation of overall structural behaviour: the scope, principles and equipment required for each investigation, with case studies. (J.St.)

Vouvé, Jean, Philippe Malaurent, and Frédérique Vouvé. 1997. *Microclimate analysis of deteriorated wall paintings. With restitution of original decoration through imaging*. **Conservation and Management of Archaeological Sites** 2, no. 1, 9–16.

The authors present a methodology for instrumentally monitoring the environment and analyzing the deterioration of subterranean wall paintings; the methodology is illustrated with a case study. Additionally, they describe the semiautomatic recording and digital re-creation of the wall painting under study, which can aid in restoration or, alternatively, allow for re-creation of the painting in a museum context. (A.O.)

[Bib. V: 86 ref.]

ANNOTATED BIBLIOGRAPHY V: Conservation Principles and Practices

Adam, Jean Pierre, and Ann Bossoutrot. 1990. *Restauration architecturale et préservation des sites archéologiques*. In Marie Cl. Berducou (ed.), **La Conservation en Archéologie**, 333–366. Paris: Masson.

French. The bulk of this chapter devoted to archaeological site conservation is a revised version of the authors' previous works (see Bossoutrot 1987 cited herein and Adam 1983 in Bibliography VI). New material has been added, including an introductory review of the history and principles of archaeological preservation, written from a European perspective, and a greatly expanded section on presentation strategies. The result is a much fuller and more contextual treatment of archaeological site conservation. (M.D.)

Agache, Roger. 1982. **Revoir Notre Passé: de la Fouille à la Reconstitution Archéologique** (No. 10. Numéro spécial du Bulletin de la Société de Préhistoire du Nord et de Picardie).

French. The justification and promotion of archaeological *reconstitution* are the subject of this monograph. Referred to elsewhere as experimental archaeology, archaeological interpretive parks, or reconstructed villages, these reconstructed habitats are undertaken in the interests of both archaeological research and public education. Illustrated examples in the form of captioned photographs, which were part of a traveling exhibition from which the title of this publication was borrowed, constitutes the bulk of the book; most are European examples, but they range from reconstructed Iron Age villages to the J. Paul Getty Museum in Malibu. (M.D.)

Agnew, Neville (ed.). 1997. **Conservation of Ancient Sites on the Silk Road** (Proceedings of an International Conference on the Conservation of Grotto Sites, Mogao Grottoes at Dunhuang, October 1993). Los Angeles: The Getty Conservation Institute.

These extensive proceedings focus on the management and conservation of grotto or cave sites, primarily along the Silk Road in China but also at other sites in Asia and around the world. The papers are divided into broad categories of site management, conservation of materials, geotechnical and site stabilization issues, monitoring of the environment and microclimate, and characterization of pigments. The five articles, which discuss the methods of geotechnical stabilization for the grottoes (grout, bolts and anchors, retaining walls, roof supports, water mitigation, etc.), are of particular relevance to archaeological sites. (A.O.)

Albini, Romana, Andreina Costanzi Cobau, and Chiara Zizola. 1996. Mamshit, Israel, and San Paolino alla Regola, Rome: what cooperation or interference between archaeologist and conservator can achieve. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 1–5. London: International Institute for Conservation of Historic and Artistic Works (IIC).

This paper presents two cases of on-site conservation: frescoes at Mamshit and frescoes and mosaics at San Paolino. The Mamshit treatments were carried out many years after the excavation and are an example of “maximum intervention – minimum efficiency.” At San Paolino, collaboration

between conservator and archaeologist from the beginning of the excavation made it possible to follow the principle of “minimum intervention – maximum efficiency.” (aa abridged)

Araoz, Gustavo, Margaret MacLean, and Lara Day Kozak. 1999. Proceedings of an International Symposium on Authenticity in the Conservation and Management of Cultural Heritage in the Americas (San Antonio, Texas, March 1996). Washington D.C. and Los Angeles: US/ICOMOS and The Getty Conservation Institute.

English and Spanish. In response to the ICOMOS call for regional participation in the international debate on authenticity, the presidents of all the national ICOMOS committees in the Americas convened at this conference to address the issue. The conference was organized around four themes: defining the nature of American cultural heritage; defining authenticity of fabric, context, usage, and value; proof of authenticity in dynamic vs. static (archaeological) sites; and implications of American interpretations of authenticity on site management. While only a few of the papers directly address archaeological sites, the general discussions on authenticity are relevant. The conference resulted in the Declaration of San Antonio, the text of which is included. (A.O.)

Archäologie und Denkmalpflege. Diskussionen zur archäologischen bauforschung 2. Berlin: Deutschen Archäologischen Instituts. 1975.

German. An early review of conservation and preservation measures undertaken mainly, but not exclusively, on Greco-Roman sites. Conservation measures include anastylosis, wall capping, partial backfilling. (M.D.)

Attar, Ghassan. 1991. *Authenticity vs. stability: the conservation engineer's dilemma*. **Association for Preservation Technology** 23, no. 1, 18-21.

The author, an engineer, defines and discusses the concept of authenticity and the impact of a range of interventions on the authenticity of the structure. Minimum professional skills for a conservation engineer are recommended. An “impact assessment” table is presented and described, in which the impact of an intervention (ranging from stabilization through reconstruction) on the authenticity and stability of a structure is assessed. (M.D.)

Bahn, Paul G., Robert G. Bednarik, and Jack Steinbring. 1995. *The Peterborough petroglyph site: reflections on massive intervention in rock art*. **Rock Art Research** 12, no. 1, 29-41.

The effects of massive interventions at petroglyph sites (e.g., contact recording procedures, conservation treatments, shelters) are considered by examining the history, procedures and results of such practices at a public site near Peterborough in Canada. It is argued that the impact of projects such as the massive altering of environment needs to be monitored independently, and that such objective information is required in the planning of other projects of this kind. The need for competent scientific assessment of such projects is stressed, and the paper considers the potential disadvantages of massive intervention projects. (aa)

Balut, Pierre-Yves. 1982. *Restauration, restitution, reconstitution*. **Ramage** 1, 95–110.

French. In this philosophical essay on three major architectural interventions—*restauration, restitution, reconstitution*—the author attempts to clarify the underlying concepts that have guided their practice and the conflicts that have arisen as a result of the differing attitudes of architects and archaeologists toward archaeological structures. (M.D.)

Berducou, Marie. *Introduction to archaeological conservation*. In Nicholas Stanley Price, M. Kirby Talley Jr. and Alessandra Melucco Vaccaro (eds.), **Historical and Philosophical Issues in the Conservation of Cultural Heritage**, 248–259. Los Angeles: The Getty Conservation Institute.

In this philosophical discussion, the author describes the emergence of the idea of cultural property in recent decades and the application of the idea to archaeological objects and sites, what it means, and how it affects their preservation. In essence, cultural property is that which we take the trouble to conserve. But what does it mean to conserve and what are the principles that guide us in conservation? What is the difference between conservation and restoration, and where on the continuum of preservation actions does one end and the other begin? Finally, how does archaeological context influence our valuation of the object or structure and our decision to begin the conservation process? (A.O.)

Bossoutrot, Anne. 1987. *La conservation des sites archéologiques*. In **Conservation des sites et du mobilier archéologiques. Principes et méthodes** (Étude et document sur le patrimoine culturel, no. 15), 5–21. UNESCO.

French. The author makes a brief survey of the full range of conservation problems and concerns that will be encountered on an excavation, beginning with pre-excitation planning and study, conservation during excavation and between excavation seasons, through to presentation of the site. Subjects covered include access to and circulation within the excavation, temporary roofing requirements, consolidation and stabilization of walls; buttressing of the edges of excavations, drainage, wall capping, and backfilling. The range of solutions is limited, but the scope of the presentation provides an excellent overview of archaeological site conservation. (M.D.)

Carbonara, Giovanni. 1987. *La philosophie de la restauration en Italie*. **Monuments Historiques**, no. 149 (Janvier–Février), 17–25.

French. The author reviews contemporary restoration theory in Italy, which continues to be founded in the thinking of Cesare Brandi. The views of the new generation of critical theoreticians, such as R. Pane, R. Bonelli, and P. Philippot, are explored with reference to Brandi's seminal ideas. (M.D.)

Casiello, Stella, and Bruno Sammarco. 1986. *Tecniche tradizionali di intervento per la conservazione delle strutture fuori terra nell' edilizia pompeiana*. In **Manutenzione e conservazione del costruito fra tradizione ed innovazione** (Atti del convegno di studi, Bressanone, 24–27 Giugno 1986), 319–331. Padua: Libreria Progetto Editore.

Italian with English summary. Research and *in situ* study have permitted a series of considerations respective to the problematic question of the archaeological restoration of the city of Pompeii starting from the first discovery (1748) and particularly referring to the early part of the 19th

century. It has been established that the problems of archaeological restoration were dealt with more competently than was done with the architectural ones, showing that conservation principles codified in the international literature were understood long over a century ago. (aa)

Conservation and Management of Archaeological Sites 3, nos. 1 and 2 (1999).

This double issue contains selected papers from the conference *Interpreting the Past: Presenting Archaeological Sites to the Public*, held May 30–June 4, 1993, at the University of Haifa, Israel. Articles are international in scope and treat on a variety of subjects: how the interpretation of archaeological sites can shape national identity, the evolution of archaeological site presentation, the changing nature of funding and the selection of sites to preserve with the limited resources available, and specific site treatments, particularly anastylosis. (A.O.)

Council of Europe. 1992. *Archaeological Sites in Europe: Conservation, Maintenance and Enhancement* (Conimbriga, Portugal, 18–19 October 1990).

The papers presented during this conference on archaeological sites in Europe were organized according to the following categories: techniques for on-site conservation; job training for young people in connection with site archaeology; and access and presentation to the public. (M.D.)

Cunliffe, Scott. 1996. *Documentation as a management tool: planning for conservation*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11–15 octobre 1994), 63–71. Ottawa: Publications de l'ICAHM.

English with French summary. In this paper, the overall objective is to illustrate the importance of documentation in conservation planning, and the value and necessity of a comprehensive strategy for documentation. Two brief case studies illustrate the relationship between the documentation process and the consequent conservation actions. (aa)

Díaz-Berrio, Fernández, Salvador. 1985. **Conservación de monumentos y zonas**. Córdoba, Mexico: Instituto Nacional de Antropología e Historia.

Spanish. A review of the history of western restoration theory as a series of conflicts and resolutions, from the Viollet-le-Duc and Ruskin controversy to contemporary conflicts. International and national documents, including those from Mexico, relevant to the protection of cultural property are published. (M.D.)

Dimacopoulos, Jordan. 1985. *Anastylosis and anasteloseis*. **ICOMOS Information** (Jan./March), no. 1, 16–25.

English with French, Spanish, and Italian summary. The author explores the ambiguous attributes and meanings and the incorrect etymology of the term *anastylosis*, which is widely used in architectural conservation. The interpretation of the term is traced in the Venice Charter, where it signifies the reassembly of existing elements, and as used in Greece, where the term originated, but signifies "restoration"—i.e., a whole range of interventions from consolidation through reconstruction. An analysis of Balanos' and Orlandos' theory and practice of anastylosis on the Acropolis and other monuments illustrates two prevailing schools of thought on the subject. (M.D.)

Emery, Anthony. 1987. *The presentation of monuments to the public*. In **Rescue Archaeology--What's Next** (Proceedings of a Rescue Conference held at the University of York, December 1986), 53–58. Department of Archaeology, University of York Monograph 6.

The author advocates a more creative approach to the presentation of monuments. The philosophy of “conserve as found” that for so long has characterized the British approach to ruins preservation has been changing since the creation of English Heritage in 1984. The author views the old approach as much too restrictive and would like to see even greater changes in the presentation of sites. He discusses these, which include the addition of floors and roofs to ruined buildings, and making sites more intelligible to visitors by using more imaginative displays, publishing more popular guides, and reconstructing parts of site. (M.D.)

Feilden, Bernard M. 1982. *The principles of conservation*. In **Conservation of Historic Stone Buildings and Monuments** (Report of the Committee on Conservation of Historic Stone Buildings and Monuments), 22–30. Washington, D.C.: National Academy Press.

First published in 1979, this seminal article sets forth a methodology for conservation and the principles underlying conservation of cultural property. This is followed by a discussion of seven degrees of intervention by which conservation is implemented: prevention of deterioration, preservation, consolidation, restoration, rehabilitation, reproduction, and reconstruction. (M.D.)

Fernández-Galiano, Dimas. 1994. *Proteccion de yacimientos in situ: teoria y practica*. In **Cuadernos 3. Conservación Arqueológica: Reflexión y debate sobre teoría y práctica** (Contenido del Curso–Debate realizado en Sevilla del 30 de noviembre al 4 de diciembre de 1992), 30–35. Sevilla: Consejería de cultura y medio ambiente.

Spanish. The author discusses the state of archaeological theory and practice in Spain today, and argues for the need to establish a clearer archaeological policy to meet the demands of the new age. Archaeology is no longer conducted solely in the interests of scientific research; instead the archaeologist must now consider and attempt to reconcile the multiple and sometimes conflicting social, political, educational, and even commercial aspects of excavation and preservation as well. (A.O.)

Francovich, Riccardo, and Roberto Parenti. 1988. **Archeologia e Restauro dei Monumenti** (I Ciclo di Lezioni sulla Ricerca applicata in Archeologia. Certosa di Pontignana (Siena), 28 settembre–10 ottobre 1987). Firenze: Edizioni all'Insegna del Giglio.

Italian. This collection of articles is divided into three sections. Section I contains general reflections on the relationship between archaeology and architectural restoration, from an historical and contemporary perspective. In section II the experiences over the last decade in the area of archaeological conservation are reviewed, featuring Rome, Athens, and London. Section III explores the techniques of documentation and dating of historic structures. (M.D.)

Fry, Bruce W. 1969. *Restoration and archaeology*. **Historical Archaeology** 3, 49ff.

The author argues in favor of the practice of restoration of archaeological sites, which is synonymous with reconstruction in this interpretation. British practice, with its emphasis on

stabilization of the ruin as is, is singled out as representing the antithesis of restoration. The restoration/reconstruction works undertaken at the site of Louisbourg in Canada are described and used to illustrate the alleged benefits to be derived from this practice. (M.D.)

Giavarini, Carlo, and Giuseppe Veca. 1995. *I fulmini e la conservazione del patrimonio archeologico*. **Materiali e Strutture: Problemi de Conservazione** 5, no. 3, 85–94.

Italian with English summary. This article presents a thorough discussion of the options for protecting archaeological sites from lightning. The needs of monumental structures and sheltered excavations are considered. (A.O.)

Gizzi, Stefano. 1988. *Le reintegrazioni nel restauro. Una verifica nell' Abruzzo Aquilano*. Rome: Edizioni Kappa.

Italian. Extensive review of mainly Italian theory of reintegration of new materials in monuments, from the 18th century to modern times, including illustrated case studies in categories of: archaeological sites, fortifications, and religious structures (some in ruin); parallels with wall painting restoration; conclusions (including capping on archaeological ruins). (J.St.)

Hodges, H.W.M. (ed.). 1987. **In Situ Archaeological Conservation**. Mexico City: Instituto Nacional de Antropología e Historia and the J. Paul Getty Trust.

This monograph represents the published proceedings of a conference held in Mexico in 1986. The papers cover a broad range of conservation issues, but the emphasis is on *in situ* materials conservation (bone, wood, metals, stucco, textiles, etc.). The papers most relevant to site conservation are the case studies of three Mexican sites, and a review paper on mudbrick conservation. (M.D.)

ICOMOS. 1971. **Il Monumento per l'Uomo** (Atti del II Congresso Internazionale del Restauro, Venezia, 25–31 maggio 1964). Padova: Marsilio Editori.

French, Italian and English. These acts of the 1964 congress, which produced the Venice Charter, provide an interesting historical perspective on “restoration” theory and practice. One of the sessions (*seconda A*) directly addresses archaeological issues. Restoration of archaeological sites is conceived of exclusively in terms of architectural restoration. Some of the issues explored are the perennially troubling relationship between archaeologist and architect, consolidation of Roman walls in the Piedmont region, the methods and principles of anastylosis as practiced at sites in Libya, and the need to develop more precise methods of excavation as a corollary to better restoration. (M.D.)

Instituto Andaluz del Patrimonio Histórico. 1994. **Cuadernos 3. Conservación Arqueológica: Reflexión y debate sobre teoría y práctica** (Contenido del Curso–Debate realizado en Sevilla del 30 de noviembre al 4 de diciembre de 1992). Sevilla: Consejería de cultura y medio ambiente.

Spanish. The articles in these proceedings are divided into two sections: The first considers the different issues and aspects of conservation and site management in urban and rural settings in Spain and Central America; the second pertains to methods of conservation, including the repair of ancient mortars/renders and vegetation management. (A.O.)

Jaeschke, Richard L. 1996. *When does history end?* In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 86–88. London: International Institute for Conservation of Historic and Artistic Works (IIC).

Although archaeological objects are the focus of this discussion, the issues raised are equally valid for archaeological sites and *in situ* remains. As the author notes, an object never ceases to accumulate history although its function and appearance may change. Conservators are often responsible for choosing the aspects of the past that will be revealed or emphasized. They must preserve the integrity of the object while balancing different needs and viewpoints, consider the consequences of their actions and inactions, and keep accurate records of their interventions as a part of the history of the object. (A.O.)

Jokilehto, Jukka. 1985. *Authenticity in restoration principles and practice*. **APT Bulletin** 17, no. 3 and 4, 5ff.

A brief review of restoration theory and practice through the ages focuses specifically on the concept of authenticity. Historic and contemporary examples illustrate the concept in practice. (M.D.)

----- . 1998. *The context of the Venice Charter (1964)*. **Conservation and Management of Archaeological Sites** 2, no. 4, 229–233.

The author places the Venice Charter in historical context and discusses the people and ideas central to its creation at the landmark Venice congress. The text of the charter is appended. (A.O.)

Kimbro, Edna E. 1993. *Conservation principles applied to seismic retrofitting of culturally significant adobe buildings*. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 526–532. Lisboa: DGEMN.

English with French summary. The author considers the philosophical issues involved in the seismic retrofit of historic structures with regard to the principles and guidelines of conservation embodied in the Venice Charter and the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (United States). The discussion is equally valid for the retrofit of archaeological remains. (A.O.)

Krier, Leon. 1983. *The love of ruins, or the ruins of love*. **Modulus** (The University of Virginia Architectural Review) 16, 50ff.

This article represents an intellectual justification of reconstruction from an architect's perspective. The author, a well-known postmodernist architect, admonishes archaeologists for their timidity and lack of creative response with respect to the monuments they study and advocates the reconstruction of classical monuments as the first step in his theory of Global Reconstruction—an architectural and urban policy answer to the industrial ugliness of the modern and Modernist environment. Reconstruction of the ancient monuments would serve as the model and catalyst for this global reconstruction. (M.D.)

La Rocca, Eugenio and Roberto Nardi. 1994. *Preventive conservation and restoration: a matter of costs*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 24–27. London: International Institute for Conservation of Historic and Artistic Works (IIC).

In the treatment of seriously decayed monuments, the objective of the conservator is to return the monument to the point where ordinary maintenance is once again possible. One of the main difficulties is persuading administrations to approve programmes for the maintenance of newly restored monuments. One of the strong points is how much can be saved by developing a maintenance programme, which avoids the need to repeat expensive restoration every 10 years. The authors present a sample maintenance programme. (aa abridged)

Lolli-Ghetti, Mario. 1982. *Tharros: conservation of the Punic ditch. Diversification of technologies*. In **Mortars, Cements and Grouts Used in the Conservation of Historic Buildings** (1981 Symposium, Rome). Rome: ICCROM.

The methodology for conserving the Punic fortification wall, and the principles guiding that methodology, are clearly set forth. Minimum intervention, the use of "soft technologies" (those that will least alter the nature of the original materials), and continual maintenance are advocated. The rationales for rejecting certain options are also discussed. (M.D.)

Lounsbury, Carl R. 1990. *Beaux-Arts ideals and Colonial reality: the reconstruction of Williamsburg's Capitol, 1928–1934*. **Journal of the Society of Architectural Historians** 49 (December), 373–389.

This article discusses one of the most controversial archaeological reconstruction projects, Colonial Williamsburg in Virginia. Despite extensive historical and archaeological documentation, many of the reconstructed buildings at Williamsburg are inaccurate. Ambiguous or incomplete evidence and a failure to correctly interpret or use archaeological evidence were partly responsible for inaccuracies, but more interesting are the subtle, culturally derived factors that can consciously sway the objectivity of the architect and result in misinterpretation of the evidence. Using the Capitol building in Williamsburg as his main example, the author demonstrates how the Beaux-Arts academic training of the architects who were responsible for the reconstruction influenced the final product, resulting in a reconstruction that is as much a testimony to Beaux-Arts design principles as it is to Colonial American architecture. (M.D.)

Magar, Valerie. 1996. *Ruinas y reconstrucción. Algunos aspectos históricos y teóricos*. **Imprimatura: Revista y Restauración** no. 13, 43–46.

Spanish. The author outlines the history and theory of the reconstruction of ruins, and then considers the role of ruins in human consciousness and the role of reconstruction particularly after violence or war, as in cities like Warsaw, Dresden and Danzig. (A.O.)

Marino, Luigi (ed.). 1989. **Conservazione e Manutenzione di Manufatti Edilizi Ridotti allo Stato di Rudere** (Report 1. Università di Bologna, Napoli, Firenze e Urbino. Gruppo di ricerca sul Restauro Archeologico). Firenze: Opus Libri.

Italian with one article in French. As the title of this report indicates, buildings in a state of ruin are the focus of the 80 short papers that comprise the volume. The papers do not propose a uniform methodology or approach, but reflect the eclectic nature of the field at present. Some of the papers describe individual experiences with ruins restoration, others are the result of research undertaken as part of the collaborative project on *Restauro Archeologico* by interested groups from Italian universities. An introductory paper by the editor is a brief review of the theory and practice of archaeological restoration by way of a literature review; most of the papers are brief case studies on aspects of archeological restoration; others deal with such issues as documentation, conservation and excavation, and urban archaeology. (M.D.)

Marino, Luigi. 1993. *La conservazione di manufatti edili ridotti allo stato di rudere: protezione delle creste e integrazione delle lacune*. In Luisa Masetti Bitelli (ed.), **La Conservazione e il Restauro Oggi 3: Archeologia: Recupero e Conservazione**, 129-149. Firenze: Nardini.

Italian. Discusses the most up-to-date restoration methods for ruins, whether already exhibited or just excavated, stressing that these methods are essentially geared toward prevention of further damage. Suggests that the criteria of emergency interventions are being refined; definitive consolidation solutions are given up in favor of ordinary maintenance along with the enactment of conservation measures that are, as much as possible, noninvasive and reversible. Procedures adopted also forego extensive reconstructions in favor of didactic and descriptive installations for visitors. More attention is paid to building techniques for present as well as future documentary value, until research methods and analytical tools are further refined. The illustrations and captions give concrete examples of results of preservation methods applied to standing remains of ancient walls [mainly capping and integration of lacunae to stabilize the walls]. (AATA)

Marino, Luigi (ed.). 1994. *Siti e monumenti della Giordania. Rapporto sullo stato di conservazione*. Florence: Alinea Editrice.

Italian, Spanish, and English, with English and Italian summaries. This collection of papers discusses the history of conservation at individual sites and monuments in Jordan, present activities, and plans for the future. A number of case studies are presented. (A.O.)

Marino, L., and R. Paone. 1986. *Contributi alla definizione del 'restauro archeologico': studi e ricerche preliminari*. In **Manutenzione e conservazione del costruito fra tradizione ed innovazione** (Atti del convegno di studi, Bressanone, 24-27 Giugno 1986), 11-21.

Italian. Archaeological restoration, with reference to archaeological and architectural monuments in a ruined state, seems uninteresting to archaeologists, architects, and restorers. Suggested solutions rarely differ from traditional finishing or rebuilding interventions. The archaeological restoration of structures is, in most cases and with due exceptions, still considered an extraordinary intervention. (aa)

Marquis-Kyle, Peter, and Meredith Walker. 1992. *The Illustrated Burra Charter: Making Good Decisions about the Care of Important Places*. Sydney: Australia ICOMOS.

A step-by-step explication of the Burra Charter. Commentary on each article is provided, and concepts are clearly explained with the aid of photographs and informative captions. The full text of the charter, as well as the guidelines for establishing cultural significance, developing conservation policy, and undertaking studies and reports, are appended. (A.O.)

Marshall, John. 1923. *Conservation Manual: A handbook for the use of Archaeological Officers and others entrusted with the care of ancient monuments*. Calcutta: Superintendent Government Printing.

This manual was developed in 1922 by Sir John Marshall, Director General of Archaeology in India, to provide practical guidance on the preservation of ancient monuments, and it is still in use today. Part I of the manual reviews governmental regulations and legislation relevant to the preservation of monuments. In Part II, detailed 'instructions and specifications' are provided for the conservation of ancient monuments (archaeological and historic). Some of the topics covered are the uses of cement and concrete, mortars, grouting and pointing, integration of new materials, laying out of historic gardens, vegetation control, and wall capping. Part II of the manual has recently been republished with revisions in B. Feilden, **Guidelines for Conservation. A Technical Manual**. New Delhi: The Indian National Trust for Art and Cultural Heritage. (M.D.)

Matero, Frank G. 1995. *A programme for the conservation of architectural plasters in earthen ruins in the American Southwest*. **Conservation and Management of Archaeological Sites** 1, no. 1, 5-24.

Addresses pertinent issues of *in situ* plaster preservation for standing ruins and outlines a general plaster preservation strategy, which can be implemented at such sites, including documentation, stabilization, interpretation, and maintenance. The issues and preservation strategy are illustrated in a case study, which describes methods of documentation, emergency stabilization, hydraulic lime injection grouting, and mortar repairs for lime plaster on adobe ruins at Fort Union, New Mexico. (A.O.)

Matero, Frank, Kecia L. Fong, Elisa Del Bono, Mark Goodman, Evan Kopelson, Lorraine McVey, Jessica Sloop, and Catherine Turton. 1998. *Archaeological site conservation and management. An appraisal of recent trends*. **Conservation and Management of Archaeological Sites** 2, no. 3, 129-142.

This paper comprises a review and assessment of the literature on archaeological site conservation and management over the past 25 years; a selected bibliography is included. The literature was searched to ascertain the training programs available, the disciplines represented, the publishers of conferences and information, the geographic location of published projects, and the nature of those projects. In summary, "The assessment reveals a lack of commonly agreed upon standards, principles, and practices and the need for cooperation between the related disciplines and local communities." But it also traces the development of the field from isolated material and object studies to interdisciplinary conferences and greater focus on archaeological sites as a whole. (A.O.)

Mertens, Dieter. 1995. *Planning and executing anastylosis of stone buildings*. In N. Stanley Price (ed.), **Conservation on Archaeological Excavations with Particular Reference to the Mediterranean Area** (second edition), 113–134. Rome: ICCROM.

A simple explication of the process of anastylosis for masonry buildings, from initial excavation through maintenance of the re-erected structure. Numerous illustrated examples of anastylosis and reconstruction in the Mediterranean region are provided. (A.O.)

Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments (Preprints: International Colloquium, Rome, 19–21 June 1995). Rome: ICCROM.

English and French. The proceedings are divided into sections on mortars, biocidal treatments, consolidation, treatment with water repellents, and weathering. Of particular interest are the five mortar articles, which describe the research and development of repair mortars for use at specific sites. (A.O.)

Metzger, Todd R. 1989. *Current issues in ruins stabilization in the southwestern United States*. **Southwestern Lore** (Official Publication, The Colorado Archaeological Society), 55, no. 3 (Sept.), 1–11.

Stabilization practices in the southwest United States have been aimed at preserving architectural remains, but the methodology and techniques have too often been those of modern construction, resulting in loss of original fabric. The author emphasizes the absence of essential guidelines and even interest in ruins stabilization and focuses on outlining the problems resulting from the use of incongruous materials and techniques, from insufficient documentation, and from a lack of guidance, training, and professional organizations. (M.D.)

Ministère de la Culture, Ministero per i beni culturali e ambientali, C.N.M.H.S., Soprintendenza archeologica di Roma. 1985. **Archéologie et Projet Urbain**. Rome: De Luca.

Italian. Catalogue of an exhibition contrasting the historical perspectives of conservation of urban archaeological sites with their modern counterparts, in Rome and throughout France. (J.St.)

Molina–Montes, Augusto. 1982. *Archaeological buildings: Restoration or misrepresentation*. In Elizabeth H. Boone (ed.), **Fabrications and Misreconstructions of Pre-Columbian Art**. Washington, D.C.: Dumbarton Oaks.

The author critically reviews past reconstruction practices in Mexico. These have involved large-scale reconstruction of sites, reflecting a tendency to promote aesthetic over historic values and running contrary to the spirit of the Venice Charter. Although the geographical focus is restricted, the philosophy is universally applicable. (M.D.)

Mora, Paolo, Laura Mora, and Paul Philippot. 1984. **Conservation of Wall Paintings**. London: Butterworths.

This comprehensive review of the history and treatment of wall paintings includes chapters of special interest to the principles and methodology of the conservation of cultural property generally. Application of these principles and methodology to a particular type of cultural property (wall paintings) elucidates and illustrates the theory. Of particular relevance are the chapters on

documentation (see Bibliography VII) and on presentation of wall paintings, which explore the conflict between authenticity and modern aesthetics within the context of re-integration of lost areas. The English edition of the original French text has been revised. (M.D.)

Nordby, Larry V., and Michael R. Taylor. 1988. *The handwriting on the wall: prospective preservation research strategies for the U. S. Forest Service*. In **Tools to Manage the Past: Research Priorities for Cultural Resources Management in the Southwest** (Symposium Proceedings, May 2–6, 1988, Grand Canyon, Arizona), 68–80. USDA Forest Service General Technical Report RM–164. Forest Service, U. S. Department of Agriculture.

This article describes in detail three preservation research projects that will provide data for establishing comprehensive stabilization and maintenance programs for archaeological sites in the Southwest region of the U. S. The ultimate aim of the program is to preserve the values of these sites. The research projects address three basic issues: fabric and materials, alternative preservation strategies, and building techniques. How the various parts of the projects relate to one another and the complex phrasing of each project are described. (M.D.)

Office International des Musées. 1933. **La Conservation des Monuments d'Art and d'Histoire**. Institut de Coopération Intellectuelle.

French with analytic tables of content in English, German, Spanish, and Italian. This 1933 publication is a very useful historical reference for documenting European conservation theory and practice in the early part of the century. Individual essays examine restoration principles, national practices and policies (Italy, Spain, Great Britain), presentation of monuments—with an emphasis on landscaping principles—and site-specific studies of restoration (see Bibliography VI). Of particular interest from an historical point of view are the many discussions of the use of reinforced concrete for restoration. Both historic and archaeological monuments are considered, but the latter are well represented. (M.D.)

Olsen, Olaf. 1980. *Rabies archaeologorum*. **Antiquity** 54, 15–20.

Preservation begins with excavation. In this article the author critically reviews the practice of total excavation as proposed in Philip Barker's book, **Techniques of Archaeological Excavation** and as undertaken on most sites throughout Europe. Excavations should be left with witness areas and baulks for future investigation. The manner in which archaeologists leave their sites after excavation is also irresponsible and the author goes so far as to question whether the excavation of many sites is truly justified. (M.D.)

Philippot, Paul. 1976. "Historic preservation: philosophy, criteria, guidelines." In **Preservation and Conservation: Principles and Practices** (Proceedings of the North American International Regional Conference, Williamsburg, Virginia, 1972), 367–382. Washington, D.C.: The Preservation Press.

The romantic nostalgia for the past has led to a confusion between preservation and reconstruction of that past. The author explores the source of this confusion and proposes a methodology to assess an object, its context, and its history in anticipation of its conservation. The fallacy of trying to return an object to an original state, which would include the act of reconstruction, is

emphasized. The discussion of the theory of reintegration is especially relevant to archaeological structures. (M.D.)

Preserving and Restoring Monuments and Historic Buildings (Museums and Monuments series, no. 15). UNESCO. 1972.

The focus of this multi-authored volume is the architectural heritage, but many of the precepts and practices apply to archaeological structures. Chapters by Piero Sanpaolesi on "General principles" and "Conservation and restoration: operational techniques" discuss the principles of restoration, reconstruction, and anastylosis; many of the examples are of Greco-Roman archaeological sites. (M.D.)

Preventive Measures During Excavation and Site Protection. 1986. (Ghent Conference, 6–8 November, 1985). Rome: ICCROM.

English and French. This volume represents the published papers of the conference held in Ghent, Belgium, in 1985. The 26 papers focus exclusively on the problems of conserving archaeological sites and are divided under five headings: Problems and Approaches; Techniques; Protection of Underwater Sites; Protection of Sites on Display; and Roofs and Shelters. (M.D.)

Quattrocchi, Giovanna. 1988. *Progetto Pompei*. **Archeo** 24, 24–37.

An interview with Baldassare Conticello, archaeological superintendent of Pompeii, describing the current politique of conservation, including wall cappings, shelters (*filologico*, *propositivo*, and *ombrello*), pavements, security systems, publication and site museums. (J.St.)

Ramage, Nancy H. 1992. *Goods, graves, and scholars: 18th-century archaeologists in Britain and Italy*. **American Journal of Archaeology** 96, no. 4, 653–661.

The letters of eighteenth-century British travelers and dilettanti contain commentary and opinions on excavation and conservation practices, or lack thereof, particularly at Pompeii and Herculaneum. The writers describe the removal of paintings and mosaics or their deliberate destruction to prevent others from obtaining them. Useful for illustrating how far we have come. (A.O.)

Ramesohl, H. 1995. *Graffitienschutzsysteme*. **Internationale Zeitschrift für Bauinstandsetzen** 1, no. 5, 427–435.

German with English summary. Every year, graffiti causes billions of Marks' worth of damage. It is hardly possible to prevent spraying with a reasonable effort. Therefore, privileged targets should be protected by preventive measures. Colors with low viscosity penetrate into the porous structure of building materials. It is very difficult to remove them from the pores without serious damage to the material. Different methods to minimize damage are outlined. The aim must be to prevent close contact between colors and the substrate. Then it is possible to remove soiling from façades without damaging the substrate in respecting environmental considerations. (aa edited)

Reich, Ronny. 1987. *The archaeologist's dilemma*. In **Old Cultures in New Worlds**. 8th General Assembly and International Symposium. ICOMOS, International Committee on Monuments and Sites, 1987. vol. II, 1009–1014. Washington, D.C.: U.S. ICOMOS.

The author examines the problems multi-level sites (stratified mounds) present for their preservation. While the concept of total excavation of such mounds is no longer acceptable, it is nevertheless difficult to reconcile the legitimate needs of archaeological investigation and preservation (for research and touristic purposes). Some practical measures that can alleviate the problem are discussed. (M.D.)

Roby, Thomas C. 1995. Site conservation during excavation: treatment of masonry, wall plaster and floor mosaic remains of a Byzantine church in Petra, Jordan. **Conservation and Management of Archaeological Sites** 1, no. 1, 43–57.

The author presents a case study of the wide range of site conservation activities practiced during and immediately after excavation, and emphasizes the importance of employing a conservator when planning and implementing an excavation to increase cost effectiveness and ensure greater preservation of fragile remains. Conservation procedures during excavation are described, including the preventive measures of site security, temporary shelter, and temporary reburial. *In situ* stabilization, consolidation, and cleaning of masonry, plaster, and mosaics are also described, as are the stabilization, removal, and storage of architectural fragments. (A.O.)

Roy, Ashok, and Perry Smith (eds.). 1996. **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996). London: International Institute for Conservation of Historic and Artistic Works (IIC).

The majority of the papers in this volume pertain to specific materials and broader ethical issues in objects conservation, but six pertinent site conservation studies are also included. (A.O.)

The Safeguard of the Rock-Hewn Churches of the Göreme Valley (Proceedings of an International Seminar, Ürgüp, Cappadocia, Turkey, 5–10 September 1993). 1995. Rome: ICCROM.

These proceedings focus mainly on the Göreme Valley churches, and provide an in-depth look at the varied problems and solutions applied to a single, albeit large, site. Issues of site management, tourism, stone (tuff) deterioration, stone consolidation, structural consolidation, and mural conservation are addressed. (A.O.)

Schmidt, Hartwig. 1999. *The impossibility of resurrecting the past: reconstructions on archaeological excavations*. **Conservation and Management of Archaeological Sites** 3, nos. 1 and 2, 61–68.

Today's mass tourism demands attractions at the original ancient sites. Different methods have been employed in creating tourist attractions—from reconstructing ancient buildings to having museum staff in costume demonstrate elements of daily life in history. But it is the ruins on excavation sites, even in their damaged state, that are the irreplaceable, authentic records of the past. Archaeological preservation, therefore, has to mean uncompromising conservation of the damaged original remains. (aa abridged)

Schmidt, Hartwig. 2000. *Archäologische Denkmäler in Deutschland, rekonstruiert und wieder aufgebaut*. Stuttgart: K. Theiss.

German. Provides an overview of archaeological reconstructions in Germany. The author considers the aims and intentions or a variety of case studies examining the degree to which they have succeeded or failed in providing visitors with a good understanding of the past. Contested reconstructions are also discussed as well as the issues surrounding them. Contains a valuable bibliography. (M.H.B.)

Seth, Vinod. 1988. *Restoring the excavated sites. A note on the post-excavation histogeographical ethics. Conservation of Cultural Property in India*, no. 221, 50–55. New Delhi: Indian Association for the Study of Conservation of Cultural Property.

The author proposes an unusual method of preserving excavated archaeological sites, which essentially involves putting back what was taken out of the site. In addition to replacing “each grain of the site,” a “time capsule” with information and illustrations should accompany the reinterment process for each strata. (M.D.)

7^a Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra (Silves, Portugal, 24 a 29 de Outubro 1993). Lisboa: DGEMN.

Spanish, English, French, and Portuguese, with summaries irregularly in English, French, and Portuguese. This international conference produced a large volume of proceedings, which examines all aspects of the study and conservation of earthen architecture. Papers have been divided into six sections: history and tradition, methodology and conservation techniques, field research in conservation, seismic problems, industrial perspectives, and future directions. (A.O.)

Skoulikidis, T., E. Papakonstantinou, E. Kritikou and G. Tsangalidis. 1993. Production of artificial patinas on the surface of new marbles used for the restoration of ancient monuments and on the surface of white cement copies of statues. In M.-J. Thiel (ed.), *Conservation of Stone and Other Materials*, vol. 2, 644–651. London: E. and F.N. Spon.

During the restoration of ancient monuments, new pieces of marble are often introduced. In some cases, an artificial patina must be created on the surface of the new marble. There exist some empirical methods using an iodine solution, rust, clay, soil, etc., which are usually soon washed off by acid rain and/or sulfate/humidity attack. The authors have produced two new methods: a spray of iron sulfate, and Paraloid B72 pigmented with iron oxides. (aa edited and abridged)

Stanley Price, Nicholas (ed.). 1995. *Conservation on Archaeological Excavations with Particular Reference to the Mediterranean Area* (second edition). Rome: ICCROM.

This volume is the result of the 1983 Cyprus conference organized by ICCROM. The conference papers are equally divided between object and site conservation, and there is an important review article on the 1956 UNESCO Recommendation and its inadequacies in the context of present conservation needs. (M.D.)

Stanley Price, Nicholas. 1996. *New ethical statements on site preservation for North American archaeologists*. **Conservation and Management of Archaeological Sites** 1, no. 3, 191–193.

This brief article summarizes new ethical principles for archaeological research, which have recently been announced by the Society for American Archaeology, the Archaeological Institute of America, and the American Schools of Oriental Research. In these principles, each organization clearly stresses the importance of the conservation, long term preservation, and protection of the archaeological record. Contact addresses for the organizations are provided. (A.O.)

Starosta, Ute. 1999. *Structural concepts of anastylosis*. **Conservation and Management of Archaeological Sites** 3, nos. 1 and 2, 83–90.

In this historical review of the structural implications of anastylosis, the author analyzed and compared 28 projects, both historic and modern, involving anastylosis of classical Greek and Roman structures. The structural properties of the original and new structures are considered, and the supporting systems used are also considered in light of the theories and technical limitations of the time. (A.O.)

Stevens, André. 1984. *La protection des monuments en briques crues*. **Lettre d'Information Archéologie Orientale**, no. 7, 19--27.

Drawing on examples mostly from the Middle East, the author discusses the options that are available for protecting mudbrick monuments. These options range from simple wall cappings to major interventions such as total reconstruction or the construction of a protective shelter. (M.D.)

Thiel, M.-J. (ed.). 1993. **Conservation of Stone and Other Materials**. 2 vol. London: E. and F.N. Spon.

These extensive conference proceedings, primarily on the conservation of stone, are divided into two volumes. Volume One: Causes of Disorders and Diagnosis is further divided into sections on pollution and chemical effects, physical effects, biological effects, and petrography. Volume Two: Prevention and Treatments contains articles ranging from general discussions of conservation principles and practices to more specific research on cleaning, biocides, repair mortars, consolidation materials and techniques, and monitoring. (A.O.)

Thompson, M.W. 1981. **Ruins: Their Preservation and Display**. London: British Museum Publications.

The author reviews the history of monument preservation philosophy in Britain and describes current theory and practice of monument restoration, using as examples mainly the medieval ruins of the country. (M.D.)

de la Torre, Marta (ed.). 1997. **The Conservation of Archaeological Sites in the Mediterranean Region** (Proceedings of an International Conference Organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995). Los Angeles: The Getty Conservation Institute.

This conference summary is divided into two parts: In the first, the management and presentation of archaeological sites is considered, and the articles therein present a planning model for site

management, an application of the model to the site at Akrotiri, Thera, and thoughts on building reconstruction and other aspects of site presentation. In the second part, the history of conservation and management at three Mediterranean sites—Piazza Armerina, Knossos, and Ephesus—is considered in depth. (A.O.)

Traeger, Jörg. 1994. *Ruine und rekonstruktion oder theorie und praxis*. **Kunst Chronik** 47, no. 6, 288–296.

German. The author defends the widely debated reconstruction of the Dresdener Frauenkirche. He draws from a vast number of examples of reconstructed buildings, as well as buildings preserved as ruins, to arrive at a differentiated argument supporting his standpoint. He maintains that not every building is as meaningful as a ruin as it will be in reconstructed form. (AATA)

UNESCO. 1979. **The Conservation of Cultural Property, with Special Reference to Tropical Conditions** (Museums and Monuments 11) 1979 printing, 1968.

The section entitled Monuments includes a review of conservation principles, practices, and materials. This is followed by very brief conservation site reports of major monuments in Asia, the Middle East, and Latin America and a detailed report on the conservation of monuments in India. (M.D.)

U.S. Congress, Office of Technology Assessment. 1986. **Technologies for Prehistoric and Historic Preservation** (OTA–E–319). Washington, D.C.: U.S. Government Printing Office.

This report is the result of an assessment by the Office of Technology Assessment of the use of technologies by Federal agencies to carry out their preservation responsibilities. The report reviews both federal preservation policy and the preservation process (i.e., methods and techniques) as these affect both historic and prehistoric preservation. (M.D.)

Vaccaro, Alessandra Melucco. 1989. **Archeologia e Restauro. Tradizione e Attualità**. Milano: Arnoldo Mondadori.

The history and contemporary theory and practice of restoration are discussed with reference to the archaeological heritage. The emphasis is on classical monuments and the art historical approach, which characterizes European restoration philosophy. The evolution of archaeological restoration in response to the needs of the field is reflected in the chapter on conservation and field archaeology. (M.D.)

Verité, Jacques. 1981. *'Appropriate technologies' and restoration of historic monuments*. In **'Appropriate Technologies' in the Conservation of Cultural Property**, 51–68. Paris: UNESCO.

A summary and critique of two anastylosis projects in developing countries (Mustis Arch, Krib, Tunisia and Temple of Karnak, Luxor, Egypt), which combined ancient and modern methods with local practice and improvisation. (J.St.)

Verma, D.N. 1995. *Conservation and public awareness*. In G. Kamalakar and V. Pandit Rao (eds.), **Conservation, Preservation and Restoration: Traditions, Trends and Techniques**, 307–314. Hyderabad: Birla Archaeological and Cultural Research Institute.

This paper considers the practice of conservation in India and the mental attitude of the varied Indian cultures and religions, some of whose tenets may seem to run counter to the goals of cultural resource conservation. A brief history of conservation in India provides some positive examples of conservation work, but the author concludes that greater public awareness of the need for and value of conservation should be a top priority in the emerging nation. (A.O.)

Vestiges Archéologiques, la Conservation *In Situ* (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11–15 octobre 1994). 1996. Ottawa: Publications de l'ICAHM.

French and English with French and English summaries. The 41 papers presented at this large and very relevant conference are divided into three broad categories: “Components of the Preservation Process,” “Strategies for the Selection of Places and Elements to Conserve within Sites,” and “The Role of Contributors and Clients.” (A.O.)

Viggiani, Carlo (ed.). 1997. **Geotechnical Engineering for the Preservation of Monuments and Historic Sites** (Proceedings of the International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, Naples, Italy, 3–4 October 1996). Rotterdam/Brookfield: A.A. Balkema.

These extensive and wide-ranging conference proceedings are divided into sections on geotechnical engineering; investigations of rock, soil, monuments, and their stability; monitoring; intervention techniques; and case histories at monuments and archaeological sites. See also Rossi 1997 and Burland and Standing 1997. (A.O.)

Wei, Chen and Andreas Aass. 1989. *Heritage conservation East and West*. **ICOMOS Information** (July/Sept.), no. 3, 3–8.

English with French, Spanish, and Italian summary. The authors explore the differences between East and West in approaches to the conservation of cultural property through the representative examples of the Parthenon in Athens and the Confucius Temple Complex in Qufu. The eastern respect for the spirit of a place is contrasted with the western emphasis on the material aspect of architecture. (M.D.)

Wilson, Merril Ann. 1989. *Philosophical Issues of Ruins Stabilization*. In **International Perspectives on Cultural Parks** (Proceedings of the First World Conference, Mesa Verde National Park, Colorado, 194), 91–94. U.S. National Park Service in association with the Colorado Historical Society.

This brief study of the ghost town of Independence, Colorado, raises important philosophical issues about the preservation of ruins. The author questions the presumption behind stabilization and conservation efforts that cultural resources should be preserved forever. Some resources may require such massive intervention that destruction, rather than preservation, of the integrity of the resource is the result, even if not the intention. Such sites are perhaps better left to the forces of nature, with only maintenance and minimal intervention. (M.D.)

[Bib. VI: 46 ref.]

ANNOTATED BIBLIOGRAPHY VI: Implementation: Site-specific Studies

Adam, Jean-Pierre. 1983. **Dégradation et Restauration de l'Architecture Pompéienne**. Paris: Centre National de la Recherche Scientifique.

French. This site-specific study of the causes of degradation and methods of conservation undertaken at the site of Pompeii is applicable to many other sites, especially those employing Roman wall construction. The various types of Roman wall construction, the causes of their deterioration and methods of stabilization and consolidation (injection of a lime-based grout) are all discussed. (M.D.)

Aeschlimann, Hans-Ulrich. 1995. *Instandsetzung des Borobodur-Tempels in Indonesien*. **Internationale Zeitschrift für Bauinstandsetzen** 1, no. 2, 125-134.

German with English summary. The struggle to save Borobodur has been one of the most complex and technically advanced historic preservation projects ever undertaken. Indonesia and UNESCO consulted international experts in architecture, engineering, soil mechanics, and stone conservation. Following their recommendations, the project set four goals: to install a new drainage system, to incorporate layers of epoxy/tar to keep rainwater from the temple's core, to set new reinforced concrete slabs under the balustrades and walls, and to conserve the original stones. (aa abridged)

Agnew, Neville, Heather Griffin, Mary Wade, Terence Tebble, and Warren Oxnam. 1989. *Strategies and techniques for the preservation of fossil tracksites: an Australian example*. In David D. Gillette and Martin G. Lockley (eds.), **Dinosaur Tracks and Traces**. Cambridge: Cambridge University Press.

Conservation measures undertaken at the Lark Quarry dinosaur trackway in Australia are described. The conservation program divided itself into three phases: diagnosis of the causes of deterioration, testing and laboratory work, and implementation of preservation measures. These measures included monitoring the conditions of the surface, construction of a protective roof, fence and walkway, infilling cracks with silicone and consolidation with PVA, and interpretive signs for visitors. Procedural guidelines and recommendations are presented for the prevention of damage at sites and for their long-term preservation. (aa abridged)

Amadori, Letizia, Anna Maria Mecchi, Michela Monte, Stefano Musco, and Antonio Salvatori. 1989. *La conoscenza dei materiali e delle strutture per un progetto di restauro nel Parco Archeologico di Gabii*. In **Il Cantiere della Conoscenza: Il Cantiere del Restauro** (Atti del convegno di studi, Bressanone 27-31 giugno 1989), 295-308.

Italian with English summary. Studies and analyses conducted by the Soprintendenza Archeologica of Rome with the CNR and the ENEA about the Archaeological Park of Gabii (Rome) which was to be restored. The Santuario di Giunone Gabina and the circular mausoleum are made of pietra gabina (volcanic tuff) and travertine (continental limestone) and the deterioration involves erosion of the stone surfaces and lichen incrustations. (AATA 27-239)

Amendolea, Bruna (ed.). 1994. **I Siti Archeologici: Un Problema di Musealizzazione all'Aperto** (Secondo Seminario di Studi Roma, Gennaio 1994). Rome: Gruppo Editoriale Internazionale.

Italian. This extensive compilation of articles is similar in scope and content to the first conference (Amendolea et al., 1988). Again, the focus is on the *in situ* preservation of the archaeological heritage in Italy, although other sites in the Mediterranean region are presented. (A.O.)

Amendolea, Bruna, and Rosanna Cazzella, and Laura Indrio (eds). 1988. **I siti archeologici: un problema di musealizzazione all'aperto** (primo seminario di studi Roma, Febbraio 1988). Rome: Multigrafica Editrice.

Italian. This compilation of articles on approaches to preserving archaeological sites and creating archaeological parks focuses mainly on Italy, but England and the site of Carthage are also included. Technical, theoretical, and interpretive issues are addressed in these case studies, which provide the reader with a full range of responses to *in situ* preservation of ruins. (M.D.)

Barov, Zdravko, and Constance Faber. 1996. *Affordable versus optimal conservation: considerations in preserving an ancient tomb*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 11–15. London: International Institute for Conservation of Historic and Artistic Works (IIC).

To consolidate the carved and painted ceiling of a fourth century B.C.E. Roman tomb, the authors deem it necessary to lift and invert the 14-ton block of granite from which it was made. Their efforts have been hampered by lack of funding, and they consider the question: Would no intervention be better than one without preliminary laboratory testing of the materials and procedures, particularly when such an unusual procedure is involved? (A.O.)

Barruol, Guy. 1984. *Archaeological reserves and the integration of remains in France*. **A Future for our Past** (Council of Europe), no. 23, 8–10.

English and French. The author briefly reviews two preservation trends for archaeological resources in France. The first is the establishment of reserves for protection of resources, many of which are being developed as archaeological parks open to the public. The second is the integration of archaeological remains in the urban environment. The author cites many examples of both reserves and urban integration. (M.D.)

Caperton, Thomas J. 1990. *Fort Selden ruins conservation*. In **6th International Conference on the Conservation of Earthen Architecture. Adobe 90 preprints** (Las Cruces, New Mexico, U.S.A., October 14–19, 1990), 209–211. Los Angeles: Getty Conservation Institute.

The mud and brick wall remnants at Fort Selden State Monument, New Mexico, U.S.A., were stabilized in 1972, 1974, and 1985. The techniques employed included the placement of caps on wall tops, repair of basal erosion, establishment of drainage slopes to prevent the accumulation of water next to walls, preservation landscaping, and construction of visitor trails. These efforts have retarded, but not stopped, the deterioration of the site. (aa abridged)

----- . 1993. *Long-term preservation issues related to earthen archeological sites*. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 324-329. Lisboa: DGEMN.

This article provides a critical evaluation of past preservation techniques used to stabilize the adobe walls at Fort Selden, New Mexico. These have included alterations to site drainage, repair of wall bases and installation of wall caps using adobe bricks and shelter coats, and test applications of chemical consolidants and amendments for earth; see also Caperton 1990. Recent trial techniques are described, including the reburial of several low walls and the protection of taller walls with geotextile shelters. (A.O.)

Conservación del patrimonio monumental 1. 1984. **Cuadernos de Arquitectura Mesoamericana**, no. 3 (diciembre).

Spanish with English summary and one article in English. This entire issue is devoted to preservation of pre-Columbian ruins in Mexico and provides a comprehensive overview of the severe problems affecting the many monumental, aboveground ruins, the previous emphasis on reconstruction and current thinking, and specific examples of large restoration projects undertaken at Teotihuacán, Yaxchilán, and Hochob. (M.D.)

Cristina Patrício, Teresa, and Koen Van Balen. 1996. *The anastylosis and the applicability to the late Hellenistic Nymphaeum at Sagalassos, Turkey*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11-15 octobre 1994), 77-82. Ottawa: Publications de l'ICAHM.

English with French summary. With restoration by means of anastylosis as their ultimate goal, the authors describe the scientific methodology they developed and applied to the research of the Nymphaeum. Based upon the results of photographic, topographic, and graphic surveys, as well as of detailed analyses of the stone blocks scattered about the site, they developed detailed and accurate drawings, which can be used to reconstruct the ruin. (A.O.)

Demas, Martha, Neville Agnew, Simon Waane, Jerry Podany, Angelyn Bass and Donatius Kamamba. 1996. *Preservation of the Laetoli hominid trackway in Tanzania*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26-30 August 1996), 38-42. London: International Institute for Conservation of Historic and Artistic Works (IIC).

The Laetoli hominid footprints in northwestern Tanzania are of major importance in understanding the evolution of humankind. The site was excavated in the late 1970s by Mary Leakey, documented and reburied. In subsequent years, re-vegetation occurred and damage from root growth resulted. Of particular interest in relation to reburial as a method of preservation is that serious damage occurred to a unique scientific and cultural site because subsequent monitoring and maintenance of the reburial were not carried out. This paper presents an overview of the strategy developed between 1992 and 1994 for the preservation of the trackway; it takes into consideration the many and complex requirements of preserving outdoor sites; and it describes the re-excavation, conservation, documentation and reburial of the southern 10m of the trackway completed in the 1995 field season. (aa abridged)

Egloff, Brian. 1998. *Practising archaeology and the conservation of Tam Ting, Lao People's Democratic Republic*. **Conservation and Management of Archaeological Sites** 2, no. 3, 163–175.

The author describes a project of “practicing archaeology” (for which archaeology is used as a tool for stabilizing the site rather than for academic research) and reconstruction at an ancient Buddhist shrine located in limestone caves, which is heavily visited by both worshippers and tourists. Collapsed platform structures were excavated and reconstructed; missing elements were recreated from the meager historic documentation and eyewitness accounts available. Interactions with the local community, conservation, and interpretation of the site are briefly discussed. (A.O.)

Ennaifer, Mongi. 1987. *Entretien et gestion du site de Carthage. Programme general: mesures et solutions prises dans le domaine de la conservation des mosaïques*. **Mosaïcs** no. 4, 215–237.

French. The important campaign for saving Carthage is presently showing some limitations. Indeed the conservation of the site is now facing the difficult task of preservation and presentation of the different monuments, particularly the mosaics. This study tries to analyze the efforts undertaken by the different international teams who participated in the excavations and the presentation of the National Archaeological Park. (AATA 26–1220)

Gaucher, Gilles. 1981. *Pincevent, a prehistoric site museum*. **Museum** 4, 211–217.

Early prehistoric sites are rarely preserved for presentation because of the difficulties of conserving their fragile remains. The paleolithic site of Pincevent in France has been preserved in a unique manner. A latex mould of the main complex with hearths, flint and bone was taken in order to reconstitute it in an exhibition room at the site. Other rooms display objects, plans, and photographs. (M.D.)

Gilber, Cathy A., and Renata Niedzwiecka. 1985. **The Historic Landscape of Fort Spokane: A Design Proposal** (National Park Service, Seattle, WA.). National Technical Information Service.

This master plan develops a landscaped design for presentation of the nineteenth-century ruins of Fort Spokane. It builds upon an earlier landscape study and develops a design that specifically addresses the “readability” of the historic scene. Goals for the project included expanding visitor understanding of the site through enhancement of historically significant features and contemporary use of the site while preserving historic integrity. The study presents design treatments of foundations—outline, raised wall, platform, ghosted—for enhancing their visual definition and investigates circulation around the site and pedestrian staging areas. (aa abridged)

Harrington, Spencer P.M. 1995. *Rebuilding the monuments of Pericles*. **Archaeology** 48, no. 1, 45–56.

The thirty-year Acropolis restoration project is briefly described, and the dilemmas still confronting the preservation committee are considered. A series of captioned photographs illustrates the amalgam of renovations under way and those under consideration, including anastylosis, replacement, reconstruction, and shelter construction. (A.O.)

Hinkel, Friedrich W. 1986. *Reconstruction work at the royal cemetery at Meroe*. **Nubische Studien** 42, 99–108.

Looting, removal of monument elements, poor excavation techniques, natural erosion, and tourists have all contributed to the deterioration of this site. Reconstruction, equated with anastylosis, was considered the most effective means of preservation and justifiable if the new elements would be discernible. In addition to reconstruction, stabilization of structures, fencing, and didactic exhibits were part of a plan to make the site an open-air museum. An analysis of the pyramids and the basis for their reconstruction are provided. (M.D.)

Hueber, Friedmund. 1989. *Bauforschung und Restaurierung am unteren Embolos in Ephesos*. **Osterreichische Zeitschrift für Kunst und Denkmalpflege**, no. 3–4, 120–143.

German. This report describes and illustrates with good photo-documentation the anastylosis of the Celsius Library at Ephesus from 1970–1978. All aspects of the project are discussed: research and documentation, which was made a central part of the project; sorting and classification of the elements; reconstitution of broken elements; and reproduction in artificial stone of missing elements, based on existing ones. In accordance with the precepts of the Venice Charter, new materials are recognizable as such. (M.D.)

Johnson, Stephen. 1988. *Le mur d'Hadrien: problèmes d'entretien et méthodes de conservation du patrimoine archéologique*. **Monuments Historiques** 155 (Feb.–March), 56–58.

French. Describes the present state of the wall and outlines the main problems of safeguarding the remains, those related to the application of the law on ancient monuments situated on private property, and those related to the physical protection against weather and tourism, restoration being ruled out. (AATA 27–352)

Labadie, Joseph H. 1988. *The 1987 Parida Cave Conservation Project, Val Verde County, Texas*. **Bulletin of the Texas Archeological Society** 59, 83–109.

Parida Cave is an extensive rock shelter in an isolated part of the Amistad International Reservoir near Del Rio, Texas. The site long has been a popular place to visit for the local population and, more recently, by boaters on the reservoir and long has been the target of illegal digging and vandalism. During the summer of 1987 the National Park Service spearheaded a major conservation project to clean up and revitalize the site. The Parida Cave Conservation Project, with a volunteer work force, picked up trash, back-filled potholes, and built a rock pathway for visitors. The project dramatically illustrates the kind of success that is possible through cooperative undertakings involving the National Park Service, private landowners, and a responsive regional archaeological community. (aa abridged)

Malnati, Luigi. 1993. *Prospettive d'intervento sull'area archeologica di Marzabotto*. In Luisa Masetti Bitelli (ed.), **Archeologia: Recupero e Conservazione** (La Conservazione e il Restauro Oggi 3), 91–99. Firenze: Nardini.

Italian. Discusses the two main problems that characterize this important archaeological zone in Emilia–Romagna, formerly a large Etruscan city. The stone foundations require continuous cleaning, and repairs are constantly necessary in spite of the presence of a cement roof installed in the 1960s

that is neither aesthetically pleasing nor efficient against vandalism or water infiltrations. The rest of the chapter presents a preliminary draft of interventions aimed at giving visitors a better, tridimensional view of the former houses. The appendix reproduces a short, computerized planimetric survey of House No. 6, containing structural calculations on the Etruscan foundations and hypotheses for the protection of the finds. (AATA)

Matero, Frank G. 1995. *A programme for the conservation of architectural plasters in earthen ruins in the American Southwest*. **Conservation and Management of Archaeological Sites** 1, no. 1, 5–24.

Addresses pertinent issues of *in situ* plaster preservation for standing ruins, and outlines a general plaster preservation strategy which can be implemented at such sites, including documentation, stabilization, interpretation, and maintenance. The issues and preservation strategy are illustrated in a case study, which describes methods of documentation, emergency stabilization, hydraulic lime injection grouting, and mortar repairs for lime plaster on adobe ruins at Fort Union, New Mexico. (A.O.)

Mouton, Benjamin. 1989. *Doura Europos ou les contrastes de Syrie*. **Monuments Historiques**, no. 162, 75–79.

French. Doura Europos is an all too typical example of a site excavated in the early twentieth century and then left without proper maintenance and conservation. The causes of degradation are outlined and the conflicts between the proposed solution to backfill the site for its protection, the desire to exploit the site's touristic potential, and the difficulties of implementing a conservation policy and drawing tourists in view of the isolation of the site are all discussed. (M.D.)

Ndoro, Webber. 1994. *The preservation and presentation of Great Zimbabwe*. **Antiquity** 68, no. 260, 616–623.

The author presents the history of preservation at the site, including the most recent strategies and interventions; see Ndoro 1995 and Ndoro and Pwiti 1997 for more specific information, and compare with Sassoon 1982. Of greater importance are the discussions on site presentation (reconciling the needs of the site, the indigenous population, and the foreign tourist) and on the justification of conservation in a developing country. (A.O.)

Office International des Musées. 1933. **La Conservation des Monuments d'Art and d'Histoire**. Paris: Institut de Coopération Intellectuelle.

French. In chapter VI, *La technique de la restauration: exemples caractéristiques*, of this multi-authored publication, early restoration practices at archaeological sites are described. The monuments or sites discussed are Herculaneum, Saqqara, Knossos and Phaestos, the Acropolis, Cyrene, the temple of Heracles at Agrigentum and Temple C at Selinus, and monuments in Tripoli. (M.D.)

O'Kelly, M. J. 1979. *The restoration of Newgrange*. **Antiquity** 53, 205–210.

Prior to its restoration, Newgrange mound in Ireland was covered with vegetation and trees, forming an integral part of the landscape. Restoration involved considerable intervention to (e.g., a concrete

retaining wall) and rebuilding of the mound, completely altering its relationship to the landscape. The author outlines the rationales for the conservation approach taken. (M.D.)

Oliva Prat, Miguel. 1973. *La conservation et mise en valeur d'un site archéologique. Le gisement préromain d'Ullastret (Gérone, Espagne)*. **Monumentum** 10, 13–20.

French. The presentation of this pre-Roman fortified site in Spain is described, more fully in photographs than in text. Consolidation of the walls with cement grouting was undertaken to stabilize the structures, and anastylosis and partial reconstruction were carried out for better presentation to the public. The museum is a restored medieval hermitage on the site. (M.D.)

Orlandos, Anastasios K. 1961. *Travaux récent d'anastylose de monuments préhistorique et classique de la Grèce*. In **Atti del Settimo Congresso Internazionale di Archeologia Classica**, Vol. I (Rome, 1958), 95–101. Rome: L'Erma di Bretschneider.

French. This is a regional report of conservation activities undertaken by the Antiquities Service at classical and preclassical sites in mainland Greece (e.g., Mycenae, the Acropolis, temple of Aphaia on Aegina, temple of Poseidon at Sounion, Epidauros). It provides a good overview of conservation practices employed on archaeological sites at the time. (M.D.)

Piedra, Carlos Aguilar. 1982. *Archaeological parks: Guayabo de Turrialba and El Caño*. In **Rescue Archaeology** (Papers from the First New World Conference on Rescue Archaeology), 163–171. Washington, D.C.: The Preservation Press.

This article explores the issues involved in the creation of archaeological parks, based on the author's experience in Central America. Two case studies are briefly discussed: the site of Guayabo de Turrialba in Costa Rica and El Caño in Panama. (M.D.)

Platon, Nikolas. 1961. *Problèmes de consolidation et de restauration des ruines Minoennes*. In **Atti del Settimo Congresso Internazionale di Archeologia Classica**, Vol. I (Rome 1958), 103–111. Rome: L'Erma di Bretschneider.

The author discusses the problems of conserving and protecting Minoan sites and reviews some of the treatments, both successful and unsuccessful, that have been used. Of particular interest are the different approaches to restoration undertaken at the three major sites of Knossos, Phaestos, and Mallia and the conservation problems that are now affecting Evans' reconstructions at Knossos. (M.D.)

Restoration, preservation and maintenance of Babylon. **Iraq Today** (Feb.), 1980, 13ff.

This articles attempts to provide a preliminary account of the extensive reconstruction work being carried out on the ruins at the site of Babylon. Press reports have been generally more informative; see e.g., **New York Times** April 19 and June 25, 1989. (M.D.)

Roby, Thomas C. 1995. *Site conservation during excavation: treatment of masonry, wall plaster and floor mosaic remains of a Byzantine church in Petra, Jordan*. **Conservation and Management of Archaeological Sites** 1, no. 1, 43–57.

The author presents a case study of the wide range of site conservation activities practiced during and immediately after excavation, and emphasizes the importance of employing a conservator when planning and implementing an excavation to increase cost effectiveness and ensure greater preservation of fragile remains. Conservation procedures during excavation are described, including the preventive measures of site security, temporary shelter, and temporary reburial. *In situ* stabilization, consolidation, and cleaning of masonry, plaster, and mosaics are also described, as are the stabilization, removal, and storage of architectural fragments. (A.O.)

Rutschmann, Reimund. 1987. *Archäologischer Park. Köngen*. **Garten and Landschaft**, Dec., 27–31.

German. Cited here is one of five case studies in this issue of **Garten and Landschaft** on archaeological site presentation in the state of Baden–Württemberg. The three Roman sites (Köngen, Limes Fort (Reiterkastell), and Xanten) illustrate a design-oriented approach to site presentation that is characteristic of many German sites. Landscaping; the use of vegetation or paving stone to outline a complex, symbolic representation; reconstructions; enclosed shelters; and on-site museums are recurring features of this approach. The Viking site of Haithabu is discussed in terms of its management plan to protect both ecological and archaeological resources. The excavation of remains of the Jewish ghetto below the Börneplatz in Frankfurt presents a very different set of presentation issues. (M.D.)

Scichilone, Giovanni. 1986. *The site of the cathedral at Atri: a case study of in situ conservation of archaeological remains*. In **Preventive Measures During Excavation and Site Protection** (Ghent Conference), 309–314. Rome: ICCROM.

Roman remains in the square of the thirteenth-century cathedral at Atri were preserved for public viewing. The author describes the steps taken to conserve and present the site. These included enclosing the site within a concrete perimeter wall to prevent water infiltration and encasing remains in glass showcases with internal environmental controls. (M.D.)

Slim, Hédi. 1988. *La sauvegarde et la mise en valeur du grand amphithéâtre d'El-Jem*. **Africa** 10, 325–358.

French. This article describes in detail the restoration work carried out on the Roman amphitheater of El Jem in Tunisia. The work was preceded by a full study of the theater, which was in danger of collapsing. Consolidation and reconstruction of the walls and arches to ensure the stability of the monument were the initial concerns. Secondary efforts were aimed at reconstructing a small section of the seats of the theatre to provide visitors with a sense of the theater's original form, establishing a circulation route around the theater, and enhancing the protected zone around the monument by landscaping and constructing a graded entry to the lower ancient levels from the surrounding modern village. (M.D.)

Smith, A. Ledyard. 1968. *Reconstruction at the Maya ruins of Seibal*. **Monumentum** 2, 82–96.

Description of the complete reconstruction of a pyramid and temple complex and a round platform at the site of Seibal in Guatemala. The re-erection and mending of stele using an epoxy is also described. (M.D.)

Tampone, Gennaro, and Sergio Vannucci. 1987. *The effects of modern restoration techniques on the prehistoric temples of the Maltese Islands*. In **ICOMOS 8th General Assembly and International Symposium: Old Cultures in New Worlds**, Vol. I, 484–491. Washington, D.C.: U.S. ICOMOS.

English with French summary. The prehistoric megalithic temples of the Maltese Islands are undergoing severe and rapid degradation due to devastating meteorological action, which is damaging the porous Globigerina and Coralline limestone of which they are built. There is as yet no feasible plan for their protection. Some restoration work has been carried out on the temples, but none of the interventions and none of the techniques used have been satisfactory, though they are useful today as case studies. (ATA 27–1648)

Thorn, Andrew, and Andrew Piper. 1996. *The Isle of the Dead: an integrated approach to the management and natural protection of an archaeological site*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 149–152. London: International Institute for Conservation of Historic and Artistic Works (IIC).

The Isle of the Dead retains an historic cemetery, aboriginal shell midden, and internationally significant high-water mark. With careful management and accurate environmental impact assessment, the site has been protected through natural means requiring minimal intervention. The natural isolation of the island has been used to control visitor access, and tree plantings have been used to stabilize the environment around the headstones. (A.O.)

Thorne, Robert M. 1996. *Archaeological site preservation as an appropriate and useful management tool*. In **Vestiges Archéologiques, la Conservation In Situ** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11–15 octobre 1994), 195–199. Ottawa: Publications de l'ICAHM.

English with French summary. The author states that in the past, archaeological site management in the United States meant either avoiding the site or recording data and then abandoning the site. But today, to preserve the site in accordance with new legislation and thinking, *in situ* management should and can be a multidisciplinary effort. This approach is illustrated with a case study of the preservation and stabilization of shoreline deposits at Lake Britton, California. (A.O.)

Tomasevic–Buck, Teodora. 1985. *From antiquity to kinetic art. A Roman town and its presentation to the public*. **Museum** 37, no. 3, 127–135.

The presentation of the Roman town of Augusta Raurica in Switzerland incorporates a number of different approaches to site preservation and presentation. Remains excavated prior to the Second World War have been mainly left untouched and without formal display. Other remains have been reconstructed to make site museums, and yet others have been enclosed and form part of a modern apartment complex. (M.D.)

Torres de Araúz, Reina. 1982. *The site museum of the El Caño archaeological park*. **Museum** 34, no. 2, 117–119.

The archaeological site at El Caño, Panama, had long been subjected to looting, ploughing, and grazing, but was saved in 1973 when it became an archaeological park. The author describes its former desecration and degradation and the efforts now under way to preserve and present the site, which include the establishment of a site museum and the reconstruction of a traditional pre-Columbian house. (M.D.)

Tuchelt, Klaus. 1994. *Notizen über ausgrabung und denkmalpflege in Didyma*. **Antike Welt** 25, no. 1, 2–31.

German. The antique sanctuary of Didyma on the Turkish coast is an example of the possibilities and limitations of an excavation and of site preservation in an inhabited settlement. From the beginning of excavations in Didyma in 1906, the preservation of the site, the reconstruction of the antique buildings, and the conservation of the excavated and rescued objects have been a central part of the work. The modern settlement, traffic and tourism have caused and still cause erosion of the excavation area. In 1976, the old settlement including the sanctuary and the temple of Didyma and a 600 m circle around them were declared a preservation area, prohibiting modern building work. Regular surveys outside the preservation area revealed the procession route from Milet to Didyma and a sanctuary at its summit dating to the 6th century B.C.E. (AATA)

Ulbert, Günter, and Gerhard Weber (eds). 1985. **Konservierte Geschichte? Antike Bauten und ihre Erhaltung**. Stuttgart: Konrad Thies Verlag.

German. This collection of articles addresses the question of conserving history through the preservation of its physical remains. The focus of the individual studies is Roman remains in Europe. There are eighteen studies of past and present approaches to conservation. A majority of these are site-specific studies of German, Austrian, and Hungarian sites, but there is also one on Carthage, as well as area studies of England, Austria, and Switzerland. (M.D.)

Vérité, Jacques. 1988. *Tunisie. Restaurations et restitutions aux thermes d'Antonin de Carthage*. **ICOMOS Information** (July/Sept.), no. 3, 17–23.

French with English, Spanish, and Italian summary. The restoration work being carried out on the Roman baths at Carthage is presented. The author argues that such "restorations," which include both anastylosis and reconstruction, satisfy scientific and economic goals. (M.D.)

[Bib. VII: 26 ref.]

ANNOTATED BIBLIOGRAPHY VII: Reburial of Archaeological Sites

Agnew, Neville. 1997. Review of **Experimental Earthwork Project 1960–1992**. M. Bell, P.J. Fowler and S.W. Hillson (eds). Council for British Archaeology (1996). **Conservation and Management of Archaeological Sites**, 2, 101–110.

The author reviews the Experimental Earthworks Project published in Bell et al. 1996 from the perspective of conservation and the lessons that can be learned for reburial of archaeological sites. (M.D.)

Altieri, A., M.C. Laurenti, and A. Roccardi. 1999. *The conservation of archaeological sites: materials and techniques for short-term protection of archaeological remains*. In **Proceedings of the 6th International Conference on “Non-Destructive Testing and Microanalysis for the Diagnostics and Conservation of the Cultural and Environmental Heritage.”** (Rome, May 17–20, 1999). Ministry of Cultural Heritage and the Italian Society for Non-Destructive Testing Monitoring Diagnostics.

The testing procedure and preliminary results of the project of the ICR and the Soprintendenza Archeologica per l'Etruria Meridionale to undertake testing of different reburial systems on mosaic floors and wall plasters in the Terme Taurine in Civita are described in this paper. The emphasis is on short-term reburial methods. Geotextile and a new material, goretex, were used in combination with sandbags or 'mattresses' filled with clay pellets. The paper also includes a brief summary of past reburial methods and commonly used materials such as clay pellets, pozzolana, and geotextiles. (see also Laurenti, Maria Concetta and Antonella Altieri. 1999? *Materiali e tecniche per la protezione a breve termine dei mosaici pavimentali nelle aree archeologiche*. [Aiscom. Atti del VI Colloquio, Venezia 20–23 Gennaio, 1999]) (M.D.)

Aoyagi, M, and E. Foschi. 1997. *I mosaici pavimentali della villa romana di Cazzanello (Tarquinia): Problemi di datazione e di restauro conservativo*. **Atti del IV Colloquio dell'Associazione Italiana per lo Studio e la Conservazione de Mosaico 1996**. Edizioni del Girasole.

Italian. This article describes the reburial work carried out to protect mosaics at the Roman villa of Cazzanello (Tarquinia) at the end of the excavation seasons. Permanent reburial consists of using black polypropylene geotextile (Geolon) to cover exposed surfaces over which is placed pumice; seasonal reburial incorporates the use of a white polypropylene geotextile (Geodren) and 'mattresses' filled with pumice. (B.L/M.D.)

Ashurst, John, Nick Balaam, and Kate Foley. 1989. *The Rose Theatre*. **Conservation Bulletin** (English Heritage), no. 9, 9–10.

The fragile remains of the Elizabethan Rose Theatre were covered for temporary protection during building construction on the site. This report describes the reburial measures undertaken by English Heritage and the rationales for the choices made. A geotextile fabric was laid over the remains and covered with sand into which was incorporated a leaky-pipe irrigation system. (M.D.)

Bedello Tata, Margherita and Laura Spada. 1995. *Progetto di Restauro per il Complesso Musivo delle Terme dei Cisarri ad Ostia*. In I. Bragantini and F. Guidobaldi (eds.), **Atti del II Colloquio dell'Associazione Italiana per lo Studio e la Conservazione del Mosaico**, (Roma 5-7 Dicembre 1994), 229-234. Bordighera: Istituto Internazionale di Studi Liguri.

Italian. The author describes the practical application of two temporary, shallow, surface protection methods for a mosaic pavement at Ostia, Terme dei Cisarri: one is a geotextile mattress made of expanded clay pellets ("Leca") and pellet dust placed in contact with the mosaic; the second is an anti-root geotextile composite that inhibits root growth into the mosaic. Both systems allow for easy removal of the fill. (A.B.R.)

Bell, M, P.J. Fowler and S.W. Hillson, eds. 1996. **Experimental Earthwork Project 1960-1992**. London: Council for British Archaeology.

This report reviews the first 32 years of the Experimental Earthwork Project where two earthworks were constructed as a long-term experiment to investigate how the archaeological record is formed, and how buried materials change and decay over time. Two contrasting sites were studied and compared: an alkaline chalk downland at Overton Down, Wiltshire (established in 1960), and an acidic heathland at Wareham Heath, Dorset (established in 1963). Each earthwork includes structural elements found in archaeological monuments in Britain and a range of materials including wood, bone, leather, textiles, flint, pottery, and some glass. The experimental plan was to monitor change by excavating sections across the earthworks at intervals of 2, 4, 8, 16, 32, 64, and 128 years. In addition to quantitative information on burial conditions at various levels, this publication also discusses soil micromorphology and chemistry, SEM studies of buried materials, amino acid studies and pollen analysis. Results show that many of the changes occur within decades of burial, and the extent of post-burial changes can be much greater than generally thought. (a b)

Burch, Rachel. 1997. **The Reburial of Wall Paintings: a Critical Assessment of the Technique of Reburial for the Conservation of In Situ Excavated Plasters**. Postgraduate Diploma Dissertation, Courtauld Institute of Art, University of London.

A postgraduate diploma dissertation that discusses reburial as a method for the *in situ* preservation of wall paintings. The dissertation reviews published literature on reburial, characterizes the nature and mechanisms of reburial and potential sources of deterioration in a reburial environment, and discusses sources of deterioration during burial and upon excavation. Ethical and technical considerations are discussed, as well as the importance of monitoring and maintaining the reburial environment. It also includes an informative summary of results from a questionnaire sent to over 130 international archaeologists, conservators, and preservation professionals to obtain their perception of reburial as a conservation option and to gather information not necessarily published on the methods and techniques of reburial. (A.B.R.)

Calarco, Dominic A. 2000. *San Diego Royal Presidio. Conservation of an earthen architecture archaeological site. Terra 2000 Preprints* (8th International Conference on the study and conservation of earthen architecture, Torquay, Devon, UK, May 2000), 20-25. London: James and James Ltd.

The ruins of the San Diego Presidio, an adobe construction dating to the 18th century, is one of only four presidios in California. The author relates the history of the site, its excavation history, the

many attempts to preserve and interpret the site, and the decision that led to reburial of the excavated remains in 1998. The rationale for reburial, involvement of the community, and technical considerations and implementation are described. (M.D.)

Corfield, Mike. 1996. *Preventive conservation for archaeological sites*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 32–37. London: International Institute for Conservation of Historic and Artistic Works (IIC).

Unexcavated sites survive because they have reached a state of equilibrium with their environment; human activities can have a profound impact on that environment, especially if they alter the local hydrology. In England, recent research has focused on defining and quantifying the relationships between important environmental factors, particularly for waterlogged sites, in order to allow for successful *in situ* preservation of burial environments and thus of buried sites. The author describes the impacts and complex interactions of these factors, which include soil and water chemistry, geology, mineralogy, and hydrology. (A.O.)

Corfield, M., P. Hinton, T. Nixon and M. Pollard (eds.). 1998. **PARIS Conference Proceedings at the Museum of London**, April 1–3, 1996. Museum of London Archaeology Service.

Proceedings from a conference organized by the Museum of London, Bradford University, and English Heritage that brought together developers, engineers, and archaeological scientists to discuss the problems of *in situ* preservation of urban and waterlogged sites in northwestern Europe. The papers focus on the influence of groundwater and changes to it due to preservation policies and the effects of construction techniques on both site hydrology and physical integrity. Germane but indirectly related to the topic of backfilling or reburial are certain papers that address the chemical, geotechnical, hydrological, and microbiological nature of burial and reburial environments (Shilston & Fletcher; Simpson; Pollard; Hopkins) and two papers on field monitoring of these processes (Davis; Caple). Though most of the research in these papers has been conducted on waterlogged sites, the applicability to dry sites is envisaged. (A.B.R.)

Demas, Martha, Neville Agnew, Simon Waane, Jerry Podany, Angelyn Bass, Donatius Kamamba. 1996. *Preservation of the Laetoli Hominid Trackway in Tanzania*. In Ashok Roy and Perry Smith, eds. **Archaeological Conservation and its Consequences**: (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 38–42. London: International Insititute for conservation of Historic and Artistic Works (IIC).

The Laetoli hominid footprints in northwestern Tanzania are of major importance in understanding the evolution of humankind. The site was excavated in the late 1970s by Mary Leakey, documented and reburied. In subsequent years, re-vegetation occurred and damage from root growth resulted. Of particular interest in relation to reburial as a method of preservation is that serious damage occurred to a unique scientific and cultural site because subsequent monitoring and maintenance of the reburial were not carried out. This paper presents an overview of the strategy developed between 1992 and 1994 for the preservation of the trackway, which takes into consideration the many and complex requirements of preserving outdoor sites, and describes the re-excavation, conservation, documentation and reburial of the southern 10 m of the trackway completed in the 1995 field season. (aa abridged)

Dowdy, Katherine and Michael Romero Taylor. 1993. *Investigations into the benefits of site burial in the preservation of prehistoric plasters in archaeological ruins*. In **7a Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra: comunicações: Terra 93**. Lisboa: Direcção Geral Dos Edifícios e Monumentos Nacionais.

This paper summarizes the results of a joint project by the US National Park Service and the Getty Conservation Institute at Chaco Culture National Historical Park to investigate the benefits of reburial of archaeological sites. Rooms excavated in the 1890s and 1920s were re-excavated in 1992 to determine their condition, demonstrating the beneficial effects of reburial on preservation of architectural remains. The paper focuses specifically on the preservation of mud plaster in a buried context. (M.D.)

Fry, Malcolm F. 1996. *Buried but not forgotten: sensitivity in disposing of major archaeological timbers*. In Ashok Roy and Perry Smith (eds.), **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), , 52–54. London: International Institute for Conservation of Historic and Artistic Works (IIC).

This paper briefly reviews the main practical options for preserving massive timber discoveries, particularly log boats, which because of their condition are unlikely to be wanted for display or further research, but which cannot simply be discarded. For the last 20 years in Northern Ireland, one course of action has been reburial on a patch of land set aside specifically for that purpose. Each timber was wrapped in heavy-duty polyethylene and placed in individually marked plots under 2m of soil. Aspects of long-term preservation of the timber in its new environment are considered, in particular possible reactions with the soil. (BCIN)

Gibbs, Ronnie. 1994. **The Use of Backfill Techniques on 'Dry' and 'Waterlogged' Archaeological Sites**. BSc Dissertation, University of London.

This thesis investigates materials and techniques for backfilling 'dry' and 'waterlogged' sites. It presents an experimental program that tests the effectiveness of expanded clay pellets as a fill material and also examines how certain artifacts treated with Paraloid B-72 respond to a burial environment. The introduction outlines the basic requirements and theoretical considerations that go into developing a backfill strategy. Gibbs also discusses materials and methods of backfilling as gleaned from a literature review and from results of a questionnaire on backfilling techniques sent to over 70 archaeologists. (A.B.R.)

Goodburn-Brown, Dana, and Richard Hughes. 1996. *A review of some conservation procedures for the reburial of archaeological sites in London*. In Ashok Roy and Perry Smith, eds., **Archaeological Conservation and its Consequences** (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), , 65–69. London: International Institute for Conservation of Historic and Artistic Works (IIC).

The paper briefly reviews the practical methodologies used to stabilize and rebury archaeological features (Roman floor and wall plaster and waterlogged timbers) at three sites in London, but more importantly, reviews some of the negative results of reburial. (A.B.R.)

Ladron de Guevara, Bernadita and Gabriela Alt. 1994. *Técnica de Cierre de Excavaciones en Sitios Arqueológicos. Museos (Coordinación Nacional de Museos. Chile)*. No. 18, 26–28.

Spanish. In the context of an archaeological survey, test trenches were backfilled to protect the archaeological deposits at Santos del Mar in Chile. Three simple methods, consistent with needs of protection and probability of re-excitation, were used to rebury the trenches at two different sites. Excavated soil was used, plastic netting to wrap *in situ* features or protect sides of trench. One of the trenches was re-excavated the following year and the results of the reburial evaluated (M.D.)

Martinelli, Antonella. 1993. *Un'esperienza di reinterro: La Villa Marittima di Cala Padovano*. In **Conservation, Protection, Presentation: Fifth Conference of the International Committee for the Conservation of Mosaics, Faro – Conimbriga, 4–8 October 1993. Proceedings**, (Mosaics 6)21–30. Lisbon: Instituto Portugues Museus.

Italian. The author describes the reburial of excavated mosaics from a Roman villa in the district of Bari, in the Cala Padovano site. The reburial incorporated typical materials used for mosaics—sand, clay pellets, plastic mesh, and soil. After three years the reburial was partially re-opened and the results evaluated. (M.D.)

Mora, Paolo. 1984. *Conservation of excavated intonaco, stucco and mosaics*. In Nicholas Stanley Price (ed.), **Conservation on Archaeological Excavations with Particular Reference to the Mediterranean Area**, 97–104. Rome: ICCROM.

In an early discussion of reburial techniques, the author proposes a filling of expanded clay pellets and earth, separated by plastic netting, as a covering for mosaics, and the use of vermiculite adjacent to wall paintings. The prerequisites of the reburial materials are discussed. (M.D.)

Moss, Elizabeth. 1998. **Protection and Environmental Control of the Plastered Mudbrick Walls at Çatalhöyük**. MSc Thesis, University of Pennsylvania.

This thesis focuses on examining and developing methods of preventive conservation to control damage during and after excavation of Çatalhöyük, a Neolithic site in south central Turkey, known for its painted plastered mudbrick walls and relief sculptures. This work includes a site description; characterization and analyses of earthen elements; and an experimental program that used simulated models of mud-plastered walls to examine the effects that moisture, salts, and desiccation could have on earthen materials. In addition, the experimental program tested various short-term preventive methods of surface protection to mitigate damage caused immediately upon excavation due to rapid, excessive drying of both the plaster and its earthen substrate. Some of the materials tested for surface protection were perlite, vermiculite, and geotextiles. Test results proved that a temporary protective composite system made of a combination of these materials was effective in mitigating desiccation damage that can occur immediately after excavation, and far outweighed the negative results of leaving the earthen surfaces unprotected. (A.B.R.)

Nardi, Roberto. 1982. *Couverture provisoire pour les mosaïques que l'on ne peut enlever*. **International Committee for Mosaics Conservation Newsletter**, no. 5, 5-13.

French. The author describes an early experiment to find a better means of temporary protection for mosaics after an unsuccessful experience using plastic netting and soil (root penetration and adherence of the netting to mosaic). A one-year test was conducted using variations of clay pellets, plastic netting, soil, and sand in various sequences. None of the variations prevented root penetration, a serious problem the author identified as requiring further research in the use of herbicides. (M.D.)

Nordby, Larry V., Michael R. Taylor, and Judith G. Propper. 1988. *The handwriting on the wall: prospective preservation research strategies for the U.S. Forest Service*. In **Tools to Manage the Past: Research Priorities for Cultural Resources Management in the Southwest** (Symposium Proceedings, May 2-6, 1988, Grand Canyon, Arizona), 68-80.

This article describes research projects that will contribute to establishing ruins stabilization programs (see Bibliography V). In the discussion of current stabilization techniques, the authors review the assumptions that underlie the use of backfilling as a preservation strategy and some of the techniques that have been advocated. They point out the lack of any real data to support these assumptions and outline areas of research that should be investigated. (M.D.)

Petriaggi, R. 1990. Risultati di un esperimento di protezione di pavimenti in mosaico conservati all'aperto ne sito di Ostia Antica, in **Mosaicos no. 5, Conservación In Situ, Palencia 1990**, 255-266. Rome.

This paper describes three reburial tests carried out at Ostia in 1989 on mosaic pavements: one in the frigidarium where a sheet of geotextile was covered with a 0.5 m layer of expanded clay pellets (Leca); and the second and third in the caldarium, where only a single 0.5 m layer of expanded clay pellets was used (no geotextile). The results showed that clay pellets alone were a valid option, being light, clean, and easy to remove. The geotextile appeared to concentrate moisture and promote root growth at the surface of the mosaics and had no advantages clay pellets alone. The author also suggests using a system of fine plastic mesh (as in Nardi, 1982) and clay pellets to provide adequate temporary protection. (A.B.R.)

Podany, Jerry, Neville Agnew, and Martha Demas. 1993. *Preservation of excavated mosaics by reburial: Evaluation of some traditional and newly developed materials and techniques*. In **Conservation, Protection, Presentation: Fifth Conference of the International Committee for the Conservation of Mosaics, Faro - Conimbriga, 4-8 October 1993. Proceedings**, (Mosaics 6), 1-19. Lisbon: Instituto Portugues Museus.

In the ongoing efforts to preserve excavated mosaics, the option of reburial is gaining recognition from archaeologists and conservators alike. While it is generally agreed that reburial can provide the optimum environment for long-term preservation, guidelines and characterization of this environment have not been broadly established. This paper reviews issues paramount in the design and implementation of reburial, including the long-term effect upon mosaics and sites as a whole. A comparison is made between the more commonly used materials and the effectiveness of newly developed synthetic products, such as geotextiles integrated with a backfill material from the site. Although the work presented focuses on mosaics, it is part of a larger effort to study and characterize reburial strategies and the effects of those strategies upon archaeological sites. (aa)

Roby, Thomas. 1995. *Site Conservation during excavation: treatment of masonry, wall plaster and floor mosaic remains of a Byzantine church in Petra, Jordan*. In **Conservation and Management of Archaeological Sites**. Volume 1, Number 1.

The author describes the conservation treatments carried out on the architectural remains of a Byzantine basilica in Petra, Jordan, during and immediately after the excavation. Among the treatments were temporary reburial of the remains of a figurative mosaic pavement in the two side aisles, and the fragmentary remains of the opus sectile pavement in the central aisle. The reburial stratigraphy consisted of 30 cm of excavation soil laid over a continuous sheet of spun-bonded polypropylene geotextile (Tyvar) to protect the mosaics between the initial phases of conservation work and construction of a permanent shelter for the site. Earlier in the excavation another temporary reburial method was used: a layer of perlite between two sheets of plastic netting. The perlite produced many fine particles that seeped through the plastic netting and were difficult to remove from the mosaic. (A.B.R.)

Silver, Constance S., Joel Snodgrass, and Richard Wolbers. 1993. *A program for the conservation of prehistoric mural paintings on mud renderings in the American southwest*. In **7th International Conference on the Study and Conservation of Earthen Architecture**. Lisbon: Direcção Geral dos Edifícios e Monumentos Nacionais.

This paper describes the conservation treatments of prehistoric mural paintings (c. A.D. 1150) on mud renderings in two rooms at Aztec Ruins National Monument, New Mexico, an archaeological site under the jurisdiction of the National Park Service. The objectives of the project were: utilization of the inherent rheological properties of the murals as part of the conservation treatment; development of methods to remove deleterious aged coatings of shellac and cellulose nitrate; and implementation of conservation backfilling of one mural to address long-term preservation. (aa, edited)

Thorne, Robert M., Patricia M. Fay, and James J. Hester. 1987. **Archaeological Site Preservation Techniques: A Preliminary Review** (Environmental Impact Research Program, Technical Report EL-87-3). Vicksburg, Mississippi: Waterways Experiment Station, Corps of Engineers.

Reburial is discussed briefly as one site preservation technique (pp 31f.). The importance of distinguishing between excavated units and fill material is emphasized. Traditional markers such as glass or a fill of sand or gravel are noted. The use of filter fabrics or polyethylene film is given equivalent value as horizon markers. Type of fill material (chemically similar to artefact-bearing matrix) and cost factors are also mentioned. (M.D.)

[Bib. VIII: 39 refs.]

ANNOTATED BIBLIOGRAPHY VIII: Erosion Control and Site Stabilization

Ahern, Kate. 1991. *Visitor wear and tear of cultural landscapes: recommendations for Stonehenge*. CRM 14, no. 6, 24–26.

At Stonehenge, the impact of visitor foot traffic has resulted in soil erosion, compaction, and destruction of the natural grasses. Trial tests were conducted to determine the most effective combination of grass type, reinforcement materials, and maintenance practices for creating durable grass paths. Results indicated that such paths were feasible with regular maintenance, rest periods (effected by shifting the roped pathway), and repair. (A.O.)

Andropogon Associates, Ltd. 1989. **Earthworks Landscape Management Manual**. Washington, D.C.: National Park Service, U.S. Dept. of the Interior (reproduced by NTIS).

This manual was designed by a private consulting firm, Andropogon Associates, to provide management strategies and interpretive guidelines for earthwork sites in the U.S. National Parks. The emphasis is on stabilization of sites using native habitats. The first part of the manual is a critical review of current management practices and recommendations for vegetative cover types and for interim stabilization measures. The second part of the manual comprises management guidelines for forest and grass covers and for the restabilization and revegetation of damaged ground surfaces. These latter guidelines are especially pertinent to the control of erosion. (M.D.)

Arvanitakis, M., P. Mira, E. Kotsopoulou, and A. Asteriou. 1988. *Stabilization and protection of the sides of the trenches and pits of the Vergina Royal Tombs, Greece*. In Paul G. Marinos and George C. Koukis (eds.), **The Engineering Geology of Ancient Works, Monuments and Historical Sites. Preservation and Protection**, vols 1–3. Rotterdam: A.A. Balkema, vol. 1, 249–152.

During trial excavations on the Vergina Royal Tombs, the sides of the pits and trenches leading to the tombs were uncovered. The sides are in a state of critical equilibrium; their geometry is constantly changing. The possibility of stabilizing and protecting the sides, by either using injections or surface consolidation with prepolymer of isocyanate, was examined. (aa)

Bates, A. Leon, Sidney S. Harper, Kenneth R. Kelley, and David H. Webb. 1997. **Banks and Buffers: A Guide to Selecting Native Plants for Streambanks and Shorelines**. Muscle Shoals: Clean Waters Initiative Program, Environmental Research Center, Tennessee Valley Authority.

This is an active user's guide for the selection of native plants for streambank and shoreline protection. Printed material contains information on each plant species, as well as charts for the selection of appropriate plants based on six zones that range from submerged aquatic to dry upland. The plant species are common to the Tennessee River Valley region but are also found in other areas of the eastern United States. The plant database is also included on a CD-ROM. (Thorne 1998 abridged)

Clarke, P., and J. Hope. 1985. *Aboriginal burials and shell middens at Snaggy Bend and other sites on the central Murray River*. **Australian Archaeology** 20, 68–89.

Describes erosion control measures on sand dunes where wind exposes burials. Three 100-meter-long, 1-meter-high brush fence windbreaks across the dune core proved less effective than a mat of eucalyptus branches laid across the site to act as a sand trap. (N.S.P.)

Ehrenhard, John E. 1994. *Stabilization and restoration at Russell Cave*. **CRM** 17, no. 1, 28–30.

Stream erosion had undercut the protective talus slope at the mouth of Russell Cave, threatening the archaeological deposits within. The local topography was altered to direct the stream away from the cave entrance, the bank was rebuilt and covered with a layer of filter fabric, and the fabric was covered with boulder riprap and fill. (A.O.)

Ehrenhard, John E., and Robert M. Thorne. 1991. *An experiment in archaeological site stabilization, Cumberland Island National Seashore*. **CRM** 14, no.2, 13–16.

Changes in the natural and cultural environment on and around Cumberland Island National Seashore are accelerating shoreline erosion; the rate of loss of unprotected cultural deposits has increased accordingly. Surprisingly, along the northwest shore between Terrapin Point and Cumberland Wharf, the tidal marsh zones are stabilizing thanks to an increase of naturally deposited oyster shell rakes (dikes). Construction of an experimental, artificial rake emulating this natural phenomenon was undertaken to expedite the revegetation of a static marsh zone, and thus help stabilize the bankline and its cultural deposits. (aa)

----- 1993. *An experiment in archaeological site stabilization – part II, Cumberland Island National Seashore*. **CRM** 16, no. 5, 3–4, 16.

An experimental, artificial rake (dike) was constructed to prevent erosion of the shoreline and vulnerable archaeological deposits; to protect the rake from erosion by wild horses and pigs strips of GEOWEB were installed on animal paths. The authors discuss the positive results of the experiment. See also Ehrenhard and Thorne 1991. (A.O.)

Garfinkel, Alan Philip, and Bobby L. Lister. 1983. **Effects of High Embankment Construction on Archaeological Materials**. State of California, Department of Transportation.

This report presents a field study conducted by the California Department of Transportation to determine the effects of constructing a 75-foot-high embankment over a simulated Native American artefact site. The results supported findings of a preliminary laboratory study. The soil surrounding the artefacts consolidated one to two inches within the test sites. Fragile artefacts such as shell and bone suffered some minor damage while the stone artefacts were generally not affected. Guidelines for preservation of archaeological sites on future construction sites are provided. (aa abridged)

Garrett, Susan. 1983. **Coastal Erosion and Archeological Resources on National Wildlife Refuges in the Southeast**. Atlanta, Georgia: Archaeological Services Branch, National Park Service, Southeastern Region.

This report first summarizes the known information on prehistoric archaeological resources in each of the coastal refuges managed by the U.S. Fish and Wildlife Service in the Southeastern Region. The study then looks at preservation as a treatment measure for eroding sites. The use of erosion control measures has become fairly common along reservoir or lake shorelines, but is still rare in the coastal zone. Potentially useful control measures, including structural measures such as bulkheads, seawalls, and revetments, and non-structural measures such as vegetation, are discussed in terms of their applicability to archaeological sites, their durability, and their cost-effectiveness in comparison to data recovery. (aa abridged)

Hughes, P.J., A.L. Watchman, and M.E. Sullivan. 1981. *Conservation of the Mount Cameron West engraving site, northwestern Tasmania*. **Papers and Proceedings of the Royal Society of Tasmania** 115, 211-222.

This shoreline site with rock engravings has long been covered with a naturally occurring mantle of sand. A thorough study of the geology and an initial investigation of coastal erosion to the site indicate that the rock is relatively stable, but coastal erosion constitutes a serious threat to the site. The authors outline erosion control measures that could be implemented to help stabilize the site until a more complete study can be undertaken. These measures include stabilization of the sand dune through planting of grasses to trap windblown sand, maintenance, and perhaps extension of the existing sand mantle. (M.D.)

Keown, Malcolm P. 1983. **Streambank Protection Guidelines**. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.

This publication is written in layman's terms and is intended to provide general information to the public on the subject of streambank stabilization. The nature of streams and reasons for streambank erosion and failure are discussed. A variety of standard streambank stabilization techniques are presented for consideration. (Thorne 1989b)

Keown, Malcolm P., and Elba A. Dardeau, Jr. 1980. **Utilization of Filter Fabric for Streambank Protection Applications** (Technical Report HL-80-12). Vicksburg, Mississippi: U.S. Army Engineer Waterway Experiment Station.

At the time it was written, this report represented a state-of-the-art literature survey of filter fabric [geotextiles] use. U.S. Corps of Engineers offices as well as filter cloth manufacturers were queried for both published and unpublished histories of filter fabric use for streambank stabilization. Indications are that if properly selected, filter fabric can serve as a replacement for natural filters. Other possible uses are described. A bibliography is included. (Thorne 1989b abridged)

Lenihan, Daniel J. (Project Director), et al. 1981. **The Final Report of the National Reservoir Inundation Study**, vols 1-2. Santa Fe, New Mexico: Southwest Cultural Resources Center, National Park Service.

Detailed study of the impact of inundation on archaeological sites and of techniques to minimize damage. Includes discussions of techniques for preinundation site and soil stabilization and a review of materials and linings used for stabilization during reservoir construction, as well as preliminary experiments in the preservation of submerged Anasazi structures. (N.S.P.)

Ling Yuquan, Qu Jianjun, Fan Jinshi and Li Yunhe. 1997. *Research into the control of damage by windblown sand at the Mogao grottoes*. In Neville Agnew (ed.), **Conservation of Ancient Sites on the Silk Road** (Proceedings of an International Conference on the Conservation of Grotto Sites, Mogao Grottoes at Dunhuang, October 1993), 213–226. Los Angeles: The Getty Conservation Institute.

Windblown sand has been a constant and severe problem at the Mogao grottoes. To address the issue, a two-part research project was conducted. In the first part, the patterns of wind and sand movement were monitored and studied using meteorological data and information collected from sand traps. The second part involved the construction of a synthetic fabric windbreak fence to mitigate the effects of the sand and a monitoring program to assess the effectiveness of the intervention. (A.O.)

MacDonald, Anne. 1990. **Surface Erosion and Disturbance at Archaeological Sites: Implications for Site Preservation** (Environmental Impact Research Program, Miscellaneous Paper EL-90-6). Vicksburg, Mississippi: U.S. Army Engineer Waterway Experiment Station.

Surface erosion is one of the most ubiquitous processes that alter exposed archaeological sites and often result in significant data loss. Impacts due to surface erosion occur naturally, but can be unwittingly increased by many management activities, usually in the form of surface disruption of the archaeological site or adjoining ground. This report reviews surface erosion/disruption processes and their effect upon archeological sites; reviews management activities that occur on lands under U.S. Army Corps of Engineers jurisdiction and may influence rates of surface erosion/disruption; and examines ways of managing sites to reduce surface erosion/disruption potential. (aa abridged)

Marinos, Paul G., and George C. Koukis (eds). 1988. **The Engineering Geology of Ancient Works, Monuments and Historical Sites. Preservation and Protection**, vols 1–3. Rotterdam: A.A. Balkema.

This massive three-volume work represents the publication of papers from an international symposium held in Athens in September 1988. The articles cover a wide variety of subjects, organized by theme. Subjects include analysis, provenance, and consolidation studies of building stone; geophysical methods of site investigation; seismic risk studies; paleogeological reconstructions; etc. The three articles annotated in this bibliography were selected as being most relevant to the present topic. (M.D.)

Mathewson, Christopher C. (compiler). 1989. **Interdisciplinary Workshop on the Physical-Chemical-Biological Processes Affecting Archeological Sites** (Environmental Impact Research Program, Contract Report EL-89-1). Vicksburg, Mississippi: U.S. Army Engineer Waterway Experiment Station.

This interdisciplinary workshop investigated the impacts of burial on archaeological sites. The deterioration of artefacts and disturbance of spatial relationships are examined with respect to changes in soil chemistry, soil compaction, changes in hydrology, and the burrowing of animals as a result of burial or inundation of a site. A qualitative site decay model resulting from the workshop indicates the relative significance of site environment on decay of an archaeological site and can be used as a basis for determining the effects of burial strategies. (M.D.)

Mathewson, Christopher C., and Tania Gonzalez. 1988. *Protection and preservation of archaeological sites through burial*. In Paul G. Marinos and George C. Koukis (eds.), **The Engineering Geology of Ancient Works, Monuments and Historical Sites. Preservation and Protection**, vols 1-3. Rotterdam: A.A. Balkema, vol. 1, 519-526.

Archaeological sites often come into conflict with engineering projects. In cases where the project requires excavation, the archaeological site must be excavated and the information recorded to be preserved. If, however, the site is to be buried below fill, inundated, or crossed by equipment, it is often preferable to protect the site below an engineered cover, rather than to excavate it. However, each of the site components and spatial relationships reacts differently to changes in the physical, biological, and chemical environment induced by burial. The design of a burial project must, therefore, be carried out as a cooperative effort between the archaeologist and engineering geologist: the archaeologists must identify the critical components or relationships to be protected, and the engineering geologist must design the burial to produce the desired environmental conditions. (aa)

Mathewson, Christopher C., Tania Gonzalez, and James Eblen. 1992. **Burial as a Method of Archaeological Site Protection** (Environmental Impact Research Program, Contract Report EL-92-1). Vicksburg, Mississippi: U.S. Army Engineer Waterway Experiment Station.

This report updates and summarizes research undertaken by the U.S. Army Engineer Waterway Experiment Station and the Center for Engineering Geosciences (Texas A&M University), looking specifically at the physical and chemical changes that take place upon the burial of an archaeological site. It expands on earlier publications by Mathewson et al. (M.D.)

Morrison, W.R., and L.R. Simmons. 1977. **Chemical and Vegetative Stabilization of Soils** (Technical Report no. REC-ERC-76-13). U.S. Department of Interior, Bureau of Reclamation.

This report contains the results of a study on various chemical and vegetative methods of soil stabilization. Three main items of work were accomplished under the study: laboratory studies of 30 liquid soil stabilizers and on materials and methods for waterproofing soils and arresting erosion; discussions of various chemical and vegetative methods in the field; and a survey of chemical stabilization of soils and revegetation methods and materials for erosion control. Results of this study indicate the potential effectiveness of chemical and vegetative stabilization. (aa abridged)

Po-Ming, Lin, Neville Agnew, Li Yunhe and Wang Wanfu. 1997. *Desert-adapted plants for control of windblown sand*. In Neville Agnew (ed.), **Conservation of Ancient Sites on the Silk Road** (Proceedings of an International Conference on the Conservation of Grotto Sites, Mogao Grottoes at Dunhuang, October 1993), 227-234. Los Angeles: The Getty Conservation Institute.

At the Mogao grottoes, a synthetic fabric windbreak fence was designed and installed to mitigate the effects of windblown sand. (See Ling et al., 1997.) To create a more permanent solution, a vegetation windbreak was planted. This paper describes the design of the vegetation windbreak and its associated drip irrigation system. (A.O.)

Rogers Jr., Spencer. 1986. **Artificial Seaweed for Shoreline Erosion Control?** (National Technical Information Service).

Springfield, Virginia: U.S. Department of Commerce.

The use of artificial seaweed to control erosion has not lived up to its expectations. The author reviews the history, theory, and documented projects in both the U.S. and Europe. He concludes that only under certain conditions (e.g., inlet channels) has artificial seaweed proven some effectiveness. Experimentation with the use of seaweed, especially in the U.S., to control shoreline erosion has not been successful, despite initial suggestions to the contrary. (M.D.)

Rutkowski, Bogdan, and Krzysztof Nowicki. 1988. *The problem of preservation of mountainous sites in Crete*. In Paul G. Marinis and George C. Koukis (eds.), **The Engineering Geology of Ancient Works, Monuments and Historical Sites. Preservation and Protection**, vol. 3, 1475-1478.

Archaeological sites situated high in the mountains encounter different problems of preservation those sites in the agricultural or urbanized areas. Erosion is the most important factor that has shaped the appearance of the sites. The balance between a destructive and protective role of erosion is very delicate, and it is always disturbed when the site is unearthed. The author examines the erosion processes as they have affected a number of mountainous sites in Crete. (aa abridged)

Snelson, W.J., M.E. Sullivan, and N.D. Preece. 1986. *Nundera Point—an experiment in stabilizing a foredune shell midden*. **Australian Archaeology** 23 (Dec.), 25-41.

This article describes in detail an experiment in stabilizing a coastal midden site. Working within constraints imposed by an ongoing coastal research program, stabilization measures were implemented: the dune profile was re-established; native grasses were planted; 'Enviromat,' a commercial product consisting of a nylon mesh enclosing aspen wood shavings, was laid over the dune for mulching and protection of the surface; and dune-forming fences were installed in the blowout area. Subsequent evaluation has shown that these measures have been largely successful; problems that were encountered are reviewed. (M.D.)

Steffny, Ernst. 1993. *Versuch einer Stabilisierung von Grabungsprofilen in einem begehbaren Befund*. **Arbeitsblätter für Restauratoren** 26, no. 1, 275-276.

German with English abstract. A stratigraphic profile measuring 10 m² in a covered and protected excavation area—dried out and crumbling after 20 years—was stabilized using Casein solution. After six months of observation, this experiment, under the specific climatic conditions, can be regarded as successful. (aa edited)

Thomas, Gordon. 1999. *The role of research and education in site management at the Lemba Experimental Village, Cyprus*. **Conservation and Management of Archaeological Sites** 3, nos. 1 and 2, 109-123.

The Lemba Experimental Village was established in 1988 with a view to understanding site formation processes through the construction of full-scale experimental buildings. Monitoring and recording of construction and erosion processes provides a long-term history of events on the site, which can be related to the deposits and features encountered when excavation is undertaken. Comparative information has been obtained from the structural analysis and excavation of buildings abandoned 25-30 years ago in the village of Souskiou, where similar deposits are encountered. The

results of the work are used as a comparative database for understanding deposits on prehistoric archaeological sites. (aa abridged)

- Thorne, Robert M. 1985. **Preservation is a Use: Archaeological Site Stabilization, An Experimental Program in the Tennessee River Valley.** Archaeological papers of the Center for Archaeological Research, no. 5, University of Mississippi, Tennessee Valley Authority Publications in Anthropology no. 40.

This detailed review of erosion control techniques applicable to archaeological site stabilization discusses the advantages and disadvantages of each technique and considers their potential impacts on archaeological sites. Some thirty previous efforts at archaeological site stabilization in the U.S. are then reviewed and evaluated according to the techniques utilized. The study concludes with various experiments at site stabilization and protection undertaken in the Tennessee River Valley. (M.D.)

- 1988a. **Filter Fabric: A Technique for Short-Term Site Stabilization** (Archaeological Assistance Program, Technical Brief, no. 1). Washington, D.C.: Department of the Interior, National Park Service.

This report briefly discusses what filter fabrics [geotextiles] are and their usual applications. The advantages and disadvantages of filter fabric are discussed. A specific example of the application of filter fabric to an archaeological site (Huffine Island) is given, and the details of the processes involved in choosing the specific stabilization technology for the site are fully discussed. The actual installation of the filter fabric is described in detail. Installation monitoring is explained. (Thorne 1989b)

- 1988b. **Guidelines for the Organization of Archeological Site Stabilization Projects: A Modeled Approach** (Environmental Impact Research Program, Technical Report EL-88-8). Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.

This set of guidelines is designed to identify a procedure for evaluating technical options for archaeological site preservation technical options and for selecting the proper options to be employed in specific situations. In the absence of any prior guidelines, these guidelines are based on interviews with Federal archaeologists with direct personal experience in specific site preservation situations. The guidelines so developed were tested at a prehistoric mound site on Huffine Island, Tennessee, and those efforts are presented as a case study in site preservation. The solution adopted at Huffine Island to control erosion was the use of geotextile filter fabric. (aa abridged)

- 1989a. **Intentional Site Burial: A Technique to Protect Against Natural or Mechanical Loss** (Archaeological Assistance Program, Technical Brief, no. 5). Washington, D.C.: Department of the Interior, National Park Service.

This is the second technical brief in the series on site stabilization and maintenance. The object of this report is to provide guidance on the design of an effective project for intentional site burial. It identifies the processes which must be addressed by an archaeological program manager considering intentional site burial: evaluation of the sites' artifact and ecofact components and their reaction to their physical and chemical environments; the measurement of potential impacts against

the goals for protecting the site; discussion of the actual mechanics of burying a site; establishing a monitoring program; and pricing site burial. (Thorne 1989b abridged)

- 1989b. **Archaeological Site Stabilization Bibliography**. National Clearinghouse for Archaeological Site Stabilization, Center for Archaeological Research, University of Mississippi.

This bibliography compiled at the National Clearinghouse for Archaeological Site Stabilization is an ongoing project to collect bibliographic references related to site stabilization. It is important to note that this does not include stabilization of standing structures (i.e., architectural stabilization or consolidation). The bibliography is divided into four sections: philosophy, technical support, management recommendations, and practical applications. The citations are all relevant to the topic of the present bibliography and many are annotated. A copy of the bibliography can be obtained from the Clearinghouse, Center for Archaeological Research, University of Mississippi, University, MS 38677. (M.D.)

- 1990. **Revegetation: The Soft Approach to Archaeological Site Stabilization** (Archaeological Assistance Program, Technical Brief, no. 8). Washington, D.C.: Department of the Interior, National Park Service.

The reintroduction of plants to an archaeological site is a "soft" approach to site stabilization (as compared with engineered solutions such as rip-rap). The author reviews the many benefits of revegetation as well as the possible adverse effects caused by root disturbance and bio-chemical changes. Sources of information about plant selection and techniques of revegetation are briefly reviewed. (M.D.)

- 1996. *Archaeological site preservation as and appropriate and useful management tool*. In **Vestiges Archéologiques, la Conservation *In Situ*** (Actes du deuxième colloque international de l'ICAHM, Montréal, Québec, Canada, 11-15 octobre 1994), 195-199. Ottawa: Publications de l'ICAHM.

English with French summary. The author states that in the past, archaeological site management in the United States meant either avoiding the site or recording data and then abandoning the site. But today, to preserve the site in accordance with new legislation and thinking, *in situ* management should and can be a multidisciplinary effort. This approach is illustrated with a case study of the preservation and stabilization of shoreline deposits at Lake Britton, California. (A.O.)

- Thorne, Robert M., Patricia M. Fay, and James J. Hester. 1987. **Archaeological Site Preservation Techniques: A Preliminary Review** (Environmental Impact Research Program, Technical Report EL-87-3). Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.

Archaeological site preservation as a practice is a newly emerging field, which combines a variety of civil engineering techniques with knowledge of the characteristics of archaeological properties. The scope of this report includes a review of techniques that have been employed in attempts to preserve and protect archaeological sites. Divided into techniques termed "natural" and "man-made," which have been applied to site situations termed "horizontal" and "vertical," a total of 29 methods is described. Ranging from earth burial and other vandal-prevention devices to natural and man-made camouflage and stream control structures, the techniques described provide an initial

summary of the technology currently available in archaeological site preservation and protection. (aa abridged)

U.S. Army Corps of Engineers. 1988. **The Archaeological Sites Protection and Preservation Notebook** (Environmental Impact Research Program). Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.

This loose-leaf format notebook was first issued in 1988 and is periodically updated with supplements. It is one of many U.S. Army Corps of Engineers' contributions to the preservation of archaeological resources, which are published under the auspices of the Environmental Impact Research Program. The topics presently covered in the notebook are impacts, site burial, structural stabilization (of sites), soil and rock stabilization, vegetative stabilization, camouflages and diversionary tactics, site surveillance, stabilization of existing structures, faunal and floral control, signs, and inundation. The contributions are site-specific reports describing and evaluating measures undertaken to preserve archaeological sites. Impacts, site burial, and structural stabilization are the subject areas that have received the most contributions thus far. (M.D.)

Wainwright, John. 1994. *Erosion of archaeological sites: results and implications of a site simulation model*. **Geoarchaeology: An International Journal** 9, no. 3, 173-201.

A computer simulation model was developed to investigate the postdepositional changes on archaeological sites due to soil erosion in a semi-arid environment. The model is applied to a series of hypothetical site configurations on hillsides, using archaeological structures, to observe the morphological changes due to slope form. The results show considerable variation in site preservation potential, relating to different initial spatial patterning of the site and initial slope form. Implications are drawn from the results of the simulations, both in terms of archaeological theory and practice, and in terms of site conservation and management. (aa abridged)

Zallar, S.A., K. Siow, and P.J.F. Coutts. 1979. **Stabilization of Coastal Archaeological Sites in Victoria. A Pilot Study** (A joint publication by the Soil Conservation Authority and the Victoria Archaeological Survey). Victoria, Australia: Ministry for Conservation.

Comparative study of different techniques to stabilize eroding coastal Aboriginal sites in Australia. Techniques discussed include brush matting, tire mattresses, fences, dune re-shaping by machinery, and vegetative and chemical stabilization. (N.S.P.)

Zielinski, Adam. 1989. *In-situ conservation of the Temple of Amun Nakht, Ayn Birbiyeh, Dakhleh Oasis in Egypt*. **Association for Preservation Technology Bulletin** 21, no. 1, 49-60.

This report of conservation measures undertaken at the site of Ayn Birbiyeh includes a brief description of the use of plantings as a permanent windbreak. The planting of trees in a semicircle approximately 100 m from the site is meant to protect it from wind-blown sand carried by the prevailing N-NW winds. (M.D.)

[Bib. ix: 42 ref.]

ANNOTATED BIBLIOGRAPHY IX: Consolidation and Stabilization of Structures

Adam, Jean-Pierre, and Michel Frizot. 1983. **Degradation et restauration de l'architecture pompéienne**. Paris: Centre National de la Recherche Scientifique.

French. A rare global review for an individual site of construction (materials and techniques), causes of deterioration, mortar analysis, conservation proposals (including wall consolidation, rectification of earthquake damage, elimination of damp, control of vegetation). (J.St.)

Aeschlimann, Hans-Ulrich. 1995. *Instandsetzung des Borobodur-Tempels in Indonesien*. **Internationale Zeitschrift für Bauinstandsetzen** 1, no. 2, 125-134.

German with English summary. The struggle to save Borobodur has been one of the most complex and technically advanced historic preservation projects ever undertaken. Indonesia and UNESCO consulted international experts in architecture, engineering, soil mechanics, and stone conservation. Following their recommendations, the project set four goals: to install a new drainage system, to incorporate layers of epoxy/tar to keep rainwater from the temple's core, to set new reinforced concrete slabs under the balustrades and walls, and to conserve the original stones. (aa abridged)

Agnew, Neville (ed.). 1997. **Conservation of Ancient Sites on the Silk Road** (Proceedings of an International Conference on the Conservation of Grotto Sites, Mogao Grottoes at Dunhuang, October 1993). Los Angeles: The Getty Conservation Institute.

These extensive proceedings focus on the management and conservation of grotto or cave sites, primarily along the Silk Road in China but also at other sites in Asia and around the world. The papers are divided into broad categories of site management, conservation of materials, geotechnical and site stabilization issues, monitoring of the environment and microclimate, and characterization of pigments. The five articles, which discuss various methods of geotechnical stabilization applied to grottoes (grout, bolts and anchors, retaining walls, roof supports, water mitigation, etc.), are of particular relevance to archaeological sites. (A.O.)

Alva Balderrama, Alejandro, and Jeanne Marie Teutonico. 1983. *Notes on the manufacture of adobe blocks of earthen architecture*. In **International Symposium and Training Workshop on the Conservation of Adobe**. (Lima-Cusco, 10-22 September 1983), 41-54. Lima-Cusco: UNDP/UNESCO.

A concise guide for the characterization and analysis of soil types; the preparation of raw materials, and the manufacture of adobe bricks. (J.St.)

Ashurst, John. 1983. **Mortars, Plasters and Renders in Conservation**. London: Ecclesiastical Architects' and Surveyors' Association.

Description of the physical properties of binders, reinforcements, supports, aggregates; mortar analysis; maintenance and repair (with technical drawings). Slightly superseded by Ashurst and Ashurst 1988. (J.St.)

- . 1990. *Methods of repairing and consolidating stone buildings*. In John Ashurst and Francis G. Dimes (eds.), **Conservation of Building and Decorative Stone**. London: Butterworth-Heinemann.

This review of methods of consolidating stone buildings includes a section on the treatment of "monument sites," which refers to excavated or ruined masonry structures. Temporary protective systems, methods of consolidation, capping, and problems caused by vegetation are all considered. Grouting and poulticing are covered under historic masonry. Clear analysis, practical advice, and the recognition of the problems specific to ruins or excavated structures make this chapter especially valuable. (M.D.)

- Ashurst, John, and Nicola Ashurst. 1988. **Practical Building Conservation**. 5 vols. Aldershot: Gower Technical Press.

These are comprehensive manuals of modern materials and practices, of which volumes 1–3 are most useful for archaeological site conservation. Vol. 1, "Stone Masonry," covers repair and maintenance (including ruined structures), control of organic growth, grouting, plastic mortar repair, cleaning, desalination, and chemical consolidation. In Vol. 2, "Brick, Terracotta and Earth," the subjects are control of damp, mortar analysis, pointing stone and brick, and repair and maintenance of brick and earth-based materials. Vol. 3, "Mortars, Plasters and Renders," includes information on non-hydraulic lime, hydraulic limes and cements, additives, external renders, gypsum plasters; and detailed case studies of restoration of plasters in a ruined context. (J.St.)

- Atzeni, Cirillo, Maria Grazia Cabiddu, Luigi Massidda and Ulrico Sanna. 1996. *The use of 'stabilized earth' in the conservation of megalithic monuments*. **Conservation and Management of Archaeological Sites** 1, no. 3, 161–168.

The authors describe the process of designing and evaluating an earthen mortar, which could be used to impede water ingress into masonry structures and also act as an effective substrate for a water-repellent polymer. Of the seven mortars tested, that composed of earth, lime, sand, latex, and polypropylene fibers gave the desired results and was selected for field application at GennaMaria, a Middle-Late Bronze Age dry-stone tower in Sardinia. (A.O.)

- Baldi, Pio. 1982. *Tharros (Oristano Sardinia): Preservation of the Punic ditch; methodological considerations*. In **Mortars, Cements and Grouts used in the Conservation of Historic Buildings**, 249–253. Rome: ICCROM.

Theoretical outline of the role, frequency, and type of maintenance intervention as related to deterioration of an archaeological site. (J.St.)

- Barcellona, S., U. Santamaria, E. Borrelli, and M. Laurenzi Tabasso. 1993. *Evaluation of injection grouting for structural strengthening of ancient buildings*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 637–643. London: E. and F.N. Spon.

A methodology for evaluating the properties of hydraulic injection grouts was developed, and four commonly used Italian grouts were tested and compared. Chemical, physical, and mechanical properties, including workability, strength, sulfate resistance, porosity, and soluble salt content were evaluated using standardized tests. (A.O.)

Bendakir, Mahmoud, and François Vitoux. 1993. *Methodologie de recherche pour la preservation du site archeologique de Mari (Syrie)*. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 317–323. Lisboa: DGEMN.

French with English summary. The authors present the results of research into the migration of moisture through adobe walls, particularly as it relates to capillary rise and erosion of wall bases. Methods for repair and prevention of further damage are then described. (A.O.)

Berlucchi, N. and R. Ginanni Corradini. 1995. *Experimentation of a chemical-physical methodology for the reconstruction of historic mortars*. In **Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments** (Preprints: International Colloquium, Rome, 19–21 June 1995), 1–13. Rome: ICCROM.

This paper describes laboratory methods used to analyze historic bedding mortars found in the masonry walls of 16 historic monuments in Campania, Italy. Based upon the results, repair mortars were developed and then analyzed to compare them with the originals; a good correspondence between the historic and repair materials was achieved. (A.O.)

Böttger, K.G. and D. Knöfel. 1993. *Development and testing of injection mortars of high sulfate resistance*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 629–636. London: E. and F.N. Spon.

Lime and gypsum plasters in the Heydau Monastery, Germany, had detached from their substrates of sandstone, lime-based mortar, and gypsum-based mortar. To reattach the plasters, injection mortars of high sulfate resistance were developed and tested. (A.O.)

Bouineau, Alain. 1986. *Renforcement des maçonneries par injection de coulis*. **ICOMOS Information**, no. 3 (July/September), 3–7.

French with English, Spanish, and Italian summary. The traditional method of reinforcing the masonry of old buildings by injecting a simple cement or hydraulic lime grout poses several problems: collapse during the washing of the masonry, segregation of the grout and subsequent obstruction in the initial stages of the inspection, etc. The author sets out to study the effectiveness of sodium silicate and bentonite cement grouts by conducting a series of tests in which these substances are injected into experimental walls built according to traditional techniques. (aa abridged)

Brown, Gordon E. 1987. *Mortars for tropical archeological sites*. **APT Bulletin** 19, no. 3, 42–50.

The author, president of a concrete materials technology firm, experimented with various mortar mixes for tropical sites, using local material (sascab) and portland cement, in order to develop estimates of the strength and color of mixes. (M.D.)

Burland, J.B. and J.R. Standing. 1997. *Geotechnical monitoring of historic monuments*. In Carlo Viggiani (ed.), **Geotechnical Engineering for the Preservation of Monuments and Historic Sites** (Proceedings of the International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, Naples, Italy, 3–4 October 1996), 321–341. Rotterdam/Brookfield: A.A. Balkema.

This paper discusses the role of monitoring in the geotechnical stabilization and protection of historic monuments. Attention is drawn to two important types of monitoring: long-term monitoring, which can be invaluable in determining the need for and deciding upon the most appropriate stabilization measures, and real-time monitoring, which can be used to monitor a structure during nearby construction activity or during stabilization of the monument itself. Measurements of movement of the Leaning Tower of Pisa and the Palace of Westminster, London, are used to illustrate both types of monitoring. (aa edited)

Chiari, Giacomo. 1983. *Characterization of adobe as building material. Preservation techniques*. In **Adobe. International Symposium and Training Workshop on the Conservation of Adobe** (Lima-Cusco, 10-22 September 1983), 31-40. Lima-Cusco: UNDP/UNESCO.

Concise review of adobe preservation, with a classification of soil types, appropriate physical-chemical analysis, deterioration processes and methods of conservation. (J.St.)

Chinchón Yepes, Servando. 1994. *Morteros y hormigones antiguos y de reparación*. In **Cuadernos 3. Conservación Arqueológica. Reflexión y debate sobre teoría y práctica** (Contenido del Curso-Debate realizado en Sevilla del 30 de noviembre al 4 de diciembre de 1992), 106-112. Sevilla: Consejería de cultura y medio ambiente.

Spanish. The author describes the common components of ancient and modern mortars, and makes recommendations for materials with which to repair them. (A.O.)

D'Ayala, D. and G. Croci. 1993. *Dynamic analysis of walls reinforced with polymeric fibres*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 460-467. London: E. and F.N. Spon.

This paper is concerned with the experimental dynamic analysis of tufa shearwalls reinforced with polymeric ropes. The use of this kind of rope improves the durability of the reinforced masonry by avoiding the problem of corrosion. The design and layout of the reinforcement is simplified and, as the rope acts as a thread tying the wall together, the overall mechanical behaviour may be improved. (aa abridged)

Dayre, Michel, and Emmanuel Kenmogne. 1993. *Comportement de differents systemes de protection superficielle des constructions en terre: resultats d'une campagne d'observation sur murets*. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 475-479. Lisboa: DGEMN.

French with English summary. Protective coatings were applied to earthen test walls to evaluate their performance in a temperate climate. Coatings included lime or cement washes, lime/sand/cement mortars, paints, and chemical consolidants; the performance of each is evaluated after eight years of exposure. (A.O.)

Frizot, Michel. 1972. **Mortiers et enduits peints antique – étude technique et archéologique**. Dijon: Centre de recherches sur les techniques greco-romaines.

French. Detailed technical discussion of Roman mortars and renders, with comparative review of appropriate methods of analysis: chemical, physical, and geological. (J.St.)

Gallieri, Gianoberto. 1993. *L'uso della terra cruda nella manutenzione del sito archeologico di Monte Bibele*. In Luisa Masetti Bitelli (ed.), **Archeologia: Recupero e Conservazione** (La Conservazione e il Restauro Oggi 3), 151-167. Firenze: Nardini.

Italian. First excavated in the early 1960s, this Etruscan and later Celtic site has not been inhabited since its sudden destruction in the third century B.C.E. It was built of local earth and sandstone. The project of intervention was based on careful investigation of work already applied in a program of comprehensive conservation of the site. Three main goals were identified: to channel and drain rainwater; to construct protective systems for the wall surfaces and rows of crests; and to reconstruct elevations along visitor paths. Preference was given to using local raw earth, and a long corridor was selected for research prior to the intervention. A detailed chronological and methodological account of the intervention concludes the chapter. (AATA)

Gavarini, Carlo. 1994. *Monument safety in seismic areas*. **Earthquake Spectra** 10, no. 1, 189-195.

New buildings must comply with modern safety codes and regulations, and these are often applied to historic monuments with questionable results. In order to reconcile the needs of safety and the needs of building preservation, the author proposes a parallel code for the seismic protection of monuments. A basic outline for the new code is presented and discussed. (A.O.)

Hoyle, Ana Maria, Jose Carcelen, and Federico Saavedra. 1993. *Conservation of the Tomaval Castle*. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 222-227. Lisboa: DGEMN.

English with French summary. This article describes the stabilization of an ancient adobe brick structure in Peru, in anticipation of damage, which might be caused by construction of a nearby tunnel and by natural seismic activity. Conservation measures included removal of loose fill; construction of wooden scaffolds to reinforce the walls; construction of adobe veneer walls and buttresses, which incorporated the scaffolds for further support; limited anastylosis; and wall capping. (A.O.)

Hughes, Richard. 1988. *Problems and techniques of using fresh soils in the structural repair of decayed wall fabric*. In **5th International Meeting of Experts in the Conservation of Eastern Architecture** (Rome, 22-23 October 1987), 59-69. Rome: ICCROM & CRATERRE.

An explanation of poor performance of fresh soil used in adobe conservation with practical guidelines for the manufacture of improved materials. (J.St.)

ICCROM. 1982. **Mortars, Cements and Grouts used in the Conservation of Historic Buildings** (Symposium, Rome, 3-6 November 1981). Rome: ICCROM.

Conference papers with emphasis on repair mortars (properties and specifications), grouts, and analysis of ancient mortar. (J.St.)

Kimmel, Ross. 1984. *Fort Frederick wall: analysis and stabilization*. **Association for Preservation Technology Bulletin** 16, no. 2, 33–43.

A description of the consolidation (grouting and tying), pointing, and capping (with a urethane membrane) of a ruined fort. (J.St.)

Koshman, David. 1988. *Stabilizing ruins. Coal mining ruins at Leitch Collieries*. **Association for Preservation Technology Bulletin** 20, no. 4, 55–61.

Historic ruins, constructed of stone and pre-cast concrete, were stabilized employing a number of techniques: a pre-cast concrete, sloped capping for the tops of walls, underpinning of footings with concrete to prevent further settlement, bracing of the structure with glue-laminated beams to resist lateral forces, structural epoxies to mend fractures, and the use of concrete buttresses to stabilize a wall. (M.D.)

Laurenzi Tabasso, M., and P. Sammuri. 1984. *Evaluation of mortars for use in conservation from the standpoint of the release of soluble salts*. In **ICOM Committee for Conservation. 7th Triennial Meeting** (Copenhagen, 10–14 September 1984. Preprints). Paris: ICOM and J. Paul Getty Trust.

Outline of a basic experimental procedure to determine soluble salt content in repair mortar and analyses of salt content in a range of hydraulic and non-hydraulic mixes. (J.St.)

Ndoro, Webber. 1995. *Restoration of dry-stone walls at the Great Zimbabwe archaeological site*. **Conservation and Management of Archaeological Sites** 1, no. 2, 87–96.

The author describes the current program for monitoring and conserving the dry-stone walls of Great Zimbabwe and discusses the philosophy that guided the choice of conservation methods used. These methods include dismantling and reconstructing unstable walls and also reconstructing fallen walls. (A.O.)

Papayianni, I. and K. Theocharidou. 1993. *Efflorescence tendency of mortars used in interventions on old masonry*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 621–626. London: E. and F.N. Spon.

To better understand the problem of efflorescence in repair mortars, the authors determined the soluble salt content of common repair materials (portland cement, lime, pozzolans, sand, and brick powder), and then analyzed the physical properties of 14 repair mixtures. Correlations were made between the physical properties of the mortars and their tendency to effloresce. (A.O.)

Paterakis, Alice Boccia. 1987. *The deterioration of ceramics by soluble salts and methods for monitoring their removal*. In **Recent Advances in the Conservation and Analysis of Artifacts**, 67–72. London: University of London, Institute of Archaeology.

A summary of the characteristics and effects of soluble salts, and review of qualitative and quantitative tests for their identification and for monitoring their removal; with reference to archaeological ceramics but also partly applicable to masonry and mortar. (J.St.)

Peroni, Simonetta et al. 1982. *Lime-based mortars for the repair of ancient masonry and possible substitutes*. In **Mortars, Cements and Grouts used in the Conservation of Historic Buildings** (Symposium, Rome, 3–6 November 1981), 63–100. Rome: ICCROM.

A fundamental review and comparative analysis of lime vs. cement mortars, defining ideal mortar characteristics, test results in analytical tables, and concluding with proposed specifications for the optimal mortar mix. (J.St.)

Richert, Roland von S., and R. Gordon Vivian. 1974. **Ruins Stabilization in the Southwestern United States**. Washington, DC: U.S. Department of the Interior.

A practical manual for consolidation of stone and adobe ruins, with detailed examples still of modern relevance. The materials discussed are outdated and need to be reviewed critically. (J.St.)

Rodrigues, J. Delgado. 1988. *Dry-stone wall monuments. Structural behavior, disturbing mechanisms and conservation procedures*. In Paul G. Marinos and George C. Koukis (eds), **Engineering Geology of Ancient Works, Monuments and Historical Sites**, vol. 2, 1001–1006. Rotterdam: A.A. Balkema.

Dry-stone walls are found in some of the more interesting monuments of the sub-Saharan Africa. The dimensions and forms of the stone blocks used and the method of construction are responsible for the structural behavior of the walls. Poor interlocking is a major internal cause of disturbance. External agents such as visitors, vegetation, and wild animals may also promote significant decay. Some remedial measures to improve the structural behavior and to cope with external causes of disturbance are presented and discussed. (aa)

Schuller, M.P., R.H. Atkinson and J.L. Noland. 1995. *Structural evaluation of historic masonry buildings*. **APT Bulletin** 26, no. 2–3, 51–61.

A clear depiction and concise summary of simple, non-destructive techniques for evaluating the structural integrity of historic buildings; most techniques are applicable to archaeological sites as well. Techniques include wave transmission, ultrasonic pulse velocity, mechanical pulse, impact-echo, surface hardness, and *in situ* tests of stress, deformability, shear strength, and tensile strength. (A.O.)

Starosta, Ute. 1999. *Structural concepts of anastylosis*. **Conservation and Management of Archaeological Sites** 3, nos. 1 and 2, 83–90.

In this historical review of the structural implications of anastylosis, the author analyzed and compared 28 projects, both historic and modern, involving anastylosis of classical Greek and Roman structures. The structural properties of the original and new structures are considered, and the supporting systems used are also considered in light of the theories and technical limitations of the time. (A.O.)

Teutonico, Jeanne Marie. 1988. **A Laboratory Manual for Architectural Conservators**. Rome: ICCROM.

A compendium of practical laboratory analyses, with emphasis on masonry materials (stone, brick, adobe, mortar) including: water absorption, porosity, identification of soluble/insoluble salts, particle size analysis, plastic/liquid limit of soils, analysis of lime mortar. (J.St.)

Torraca, Giorgio. 1981. **Porous Building Materials. Materials Science for Architectural Conservation**. Rome: ICCROM.

An elementary but fundamental review of processes of deterioration in porous masonry materials; the composition of mortars and clays; and conservation materials and techniques for stone and adobe. (J.St.)

Walker, P.J. and J.G. Dickens. 1993. *Intervention techniques in the conservation of dry-stone structures*. In M.-J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 452-459. London: E. and F.N. Spon.

Dry-stone walls at Great Zimbabwe were analyzed and monitored to determine causes of deterioration. Intervention options and techniques were then considered; these included improving the wall itself (which requires dismantling and relaying the core while maintaining the exterior courses), improving drainage, improving foundations, and introducing lateral supports. (A.O.)

Weaver, Martin E. *Reviewing structural conservation measures for heritage resources in rock*. In **The Safeguard of the Rock-Hewn Churches of the Göreme Valley** (Proceedings of an International Seminar, Ürgüp, Cappadocia, Turkey, 5-10 September 1993), 151-162. Rome: ICCROM.

A review of traditional and current conservation approaches to structural stabilization, especially as they apply to natural rock, and a summary of a new Cintec Harke anchor/Presstec grout system which can be used for structural stabilization of weak materials. (A.O.)

Wimble, Andy, and John Thompson. 1993. *Natural wall cappings*. **English Heritage Scientific and Technical Review** no. 2, 11-12.

After reviewing recent use of various techniques employing turf and other flora ('soft capping') for the consolidation of ruined stone structures at Jervaulx, Bolingbroke, and Tintagel, the article reports on the experiments at the eighteenth-century garrison on the island of St. Mary. Here, in 1992, the authors used a mixture of soil and proprietary material called DANU as a growing medium to help re-establish the natural flora on top of 1-2 m high granite walls of the garrison. (AATA)

[Bib. X: 14 ref.]

ANNOTATED BIBLIOGRAPHY X: Vegetation Control

Adam, Jean-Pierre. 1983. **Dégradation et restauration de l'architecture pompéienne**. Paris: Centre National de la Recherche Scientifique.

French. In his study of Pompeii, the author devotes considerable attention to the problems of vegetation at the site and discusses four herbicides that he feels can be used with minimal environmental risk: simazine, diuron, glyphosate, and the phytohormone 2-4-D. (M.D.)

Caneva, Giulia, and Giovanni De Marco. 1986. *Il controllo della vegetazione nelle zone archeologiche e monumentali*. In **Manutenzione e conservazione del costruito fra tradizione ed innovazione** (Atti del convegno di Studi, Bressanone, 24-27 Giugno 1986), 553-570. Padua: Libreria Progetto Editore.

Italian with English abstract. The traditional and current approaches to the problems of vegetation control in archaeological sites are analysed in relation to the philosophy of conservation and the problems of environmental impact. Various methods of mechanical, physical, biological, and chemical control are described, with particular emphasis on herbicides currently used and tested. (aa abridged)

Catizone, Pietro, Elena Tibiletti, Roberto Miravalle, and Francesco Corallo. 1993. *Gestione della vegetazione nei siti archeologici: le esperienze di Pompei e Selinunte*. In Luisa Masetti Bitelli (ed.), **La Conservazione e il Restauro Oggi 3: Archeologia: Recupero e Conservazione**, 185-203. Firenze: Nardini.

Italian. The authors describe the development and use of a three-phased vegetation management strategy in areas within the archaeological sites of Pompeii and Selinunte. Invasive, undesirable, and/or harmful species are first removed with commercial herbicides, then native or desirable species are planted, and finally a maintenance plan is implemented; initial results are positive. (A.O.)

Fearn, James E. 1978. **The Effects of Herbicides on Masonry**. Washington, D.C.: National Bureau of Standards, U.S. Department of Commerce, National Technical Information Service.

In preserving historic structures, the control of obnoxious vegetation is a serious problem. To deal with this problem, a number of organic herbicides have been developed by industry. The efficacy of herbicides in the control of plant life has been studied to a great degree; but heretofore, very little has been reported about the possible effects of these chemical plant killers on the materials of historic structures. In this work, an exhaustive survey of pertinent literature has been undertaken. Obtaining very little specific information from literature, a correlation has been drawn between the effects on masonry of materials similar in chemistry to herbicides and the effects that would be expected from the herbicides themselves. Methods for checking the validity of conclusions are suggested. (aa)

Hamel, G., and K. Jones. 1982. **Manual of Vegetation Management on New Zealand Archaeological Sites**. Wellington: New Zealand Historic Places Trust.

This manual discusses the problems and sets forth guidelines for the management of vegetation on New Zealand archaeological sites. The emphasis is on proper management strategies, which will depend on how the site is to be used (e.g., public access or protection for future research). While the plant species under discussion may be geographically limited, the principles applied are universally applicable. (M.D.)

Hansen, Gary W., Floyd E. Oliver, and N.E. Otto. 1984. **Herbicide Manual** (A guide to supervise pest management and to train O & M personnel). Denver: Bureau of Reclamation.

This manual was produced for the management personnel in the U.S. Bureau of Reclamation. Particularly valuable is the classification of herbicides. Also discussed are factors affecting chemical control of weeds; calculations and calibrations for herbicide application; and the design and operation of weed sprayers. (M.D.)

Herbicide Handbook of the Weed Science Society of America (6th ed.). Champaign, IL: The Weed Science Society of America. 1989.

Periodically updated, this handbook contains a complete classification of herbicides, which includes their chemical composition, uses, and toxicity levels. (M.D.)

Monte, M., and I. Roncuzzi Fiorentini. 1988. *Traitments par biocides des mosaïques de pavement en plein air: ancien porche sud – Basilique Santa Croce de Ravenna*. In **Vith International Congress on Deterioration and Conservation of Stone. Supplement** (Torun, 12–14 November 1988). Torun: Nicholas Copernicus University, 120–127.

French. Description and assessment of results of a systematic study, over a period of three years, of the application of specific biocides to a mosaic. (J.St.)

Mouga, Teresa M. L. S. and Maria Teresa F. Almeida. 1994. *Excavated monuments as environment for plants. Conimbriga, Portugal: a study case*. In Vasco Fassina, Heinrich Ott and Fulvio Zezza (eds.), **The Conservation of Monuments in the Mediterranean Basin** (Proceedings of the 3rd International Symposium, Venezia, 1994), 323–328. Venezia: Soprintendenza ai beni artistici e storici di Venezia.

The authors conducted a three-year vegetation study on excavated and unexcavated portions of the Roman town. Vegetative types are determined by the microclimate, substrate, human intervention, and age of the excavation, but all are potentially damaging to the resource through mechanical and chemical action, and through alteration of the microclimate. (A.O.)

Otto, N.E. 1970. **Evaluation of Soil-applied Herbicides for Vegetation Control** (Research Report No. 22. A Water Resources Technical Publication). Bureau of Reclamation, U.S. Dept of the Interior.

Twenty-seven soil-applied herbicide formulations were evaluated for ability to provide complete vegetation control in an arid area. Observational ratings of test plots indicate that the herbicides

prometone and isocil consistently produced the best overall plant control at median and high rates of treatment over a period of five years. Diuron provided excellent control at the high rate only. Bromacil was found to be equal to isocil. A summary of overall performance of each herbicide and rate of application is presented. (aa abridged)

Sameño Puerto, Marta, Rosario Villegas Sánchez, and Jorge García Rowe. 1996. *Inventario de la vegetación y estudio de la interferencia biocida con los materiales pétreos del yacimiento del cerro de la plaza de armas de Puente Tablas (JAÉN)*. **PH** (Boletín del Instituto Andaluz del Patrimonio Histórico) 4, no. 14, 67-74.

Spanish. The authors describe their research at Puente Tablas, which included an inventory of microflora and higher plant forms affecting the site, selection of herbicides for their effectiveness in removing these species and inhibiting future growth, and instrumental evaluation of the effects of the herbicides on the physical properties of the building stone, including capillary absorption and color. (A.O.)

Speranza, M., E. Tibiletti and P. Catizone. 1993. *Basic study of vegetation management in archaeological sites: experience at Selinunte*. **Science and Technology for Cultural Heritage** 2, 87-98.

English with Italian summary. A study was made of the vegetation in the archaeological area of Selinunte (Trapani, Italy) to collect data, which, along with other information, might be used to control the plant communities on the site. This paper describes the types of vegetation identified and the dynamic links and relationships between the vegetation and the archaeological structures. On the basis of this information, some suggestions are given for the management of the vegetation studied. [See also Catizone et al. 1993.] (aa abridged)

Warnock, Robert A., Lila Fendrick, Barbara E. Hightower, and Terry Denise Tatum. 1983. **Vegetative Threats to Historic Sites and Structures** (Prepared for the National Park Service, National Capital Region, Washington, D.C.). National Technical Information Service.

This study of vegetative threats to buildings, structures, and landscapes within the National Capital Region of the National Park Service attempts to examine the preservation issues relative to the crucial point at which vegetation threatens to overwhelm and damage the integrity of historic resources. The purpose of this report is to provide the National Capital Region with suggestions for the formulation of a philosophy for vegetation management. Using specific site examples, a range of vegetative conditions and problems has been documented. Mitigation measures, preventive maintenance solutions, and management recommendations have been made bearing in mind the interpretive goals of each site. (aa)

Villa, Alberto. 1978. *The removal of weeds from outdoor mosaic surfaces*. In **Mosaics. No. 1. Deterioration and Conservation** (First International Symposium on the Conservation of Mosaics, Rome, November 1977), 49-53. Rome: ICCROM.

A review of the role of herbicides both in pre- and post-conservation maintenance, classification of herbicides and criteria for their selection. (J.St.)

[Bib. XI: 84 ref.]

ANNOTATED BIBLIOGRAPHY XI: Protective Roofing and Shelters

- Agnew, Neville, Shin Maekawa, Richard Coffman, and Jeff Meyer. 1996. *Evaluation of the performance of a lightweight modular site shelter: Quantitative meteorological data and protective indices for the 'hexashelter'*. **Conservation and Management of Archaeological Sites** 1(3), 139–150.

The authors describe the rationale behind the development of a prototype shelter, the six-sided 'hexashelter', for protection of archaeological sites. The shelter was designed as a lightweight, modular system, which would be easy to erect and relatively inexpensive. The performance of the shelter was evaluated quantitatively by comparing meteorological parameters inside and outside the shelter, and by the use of adobe test walls for comparative weathering, likewise under and outside the shelter. (M.D.)

- Agnew, Neville H., and Mary Wade. 1986. *A case study of a paleontological site—the need for planning and protection*. In **Preventive Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November 1985), 257–270. Rome: ICCROM.

This general discussion of the problems of conserving a fragile fossil site includes a brief description of the metal-framed protective roof over this dinosaur trackway in Australia and the problems associated with its construction and performance. The absence of a fence around the site allowed kangaroos to enter the shelter; the open shelter provided no protection against wind-blown dust and rain. Illus. For a more contextual overview see also Agnew, Neville, Heather Griffin, Mary Wade, Terence Tebble, and Warren Oxnam. 1989. *Strategies and techniques for the preservation of fossil tracksites: an Australian example*. In David D. Gillette and Martin G. Lockley (eds.), **Dinosaur Tracks and Traces**. Cambridge: Cambridge University Press. (M.D.)

- Agnew, Neville and Richard Coffman. 1991. *Development and evaluation of the hexashelter*. In N. Stanley-Price (ed.), **The Conservation of the Orpheus Mosaic at Paphos, Cyprus**, 36–41. Los Angeles: The J. Paul Getty Trust.

Description of the materials, design, and construction of a light-weight, modular, temporary shelter, the 'hexashelter', over the Orpheus mosaic in Paphos. The potential advantages of this prototype shelter are its low cost; aesthetic compatibility with the environment and adaptability to irregular terrain; its ease of dismantling, reuse, and extension; and its use of on-ground concrete footings to prevent damage to the archaeology. The disadvantages are that the aerotextile side panels do not exclude water completely and the covering membrane cannot withstand heavy vertical loads. (M.D.)

- Altoon and Porter. 1998. **Architects. Context and Conscience**. Milano: L'Arca Edizioni, 62–65.

A brief description with photos of a model and architectural drawings of a proposed shelter design to protect the David Alfaro Siqueiros mural in Los Angeles. The design by a Los Angeles architectural firm was part of a project by the Getty Conservation Institute to conserve the 1932 mural. The design concept (which included seating and audio-visual facilities for interpretation) and innovative use of materials and technology (teflon-coated fiberglass and rotating vertical screens to shield the mural from light) are described. The shelter design was never implemented. (M.D.)

Alva Balderrama, Alejandro, and Giacomo Chiari. 1995. *Protection and conservation of excavated structures of mudbrick*. In N. Stanley Price (ed.), **Conservation on Archaeological Excavations with Particular Reference to the Mediterranean Area** (second edition), 101–112. Rome: ICCROM.

This report includes a restatement of the 1980 Ankara proposals for research into the design and construction of protective shelters and for the requirements of temporary protection, as well as a brief description and evaluation of the metal-framed protective shelter at the Neolithic site of Tenta, Cyprus (Plate 1) and the temporary shelter utilizing traditional materials at Chan Chan, Peru (Plate 2). (M.D.)

Amendolea, Bruno (ed.). 1994. **I siti archeologici: un problema di musealizzazione all'aperto** (Secondo seminario di studi Roma, Gennaio 1994). Rome: Gruppo Editoriale Internazionale.

Italian. This compilation of articles focuses on the *in situ* preservation of the archaeological heritage in Italy, although other sites in the Mediterranean region are presented. At many of the sites, shelters have been proposed and/or erected to protect the ruins; a diverse selection is illustrated and discussed in five of the case studies. See also Amendolea et al. 1988. (A.O.)

Amendolea, Bruno, Rosanna Cazzella, and Laura Indrio (eds.). 1988. **I siti archeologici: un problema di musealizzazione all'aperto** (Primo seminario di studi Roma, Febbraio 1988). Rome: Multigrafica Editrice.

Italian. This is a compilation of articles on the problems of and solutions to preserving sites in the open; most of the sites are in Italy, a few in the UK and elsewhere. Includes discussion and/or photos of various actual and proposed protective schemes, which are presented in the context of the larger efforts to preserve and present these sites. (M.D.)

Aslan, Zaki. 1997. *Protective structures for the conservation and presentation of archaeological sites*. **Journal of Conservation and Museum Studies** (3) 9–26.

This article provides a broad overview of the research the author is undertaking at the Institute of Archaeology, University College, London. Using selected examples mainly from Europe and the Mediterranean, the author explores the types of protective shelters over archaeological sites and offers a general assessment of their effectiveness and common problems. Sheltering is looked at in the overall context of issues of conservation and presentation of archaeological sites. The author concludes with an emphasis on the need to develop a methodology for shelter design. (M.D.)

Bahn, Paul G., Robert G. Bednarik, and Jack Steinbring. 1995. *The Peterborough petroglyph site: reflections on massive intervention in rock art*. **Rock Art Research** 12 (1) 29–41.

The authors offer a critical and extensive assessment of the enclosed shelter constructed over the petroglyph site at Peterborough, Canada. (See Wainwright et al. 1997 for a detailed description of the shelter and rationale for its construction.) The shelter is severely criticized as a massive intervention to a rock art site and its associated environment, without clear criteria or a rationale for construction (i.e., the main threats or causes of deterioration). The authors state the need for objective performance evaluation of shelter interventions and candid reporting if we are to learn from others' experience. Illus. Extensive commentary on the controversy surrounding the

Peterborough shelter in response to this article can be found in *Rock Art Research* 13 (1) 1996, 47–60; 14 (1) 1997, 53–58. (M.D.)

Bahn, Paul G, and Anne–Sophie Hygen. 1996. *More on massive intervention: the Aspeberget structure*. **Rock Art Research** 13 (2) 137–138.

A brief critical review of a structure built to protect temporarily a rock art site in Sweden. The temporary, experimental shelter was built in 1989 after it was clear that the rock art was suffering from exposure to the environment. By 1996 it was recognized as a failure and removed. Further experimentation for sheltering the petroglyph panel was proposed to take place on sites with no rock art. Illus. (M.D.)

Barker, Philip. 1986. *Temporary shelters and site protection*. In **Preventive Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November 1985), 45–50. Rome: ICCROM.

The author describes methods of providing temporary shelter over archaeological remains during excavation, utilizing simple polyethylene–covered “horticultural tunnels”. (M.D.)

Bertaux, Jean–Paul, Michel Goutal, Jean–Michel Mechling, Patrick Meistersheim and Jean–Pierre Crevoisier. 1998. *The Gallo–Roman sanctuary at Grand, France. II: The protection and development of the amphitheatre*. **Conservation and Management of Archaeological Sites** 2 (4) 217–228.

An innovative shelter was designed to protect the vulnerable stone remains of the amphitheatre, to partially recreate the original volume and shape of the structure, and to provide a venue for cultural events. The shelter incorporated tiers of seating and was constructed of a metal and reinforced–concrete frame covered with laminated wooden beams (glulam). Conceptual drawings, cross–sections, and photographs are provided. Entertainment types and spectator/production infrastructures are also considered. (A.O.)

Bikai, Pierre M., and Patricia M. Bikai. 1997. *Caring for the cultural heritage: shelters*. **ACOR (American Center of Oriental Research) Newsletter** 9 (1) 1–3.

The authors describe five shelters in Jordan, four at Madaba and one at Petra. The shelters range from an environmentally–controlled, tile–roofed stone building in an urban setting to an open–air space frame construction within a larger archaeological site (Petra). A table is included which lists the final cost and the criteria that influenced the design of each shelter. (A.O.)

Bruno, Andrea. 1987. *Protecting and preserving the column of Marcus Aurelius*. **Museum** 39 (1) 2–7.

Urban pollution is destroying the monuments of Rome, many of which were covered with scaffolding and protective netting. Architect Andrea Bruno discusses the proposal for the protection of the column of Marcus Aurelius, which called for the construction of a glass structure with steel supports and a mobile (elevator) platform. This design allowed for the protection and continued viewing of the monument while restoration work proceeds. Illus. See also Miarelli Mariani 1986 and *Technology Trends* 1985. (M.D.)

Caperton, Thomas J. 1993. Long-term preservation issues related to earthen archeological sites. In **7ª Conferência Internacional sobre o Estudo e Conservação da Arquitectura de Terra** (Silves, Portugal, 24 a 29 de Outubro 1993), 324-329. Lisboa: DGEMN.

This article provides a critical evaluation of past preservation techniques used to stabilize the adobe walls at Fort Selden, New Mexico. These have included alterations to site drainage, repair of wall bases and installation of wall caps using adobe bricks and shelter coats, and test applications of chemical consolidants and amendments for earth. Recent trial techniques are described, including the reburial of several low walls and the protection of taller walls with geotextile shelters. (A.O.)

Carroll, Scott. 1998. *Temporary protection of a tel site excavation in central Turkey*. **Conservation and Management of Archaeological Sites** 2 (3) 155-162.

The shelter used at Kaman-Kalehöyük is a rare example of a temporary structure designed to protect an excavation between seasons. The reusable shelter, an alternative to backfilling, is constructed over the main excavation trench at the end of each season and dismantled at the start of the next. Wooden timbers are used for framing, and vertical members are set on flat boards which serve as footers. The large structure (40 m wide and 120 m long) is roofed with corrugated metal and fitted with gutters to control drainage. After considering the advantages and disadvantages of the system, the author argues in its favor and advocates similar measures at other sites. (A.O.)

Cerulli Irelli, Maria Guiseppina. 1985. *Il Problema delle Coperture dei Complessi Archeologici di Pompei ed Ercolano Attraverso due Secoli e Mezzo di Scavi*. **Restauro** 81, 7-11.

Italian. One of three articles in *Restauro* 81 devoted to "Coperture e protezione di zone archeologiche". This contribution is an historical outline of solutions adopted for the protection of excavated structures in Herculaneum and Pompeii. (M.D.)

Connor, Patricia, and Kenneth Pearson. 1968. *The birth of the Fishbourne Roman Palace Museum*. **Museums Journal** 68 (3), 115-117.

The decision-making process and rationales for the interior design of the Fishbourne Museum, which protects a Roman palace with its mosaics, are discussed by those responsible for much of the interior display. A key element of the interior design was that the visitors should follow a prescribed pathway, along which the history of the site would unfold. The design of the actual shelter is not discussed. (M.D.)

Conservation and Management of Archaeological Sites. Special Issue on Protective Shelters. Volume 5, Numbers 1 & 2. 2001.

This entire volume of the journal is devoted to papers on protective shelters for archaeological sites. The majority of papers are the result of a colloquium on protective shelters organized in January 2001 by the US/ICOMOS Specialized Committee on Earthen Architecture, the U.S. National Park Service, New Mexico State Monuments, and the Getty Conservation Institute. The papers cover the decision to shelter, establishing conservation and design criteria, and evaluating shelter

performance. Additional papers on a research project for protective shelters in Italy and a conference on shelters held in Bologna in 2000 are included. The volume constitutes a comprehensive overview of the issues relating to protective shelters. (M/D.)

Cortes, Javier. 1989. *Sistemas de cobertura de mosaicos conservados in situ*. **I coloquio nacional de conservación de mosaicos, Palencia 1989**, 143–149. Palencia: Diputación Provincial, Departamento de Cultura.

Author discusses shelters for mosaics in Roman villas in the region of Palencia, Spain, in general and in relation to the construction of a permanent shelter over one villa. The main criterion for a shelter is to respect and protect the archaeological remains; all other criteria are subjective. Enclosed shelters are essential for harsh climates such as prevail in Palencia, but control of the internal climate can be problematic depending on selection of construction materials. For mosaics it is suggested that illumination be from the north to avoid shadows. (J.S./M.D.)

De Bussac, G. 1997. *Archi-archéo. 12 structures de protection de fouilles archéologiques* (Ecole d'Architecture de Clermont-Ferrand). <http://www.gdebussac.net/eacf/> (March 2001).

French. This Web site presents a very brief overview of 12 studio design projects of structures to protect and present archaeological sites. The designs, done in 1995, are the work of architectural students of the Ecole d'Architecture Clermont-Ferrand. Illus. See also *Archi-Archeo. Douze structures de protection de fouilles archéologiques*. (Ecole d'Architecture de Clermont-Ferrand). G. de Bussac, s.a., Clermont-Ferrand (1997). (Available from G. de Bussac, s.a., 2 cours Sablon, 63000 Clermont-Ferrand, France. fax + 33 4 73 92 37 69; email: gdb@gdebussac.fr) (M.D.)

Demas, Martha. 1990. *Chapter IV. Protective Shelters. Preserving the Archaeological Record: Post-Excavation Site Conservation*, 231–313. MA thesis, Cornell University.

An overview of the practice of protecting archaeological sites with shelters, based mainly on a review of the literature prior to 1990, with particular reference to Schmidt's 1988 shelter categories and information about the types of materials used for shelters. The overview is arranged by category of shelter: open shelters (metal frame, reinforced concrete, and wood constructions) vs. closed shelters (representational and extra-mural shelters). (M.D.)

De Silva, T.K.N. 1986. *Roof over a monument. Sri Lankan experience*. In **Protective Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November 1985), 271–280. Rome: ICCROM.

The author discusses both temporary and permanent roofing solutions utilized for Sri Lankan monuments. Permanent roofs over stupas (funeral tumuli), statues, and image houses have ranged from traditional designs (e.g., the re-creation of an image house of brick over the Buddha statue at Aukana) to concrete roofs and proposed wood-framed structures. The difficulties of reconciling the religious-cultural-aesthetic values of the monuments with the technical-conservation requirements are underscored. (M.D.)

Dimacopoulos, Jordan E. 1995. *A Shelter in the Style of a Tumulus. Vergina, an Underground Archaeological Site and Museum in the Type of a Crypt*. Athens: Archaeological Receipts Fund.

A detailed account of the excavation and elaborate protection of five Macedonian monuments at Vergina, Greece, which were originally buried under a large earthen tumulus. The tumulus was destroyed during the excavations, but to protect the structures and house a museum, four interconnected hexagonal shelters were constructed and buried under a new tumulus. (A.O.)

Doumas, Christos. 1983. *Thera. Pompeii of the Ancient Aegean*. London: Thames and Hudson.

This account of the excavations at Akrotiri includes a brief description (29f.) of the huge metal-framed (Dexion) shelter constructed over the remains. The advantages of the system are its ease of erection, its ability to expand as the excavations proceed, and its wide internal spans. Numerous interior views and one exterior view of the shelter provide a sense of context. (M.D.)

Doumas, Christos. 1997. *Management Considerations at a Mediterranean Site: Akrotiri, Thera*. In Marta de la Torre (ed.), *The Conservation of Archaeological Sites in the Mediterranean Region* (Proceedings of an International Conference organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995), 27–40. Los Angeles: The J. Paul Getty Trust.

At Akrotiri, metal shed roofs have long protected the site but have required high maintenance, have created less than optimal conditions for visitors and staff, and are considered an intrusion on the landscape. A pilot replacement shelter, sponsored by the European Union, has been constructed that is architecturally more distinguished and more aesthetically compatible with both the ruins and the surrounding landscape. Based on the pilot study, plans are underway to replace the old shelter with a new shelter that is more ecologically and environmentally sensitive. (A.O.)

Ein dach für Ephesos: der schutzbau für das hanghaus 2 / A roof for Ephesos: The shelter for terrace house 2 / Efes için bir çatı: yamaç ev 2 korum binası. Special issue 34. Vienna: Austrian Archaeological Institute. 2000.

German, English, Turkish. An architectural competition for protecting the Terrace Houses at Ephesos resulted in the selection of a shelter design consisting of a metal frame structure with a membrane roof and louvered panel side walls. The shelter replaces an earlier protective structure constructed in the 1980s, which covered only part of Terrace House 2, and provides protection for the remainder of the Terrace House, which contains wall and floor mosaics, mural paintings, and other architectural and decorative elements typical of a wealthy Roman house. The publication covers the design and construction process (see also R. Burch, Recent Publications on Protective Shelters, CMAS volume 6, 2003, 47–48 for a review of the publication). (M.D.)

Falck, Lindsay. 1999. **Shelter and shoring construction**. Lkd. Çatalhöyük Home Page at Çatalhöyük 1999 Archival Report. <http://catal.arch.cam.ac.uk/catal> (March 2001).

Description of two shelters constructed at the site of Çatalhöyük. The shelter over the south site, under active excavation, employs a cable and net system with minimal impact supports and canvas panels, which allows the wind to pass through to prevent uplift. A second shelter over Building 5,

which is open to the public, is a steel-framed, "double-skin tent" to facilitate ventilation, incorporating display and viewing platforms. (M.D.)

Federico, L.I. Federico. 1985a. *Protective coverings for archaeological sites: the case of Pompeii*. **ICOMOS Information** (Oct./Dec.) (4), 7-12.

English with French, Spanish, and Italian summary. This article is a review of the various roofing types and concepts employed at Pompeii over the last century, beginning with the reconstruction philosophy of the nineteenth century through the 1970s, which witnessed the use of light and reversible structures of metal with asbestos-cement roof panels. The debate continues and the problem of reconciling competing values must be faced calmly. New roofing structures with potential application to archaeological sites are briefly discussed, e.g., membrane structures, wood laminated structures, space-frames. (M.D.)

Federico, L.I. Federico. 1985b. *Pompei Come Caso Emblematico*. **Restauro** 81, 13-19.

Italian. One of three articles in *Restauro* 81 devoted to "Coperture e protezione di zone archeologiche". This is essentially the same article as Federico 1985a, with different plates. (M.D.)

Fiandra, Enrica. 1960. *A museum amid the ruins of a Minoan villa*. **Museum** 13 (2), 130-32.

English and French. In a rather early example of thoughtful conservation, the Late Minoan villa site at Kannia (Gortyna) was provided with a protective roof. The lightweight, metal-framed structure with green plastic sheathing protects areas of the site where large storage jars were found and can now be preserved *in situ*. The important issue of how various conservation policies affect the researcher is briefly addressed. (M.D.)

Fingerlin, Gerhard. 1987. *Konservierung einer römischen Villa in Grenzach*. **Denkmalpflege in Baden-Württemberg** 16, 87-90.

German. This article describes the enclosed wood-framed shelter with tile roof over Roman ruins at Grenzach, an example of a suburban design for archaeological protection; also included in Schmidt 1988. (M.D.)

Fitch, James Marston. 1982. **Historic Preservation: Curatorial Management of the Built World**. New York: McGraw-Hill.

Chapter 14, Protection and Interpretation of Sites and Ruins, includes a brief discussion of protective structures over archaeological sites. The author presents well-known examples such as Piazza Armerina, as well as lesser-known examples such as the shelter at Dinosaur National Monument in Utah, and oddities such as the protective "shrine" over the log cabin of Abraham Lincoln. (M.D.)

García-Bárcena, Joaquín. 1987a. *Cacaxtla: un proyecto de conservación del patrimonio. Antecedents de las obras de conservación de Cacaxtla, Tlaxcala*. **Antropología** (suplemento) (12), 1–9.

Spanish. The author reviews well-known protective shelters worldwide, such as that over the tomb of Qin Shi Huang, Fishbourne, Stevens' proposed Babylon project, and Kara Tepe. Less well publicized is the large metal-framed shelter at Kisnana, Hungary. (M.D.)

García-Bárcena, Joaquín. 1987b. *Cacaxtla*. In Henry W.M. Hodges (ed.), **In Situ Archaeological Conservation**, 202–205. Mexico City: Instituto Nacional de Antropología e Historia and the J. Paul Getty Trust.

Roofing options and criteria are discussed in relation to the proposed solution to protect the Great Platform at the site of Cacaxtla, Mexico. Criteria for selection included an analysis of the causes of deterioration and consequent conservation needs, architectural and aesthetic considerations, engineering requirements, and costs. The three options considered were a reconstruction of the original volumes, modular partial roofing, and a single roof covering the whole platform. The last option was judged most feasible and effective. (M.D.)

Gollman, Karl Friedrich. 1987. **Architektur und Archäologie. Schutz von Antiken Ausgrabungen** (Habilitationsschrift, Fakultät für Architektur, Technischen Universität Graz).

German. The author explores the concept of protective sheltering of archaeological sites from an historic, functional, technical, and design perspective. Part A investigates the causes of deterioration of archaeological materials left *in situ* and the degrees of protection that can be implemented (e.g., preservation, restoration, anastylosis, reconstruction). Part B examines the requirements of an archaeological shelter, the main types of shelters (during excavation, temporary, permanent), construction methods and materials, and ends with a review of existing shelters. Part C explores the design and presentation of an archaeological site, and Part D presents two case studies: the early Christian church of Teurnia and the amphitheatre at Carnuntum in Austria. (M.D.)

Guiachetti, Maurizio. 1993. *Soluzioni architettoniche per la salvaguardia dei mosaici e aree archeologiche: problema di competenze e non di metodologia*. In **Conservation, Protection, Presentation: Proceedings of the Fifth Conference of the International Committee for the Conservation of Mosaics** (Faro-Conimbriga, 4–8 October 1993), 145–149. Lisbon: Instituto Portugues Museus.

Italian. The article reviews the state of sheltering as a protective device for mosaics, criticizing shelter designs for incompatible use of materials for new constructions in relation to original materials, for impeding the visitor's experience of the site, lack of relationship to the original volumes of the building, and visual intrusion on the environment. The author proposes a change in decision making involving greater collaboration among various disciplines and raising the level of competency and professionalism for those involved in shelter design. (J.S./M.D.)

Hinkel, F. 1968. *Progress report on the removal of endangered monuments from Sudanese Nubia*. **Kush (Journal of the Sudanese Antiquities Service)** 16 (1967/68) 79–84.

This report on the removal and erection of the Semna temples from Nubia to Khartoum includes a description of the shelters erected in 1966 to protect the temples. A moveable shelter, which runs

on rails, was chosen as a means of providing protection only during the rainy season. The arched roofs of the shelters are covered with aluminium sheeting and Perspex panels; the sides are of glass panels. (M.D.)

Holzbau Konstruktionen. Detail 2 (1982), March/April, 1-3.

German. This report contains a description, photos, and drawings of the timber-framed, radial-roofed protective enclosure over the Roman ruins at Weißenburg. This enormous free-span structure was chosen as a result of an architectural competition. Visual documentation is more extensive than the Römerbad 1980 article or Schmidt 1988. (M.D.)

Hubeli, Ernst, and Paolo Fumagalli. 1987. *Eine Anschauung der Dinge. Schutzbaute für römische Funde, Welschdörfli bei Chur.* **Werk, Bauen and Wohnen** 10, 40-43.

German. The article contains a brief description and numerous photos and drawings of an enclosed shelter over Roman ruins in Switzerland. Similar in concept to the shelter over the Piazza Armerina mosaics, this structure is an abstract reconstruction in timber, incorporating louvered walls. (M.D.)

Jerome, Pamela. 1995. *Proposed permanent shelter for Building 5 at the Bronze Age site of Palaikastro, Crete.* **Conservation and Management of Archaeological Sites** 1 (1) 35-42.

Presents two proposals for a permanent shelter over the remains of a recently excavated Minoan structure of stone and adobe. In developing the proposals, the author considers the issues of reversibility, low technology/cost/maintenance, microclimatic effects, recreating the form and volume of the original structure without reconstruction, aesthetic compatibility, interpretive function, and separation of the visitor from the ruin. Illus. See also CMAS 1 (2) for correction of illustrations to this article. (A.O.)

Jianzheng, Chen. 1981. *Xian: an archaeological site museum at Banpo.* **Museum** 32 (4) 184-187.

The archaeological site museum at Xian incorporates a barrel-vaulted shelter over 3,000 m² of the excavated Neolithic remains. Inside the hall are viewing galleries and didactic exhibits; adjacent is the museum building. Construction details of the shelter are not provided. (M.D.)

Jun, Hu. 1986. *A museum on the site of an ancient copper mine.* **Museum** 38 (2) 115-119.

An enclosed shelter cum museum was constructed over the remains of the ancient copper mine of Tonglushan in China. The building, whose design and materials are not discussed, contains a great hall with viewing gallery where the remains are preserved *in situ*, and an adjoining exhibition room with artefacts and didactic exhibits. This type of structure is characteristic of the Chinese response to site protection; cf. Zilin 1985 and Jianzheng 1981. (M.D.)

Le Coperture di Aree e Strutture Archeologiche (20 ottobre 2000). <http://eulero.cineca.it/~seccia/concop.htm> (March 2001)

Italian. This Web site is the announcement of a conference organized at the Museo Civico Archeologico on shelters for archaeological sites held in October 2000. It lists the complete program of speakers, papers, and posters, which provides an interesting overview of some of the new work that is being done on this topic, particularly in Italy. (M.D.)

Lewis, Hilary. 1980. *Experiments in mudbrick conservation at Tepe Nush-I Jan*. In **The Third International Symposium on Mudbrick (Adobe) Preservation** (Ankara 1980), 109–118. Ankara: ICOMOS/ICOM.

The metal-framed protective shelters over the mudbrick remains at this site in Iran are described, and the problems encountered are briefly discussed. The gable roof forms were designed to shed snow, but the open construction does not provide adequate protection against high winds and rain, which have caused dehydration and subsequent cracking of the walls. (M.D.)

Lolli-Ghetti, Mario. 1982. *Tharros: Conservation of the Punic Ditch. Diversification of Technologies*. In **Mortars, Cements and Grouts Used in the Conservation of Historic Buildings** (1981 Symposium, Rome), 256–266. Rome: ICCROM.

In this article outlining the conservation principles followed in preserving the fortification wall at the site of Tharros, there is a brief description of the proposed use of 'suspended cloths' for additional protection. While the materials and construction specifications for the proposed shelter are vague, the concepts guiding its design are well articulated. (M.D.)

Marconi, Paolo. 1982. *Contributi progettuali al tema della protezione di monumenti e di scavi archeologici dall'inquinamento atmosferico: l'area della Regia nel Foro Romano, l'arco di Costantino, l'arco di Settimio Severo*. **Ricerche di storia dell'arte** 16, 54–64.

Italian. The author discusses the development of two types of shelters: the 'glass dome' as an individual outer shell to enclose the monuments, and an open lattice structure covered with impermeable transparent sheeting appropriate for large excavation areas. The proposal and design sketches for a latticework structure over parts of the Roman Forum and those for transparent shelters over the Arches of Constantine and Septimius Severus are discussed. (M.D.)

Matero, Frank, 1999. *Lessons from the Great House. Condition and treatment history as prologue to site conservation and management at Casa Grande Ruins National Monument*. **Conservation and Management of Archaeological Sites** 3, 203–224.

In this detailed discussion of the history of interventions and current condition recording and investigation of the earthen ruins of Casa Grande in Arizona, the author briefly describes the venerable shelter designed by Frederick Law Olmstead, Jr. in 1932 and its 1903 predecessor. Interesting are the results of the assessment as they pertain to the performance of the shelter in protecting the ruins from weather (significant reduction in atmospheric weathering of the ruin), as well as from numerous interventions carried out over the years on the unsheltered ruins. (M.D.)

Miarelli Mariani, Gaetano. 1986. *Territorio, città, monumenti*. **Studi Romani** 34 (1-2) 152-162.

Italian. The first part deals with urban planning policies in Rome. The second section is devoted to the conservation of ancient monuments, with special reference to the column of Marcus Aurelius and the recent proposal for a protective shelter of transparent glass; see also Bruno 1987 and Technology Trends 1985. (M.D.)

Minissi, Franco. 1961. *Protection of the mosaic pavements of the Roman villa at Piazza Armerina (Sicily)*. **Museum** 14 128-132.

English and French. This article is a full description, by its designer, of the enclosed, metal-framed protective shelter, with transparent perspex panes and louvers, over the mosaics of the Roman villa. The design protects the mosaics from inclement weather, reconstructs the spatial volumes of the villa but utilizes entirely modern materials to preclude any confusion between original and new elements and allows viewing of the mosaic by means of walkways. Illus. The Piazza Armerina shelter has been discussed in numerous articles: see Stanley Price 1997 and Ranellucci 1996 cited herein; and Maddalena Biggi, *Alla scoperta dei mosaici "coperti"* *Rassegna Dei Beni Culturali* 5 (1) (Jan./Feb.) 1989, 41-43; Cesare Brandi, *Archeologia Siciliana, Bollettino Dell'Istituto Centrale Del Restauro* 1956, 27-28, 93-100. (M.D.)

Minissi, Franco. 1985. *Ipotesi di Impiego di Coperture Metalliche a Protezione di Zone Archeologiche*. **Restauro** 81, 27-31.

Italian. One of three articles in *Restauro* 81 devoted to "Coperture a protezione di zone archeologiche". This is a general discussion of the problems inherent in design of protective shelters. Minissi distinguishes four types of shelters: simple, purely functional and inexpensive shelters, often temporary, but usually becoming permanent, which ignore the artistic/architectural values of the original remains; single roofs covering large expanses but without any formal spatial relationship to the protected remains; shelters over particular areas with remains of artistic value that meet museographic requirements of protection and viewing, but create their own quite arbitrary volumes; and shelters over particular remains (as just noted) but which go beyond basic museographic needs and relate directly to the spatial arrangements of the ruins. (M.D.)

Musées de Site Archéologique. UNESCO/ICOM (1982).

French. Included in this study of archaeological site museums is a brief discussion (p. 17f.) of temporary and permanent shelters over *in situ* remains with specific mention of those at Phaistos; Pylos and Lerna; the Maritime Museum in Piraeus (Greece); Konya (Turkey); and Stara Zagora (Bulgaria). (M.D.)

Papageorgiou, Athanasios. 1985. *The mosaics of Cyprus: problems of conservation*. In **Mosaics No. 3: Conservation In Situ**. (Aquileia, 1983), 31-37. Rome: ICCROM.

A brief mention of the shelter over the important Roman mosaics in the House of Dionysus in Paphos, Cyprus. The wood-framed, enclosed structure is partially representational, following original walls of the main part of the villa with walkways for viewing the mosaics. Other mosaics at

the site were protected with very simple sheds. The plans for an ambitious, integrated sheltering and landscape scheme over all the mosaics at the Paphos site are described in Sophocles Hadjisavvas. (forthcoming) *Developing a World Heritage site: the case of Paphos, Cyprus* (Paper presented at the Sixth Conference of the International Committee for the Conservation of Mosaics, 24–28 October, Nicosia, Cyprus. (M.D.)

Piano, Renzo. 1990. *Renzo Piano. Building Workshop 1980–1990. Proyectos para el futuro/Projects for the future: Acondicionamiento de la zona arqueológica/Fitting out of the archaeological sites*. A&V (Monografías de Arquitectura y Vivienda) **23**, 72–73, 88.

Spanish. Included in this issue devoted to Renzo Piano's work is a very brief overview of a proposal to shelter and interpret the site of Pompeii. Although never carried out, it is of interest chiefly as an example of high-end architecture entering the field of archaeological site sheltering. (M.D.)

Planck, Dieter. 1988. *Archäologische Ausgrabungen in Walheim a.N., Kreis Ludwigsburg. Denkmalpflege in Baden–Württemberg* **17** (1) 1–8.

German. Included in this excavation report of a Roman settlement in Germany is a brief discussion and sketch of the proposed preservation of the remains by the construction of a shelter. (M.D.)

Ranellucci, Sandro. 1996. *Strutture Protettive e Conservazione dei Siti Archeologici*. Pescara: Carsa Edizioni.

Italian. With an emphasis on theoretical issues of presenting archaeological remains to the public, the author explores a wide variety of architectural projects, implemented and proposed, for protection and interpretation of sites. Sheltering is examined in relation to deterioration phenomena at archaeological sites and numerous examples of protective and interpretive interventions by well-known architects such as Franco Minissi and Renzo Piano are discussed and illustrated. (M.D.)

Roby, Thomas C. 1996. *Site conservation during excavation: stabilization and consolidation of Roman funerary monuments in Carthage*. In Ashok Roy and Perry Smith (eds.), *Archaeological Conservation and its Consequences* (Preprints of the Contributions to the Copenhagen Congress, 26–30 August 1996), 149–152. London: International Institute for Conservation of Historic and Artistic Works (IIC).

As a cheaper and faster alternative to backfilling, an enclosed shelter of brick and corrugated iron was constructed to protect masonry walls decorated with plaster and stucco reliefs between excavation seasons. Vandalism and localized salt efflorescence could not be avoided, and the author argues that backfilling remains the best alternative for site protection between seasons. (A.O.)

'Römerbad' in Weißenburg. Baumeister **12** (1980), 1224f.

German with English summary. Description and photos of the radial-roofed protective shelter at Weißenburg; see also Holzbau 1982 and Schmidt 1988. (M.D.)

Sanchèz del Real, Cristina. 1992. *Sauvetage du site archéologique de Cacaxtla-Mexique. Projet de conservation intégrale*. In **Analyses et conservation d'œuvres d'art monumentales**. 139–150. Lausanne: Laboratoire de Conservation de la Pierre.

French. A large shelter was designed to span extensive earthen ruins with well-preserved painted murals at Cacaxtla (see also García-Bárcena 1987a, above). No interior supports were used, and the shelter is anchored by cables that extend from the roof to the ground beyond the roofline. (A.O.)

Schmid, Martin. 1998. *Protective shelters at the archaeological sites of Mallia (Crete) and Kalavassos-Tenta (Cyprus)*. **Conservation and Management of Archaeological Sites** 2 (3) 143–153.

This article describes the design and construction of four permanent shelters to protect excavated archaeological sites. Three of the shelters are composed of low, arching frames of laminated wooden beams (glulam) set in reinforced concrete foundations and covered with translucent polypropylene sheets (at the Late Bronze Age site of Mallia in Crete). The fourth shelter is more monumental, a 12-faceted conical tent composed of a frame of glulam beams covered with a coated PVC membrane. Two of the shelters also incorporate suspended walkways for visitor access (at the Neolithic site of Tenta in Cyprus). Illus. For the Mallia shelter, see also Martin Schmid. 1990. *Aménagement, sauvegarde et protection des monuments minoens*. *Bulletin de correspondance hellénique* 114, 930–939. (A.O.)

Schmidt, Hartwig. 1988. **Schutzbauten**. Stuttgart: Konrad Theiss Verlag.

German. Along with Gollman 1987, this is the most complete discussion of protective shelters published to date. The main body of the text is an extensive, though not comprehensive, descriptive and visual catalogue of open and closed shelters in Europe and the Middle East. The catalogue is especially valuable in providing information on shelters not otherwise published and on the types of materials utilized in their construction. Schmidt employs two basic categories of shelter: open shelters (Schutzdächer) and closed shelters (Schutzhäuser); the latter type incorporates two important sub-types: shelters that conform to the plan of ancient walls, and large barn-like halls (Hallenbauten) that bear no relationship to the original form and massing. Each of the approximately 100 examples is illustrated. (M.D.)

Schmidt, Hartwig. 1995. *Schutzbauten auf archäologischen grabungsstätten*. **Restauratorenblätter** 15, 45–61.

German. A restatement of the Schmidt 1988 book (see above), with the addition of the striking temporary canopy installed to protect the Apollo Epikourios Temple at Bassae in Greece. See also Theoulakis 1993. (A.O.)

Scichilone, Giovanni. 1986. *The site of the cathedral at Atri: a case study of in situ conservation of archaeological remains*. In **Preventive Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November, 1985), 309–314. Rome: ICCROM.

This description of the methods employed to preserve *in situ* excavated Roman structures in the Cathedral courtyard includes the use of glass 'showcases' for protection and display. (M.D.)

Scoppola, F. 1984. *Prima Porta: Villa di Livia, coperture*. **Bollettino dei Musei Comunali** (Rome), 190–191.

Italian. This is a brief description of measures to protect the Villa di Livia at the site of Prima Porta, which include the erection of a metal-framed, dual-level roof over the area of the baths. (M.D.)

Soromenho Marreiros, Luis. 1994. *Meios arquitectonicos de proteccion de mosaicos os casos de Conimbriga e Torre de Palma*. In **Conservation, Protection, Presentation: Proceedings of the Fifth Conference of the International Committee for the Conservation of Mosaics** (Faro-Conimbriga, 4–8 October 1993), 151–159. Lisbon: Instituto Portugues Museus.

Portuguese. Describes two examples of shelters over archaeological ruins in Portugal that fulfill their aim of protecting mosaics while allowing viewing by scholars and visitors. The first is a space-frame shelter constructed over a Roman villa with mosaics at Conimbriga. The shelter is open on three sides, with an enclosure on the fourth to protect the mosaic from sun and rain; some attempt is made to relate the shelter with the original building using a higher roofline over the impluvium. A second shelter at Torre de Palma is simpler in design, less costly and without any reference to the architectural remains, but more intrusive in the environment. (J.S./M.D.)

Stanley-Price, Nicholas. 1997. *The Roman Villa at Piazza Armerina, Sicily*. In Marta de la Torre (ed), **The Conservation of Archaeological Sites in the Mediterranean Region** (Proceedings of an International Conference Organized by the Getty Conservation Institute and the J. Paul Getty Museum, May 1995), 65–84. Los Angeles: The J. Paul Getty Trust.

In the context of a comprehensive history of interventions at Piazza Armerina, the author details the objectives and history of the construction of this well-known shelter over the Roman mosaics designed by architect Franco Minissi and provides insight into its performance, problems, and successes over the 40 years since its construction. Illus. See also Nicholas Stanley-Price and G. Ponti, forthcoming. Protective enclosures for mosaic floors: A review of Piazza Armerina, Sicily, after forty years. (Paper presented at the Sixth Conference of the International Committee for the Conservation of Mosaics, 24–28 October, Nicosia, Cyprus). (M.D.)

Stevens, André. 1981. *Proposition d'aménagement des ensembles architecturaux du parc monumental et naturel de Babylone, avec application au Temple d'Ishtar*. In **Conservation Réhabilitation Recyclage**, 619–626. Québec: Les Presses de l'Université Laval.

French. Stevens discusses his proposed tent-like membrane structure to protect mudbrick ruins of the Temple of Ishtar at Babylon. Inspired by the Bedouin tent, the roof form has cultural roots in the region but at the same time would bear an unmistakably contemporary stamp. (M.D.)

Stevens, André. 1984. *La protection des monuments en brique crues*. **Lettre d'Information Archéologie Orientale** 7 19–27.

French. As part of a general discussion of conservation and reconstruction practices on Near Eastern mudbrick sites, the author makes brief mention of new forms of protective structures, as realized at the site of Mari in Syria (a lightweight, metal-framed roof with plastic, molded modules), and as

proposed, by the author, at Babylon (membrane structure); see also Stevens 1981 for more detailed discussion of Babylon. (M.D.)

Stevens, André. 1986. *Structures nouvelles de protection des sites archéologiques du tiers monde*. In **Preventive Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November, 1985), 225–244. Rome: ICCROM.

French. This article comprises description, critical analysis, and selected photos of various traditional protective shelters and contemporary approaches utilizing new materials and structures, including the author's own proposal for Babylon and his imaginative collage of ruins within a geodesic dome. (M.D.)

Stubbs, John H. 1995. *Protection and Presentation of Excavated Structures*. In N. Stanley–Price (ed.) **Conservation on Archaeological Excavations with Particular Reference to the Mediterranean Area** (second edition), 73–89. Rome: ICCROM.

The author describes a number of protective shelters: Fishbourne, Piazza Armerina, Kara Tepe, Roselle. Brief mention is also made of new materials and structures with potential application to archaeological sites. (M.D.)

Sultov, Bogdan. 1985. *A site museum near Pavlikeni, Bulgaria*. **Museum** 37 (3) 136–139.

Efforts to preserve the remains of an ancient ceramics works near Pavlikeni were apparently implemented utilizing buildings of “metal, glass and fibro–cement on concrete foundations.” The photographs of the site show open, gable–roofed shelters protecting some of the remains and traditional materials for a structure protecting ceramic kilns. Unfortunately, there is insufficient connection between the text and the photos to provide adequate understanding of these interesting protective devices. (M.D.)

Technology Trends. ‘Living’ in a Glass House...to Safely Stow Stones. **Technology and Conservation** (Spring) 1 (1985) 12–13.

This brief article describes the encasement approach selected by the Italian superintendency of antiquities to safeguard the column of Marcus Aurelius (Antonine column), Rome. The criteria for the design were no contact between the column and new architectural elements, and transparency and reversibility of the structure; see also Bruno 1987 and Miarelli Mariani 1986. (M.D.)

Theoulakis, P. 1993. *Microclimatic monitoring at the temple of Apollo Epikourios at Bassai, Greece*. In M.–J. Thiel (ed.), **Conservation of Stone and Other Materials**, vol. 2, 808–813. London: E. and F.N. Spon, 808–813.

Deterioration of the temple at Bassai led to the installation of a temporary shelter to protect the limestone (see also Schmidt 1995). To better understand the deterioration factors and also to evaluate the impact of the shelter, climatic conditions both outside and inside the shelter were monitored, including temperature and relative humidity. The shelter has increased the RH but has diminished both humidity and temperature fluctuations; microflora populations have also been reduced. (A.O.)

Toraldo di Francia, Antonio. 1986. *Monumenti sotto vetro?* **Antiqua** 5 (Sept./Oct.) 25–26.

Italian. The author opposes proposals for the protection of outstanding monuments in Rome and Florence against air pollution by encasing them under glass. Particular reference is made to the column of Marcus Aurelius, illustrated with its scaffolding. (M.D.)

Trow, Stephen. 1996. *The exotic mosaics of Brading Roman villa.* **Conservation Bulletin** (English Heritage) 30, 10–11.

A description and history of interventions of the mosaic at Brading (one of the few sites in the UK where mosaics are on their original beds), which was covered by shelters after excavation in the late 19th century and again in the early 20th century (steel-framed barn-like structure with corrugated metal siding) and severely damaged by floods in the 1990s. A more extensive article on the condition of the mosaic and shelter, environmental monitoring and holistic plans for conservation and repair can be found in Carol Edwards, Mike Corfield, Barry Knight, Jeanne Marie Teutonico, and John Adams. forthcoming. The investigation and conservation of fourth century mosaics at Brading Roman villa, Isle of Wight, England (Paper presented at the Sixth Conference of the International Committee for the Conservation of Mosaics, 24–28 October, Nicosia, Cyprus. (M.D.)

Uchida, Akito. 1997. *Conservation of the engraved rock wall in the Temiya Cave, Japan.* In N. Agnew (ed), **Conservation of Ancient Sites on the Silk Road**, 235–243. Los Angeles: The J. Paul Getty Trust.

Engraved characters in the Temiya Cave on Hokkaido, Japan, have been dated to about 1600 years BP. Exfoliation of the tuff comprising the cliff prompted the construction of a new shelter to replace the existing simple one. Various technical and scientific studies are outlined in relation to the geology and hydrology of the site. Computer simulations show the exterior and the interior display of the new steel-reinforced structure, which will be fully air-conditioned. This structure represents a high-tech engineering solution that seems fundamentally incompatible with the simplicity and antiquity of the petroglyphs. (M.D.)

Ulbert, G. and G. Weber (eds.). 1985. *Konservierte Geschichte? Antike Bauten und Ihre Erhaltung.* Stuttgart: Konrad Thiess Verlag.

German. Included in these discussions of site and regional studies are examples of some of the large enclosed halls that have become an increasingly common response to the preservation of archaeological sites in Germany, Austria, and Switzerland. (M.D.)

Waane, Simon A.C. 1986. *Roofs and shelters: The Tanzanian experience.* In **Preventive Measures During Excavation and Site Protection** (Ghent Conference, 6–8 November, 1985), 245–256. Rome: ICCROM.

This article discusses the difficulties of preserving paleontological sites, including the use of protective shelters, based on the author's experience in Tanzania. (M.D.)

Wainwright, Ian N.M., Henry Sears, and Stefan Michalski. 1997. *Design of a Rock Art Protective Structure at Petroglyphs Provincial Park, Ontario, Canada*. **Journal of the Canadian Association for Conservation** 22 53-76.

A protective structure was constructed over one of Canada's best-known rock art sites. The art, pecked into an outcrop of marble, was being damaged by frost weathering and algal growth. The primary function of the fully enclosed shelter was to eliminate rain, snow and surface run-off while allowing the maximum amount of sunshine on the rock surface. The structure is a seven-sided, column-free building with fully glazed walls. The foundations are of poured concrete, carrying a steel frame superstructure. Particular attention was paid to ventilation of the structure for visitor comfort and conservation of the rock. Illus. See also Wainwright, Ian N.M. 1987. Rock art conservation in Petroglyphs Provincial Park. Canadian Conservation Institute Newsletter, December, 8-9. (M.D.)

Weaver, Martin. 1968. *Some contemporary approaches to the excavation and exhibition of ancient monuments in the field*. In **Proceedings of the Fifth International Congress on Iranian Art and Archaeology** 1 (Tehran), 373-379.

Included in this article is a discussion of the potential uses of air-domes to create a controlled environment, especially for the excavation of mudbrick. This is an early, exploratory article superseded by Weaver 1973, "The use of an inflatable 'air-dome' to produce controlled conditions for an archaeological site". *Studies in Conservation* 18, 88ff., which is a full discussion of the use of an inflatable air-dome at the site of Can Hasan in Turkey to control the internal environment during excavation. (M.D.)

Weidmann, Denis. 1987. *Problèmes de gestion et de conservation des mosaïques d'Obre-Boscéaz (Vaud-Suisse), abritées depuis 1841*. **Mosaicos No. 4: Conservacion "In Situ"** (Soria. 1986), 7-17. Soria: Servicio de Investigaciones Arqueologicas Diputacion Provincial de Soria.

French. Discusses history of interventions and sheltering at the mosaic site of Obre-Boscéaz, Switzerland, from the mid-nineteenth century through to a conservation program that began in 1976, involving repair of earlier shelters, installation of drainage systems and likelihood of having to modify or construct new shelters. Conditions identified as contributing to decay of mosaic under the closed shelter are increased humidity, winter salts, drainage patterns, and agricultural activity. (J.S./M.D.)

Wiplinger, Gilbert. 1990. *Restaurierungsprojekte in Ephesos*. In **Echo. Festschrift für J.B. Trentini**. Innsbruck: Universität Innsbruck.

German. A short summary of all the restoration projects in Ephesus, including the author's permanent shelter over the Roman Terrace Houses. Excavated over a 25-year period (1960-85), the houses were protected with temporary roofing until construction of a permanent shelter began in 1979. The shelter attempts to reconstruct the space of the original rooms through use of intersecting gabled roofs that make reference to the ground plan. Reinforced concrete pillars support concrete girders and a ring beam defining the perimeter of the complex and supporting a wooden roofing truss with red tiles; new wall construction was carried out in brick. The shelter was completed over only two of the terrace houses because of controversies about its scale and visual intrusiveness. For a very brief description in English with good photographs see also G. Wiplinger

and G. Wlach. 1996. **Ephesus. 100 Years of Austrian Research.** (Österreichisches Archäologisches Institut). Böhlau Verlag: Vienna, 128–35. (M.D.)

Zilin, Wu. 1985. *The museum of Qin Shi Huang terracotta warriors and horses.* **Museum 37** (3) 140–47.

A huge barrel-vaulted, latticework structure was constructed (1974–9) over the remains of the terracotta army of the emperor Qin Shi Huang in Xian province, China. The structure serves the dual purpose of protection and museum. Architectural details of the structure are lacking in this article, which is devoted mainly to a description of the archaeological remains. Plans to expand the excavated area and create a complex of museums and protective shelters to cover about 300,000 m². are briefly discussed.

Zumthor, P. 1988. *Schutzbau über Ausgrabungen in Chur, CH.* **Detail 5** (Sept./Oct.), 499–502.

German with English summary. A brief description of the timber-framed, louvered shelter over Roman remains near Chur is accompanied by full documentation in the form of photographs, plans, and sections. See also Hubeli and Fumagalli 1987. (M.D.)