



CONSERVATION PERSPECTIVES

THE GCI NEWSLETTER

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SUSTAINABILITY & HERITAGE



The Getty Conservation Institute

A Note from the Director



Earlier this spring I participated in a lively and productive meeting in Germany organized by the Staatliche Kunstsammlungen Dresden that brought together European museum colleagues who are about to embark on major facility renovations. Each of their collections is housed in an iconic historic building in the center of their respective cities. Each of them was grappling with how to integrate new and sustainable technological solutions into their historic buildings while simultaneously caring for their collections in ways that met twenty-first-century conservation standards. Not so easy! Sometimes national legislation forces a solution that meets current energy use standards but that might not be compatible with collections. In other instances, these colleagues are attempting to reintroduce sustainable lighting design or climate solutions that were part of their building's original nineteenth-century design but that have been lost through decades of technological "improvements."

Of paramount importance to these professionals was a commitment to finding the best solution for their buildings and their collections. The landscape presents few clear answers—particularly ones suited to preserving the cultural heritage—and conservation professionals are now presented with complex issues that affect not only their collections but their buildings as well.

This issue of *Conservation Perspectives* explores sustainability and cultural heritage preservation. In many respects, the work of heritage conservation aligns naturally with larger efforts to capture the environmental, economic, and social benefits that sustainable development offers. At the same time, the work of conservation may not integrate seamlessly into these larger efforts, as Erica Avrami suggests in this edition's feature article. She argues that some realignment of the field's approaches and goals is necessary to serve the drive toward sustainability, and that conservation must do a better job in demonstrating how it improves quality of life for communities.

May Cassar, in her article, charts actions that have been taken in the last few years, especially in Europe, to mitigate the effects of—and to adapt to—the now inevitable changes to the environment, from a heritage preservation point of view. Sarah Staniforth examines sustainability from the standpoint of collecting institutions, reviewing how these institutions can do their part by reducing energy consumption in a variety of ways. John Fidler, writing with George Wheeler and Dwayne Fuhlhage, shares some uncomfortable truths; while not all conservation treatment decisions are green in the current definition of the word, they are necessary for the survival of finite cultural resources.

Without question, the conservation field can provide the larger community with a model for sustainability, a point emphasized by Jean Carroon, Chris Wood, and Jerry Podany in this issue's dialogue. As Podany—senior conservator of antiquities for the J. Paul Getty Museum and current president of the International Institute for Conservation—observes, the conservation profession should be "providing a good example to everyone else about the larger meaning of the term *conservation*. The word *conservation* is, after all, in our title, and we should promote it more broadly."

A handwritten signature in black ink, appearing to read "T. Whalen". The signature is fluid and cursive, with a long horizontal stroke at the end.

Timothy P. Whalen

Contents

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ON THE COVER

The National Trust shop at Wordsworth House in Cockermouth, England, when the River Derwent overflowed after a one-in-one-thousand-year rainstorm in which twelve inches of rain fell in twenty-four hours. Climate change—manifest by increasingly severe weather patterns—can directly impact historic structures. Photo: National Trust.

4 FEATURE ARTICLE

SUSTAINABILITY AND THE BUILT ENVIRONMENT

Forging a Role for Heritage Conservation

By Erica Avrami

10

IMPACT OF CLIMATE CHANGE ON CULTURAL HERITAGE

From International Policy to Action

By May Cassar

12

SUSTAINABILITY AND COLLECTIONS

By Sarah Staniforth

15

UNCOMFORTABLE TRUTHS

By John Fidler, George Wheeler, and Dwayne Fuhlhage

18

CONSERVATION WRIT LARGE

A Discussion about Sustainability and Heritage

24 KEY RESOURCES

A list of key resources related to sustainability and cultural heritage

25 GCI NEWS

Projects, events, and publications



Quincy Market, part of the Faneuil Hall Marketplace in Boston. This 1970s rehabilitation of 19th-century buildings was the first historic preservation project to be honored by the American Institute of Architects with its Twenty Five Year Award—honored for its visionary redesign and its compatibility with sustainability principles. Photo: © Chris Wood. Licensed under the Creative Commons Attribution-Share Alike License.

SUSTAINABILITY AND THE BUILT ENVIRONMENT

Forging a Role for Heritage Conservation

BY ERICA AVRAMI

When the Athens Charter was adopted in 1931, the world's population was two billion. By the drafting of the Venice Charter in 1964, that number had increased to three billion. Today, there are nearly seven billion people, with more than half living in urban areas.

While there are many unresolved questions about how sustainability is defined and put into operation, we know that current consumption of earth's limited resources cannot be sustained in light of exponential population growth. The climate

change effects of greenhouse gas emissions, while debated, are well documented and widely acknowledged, as are the alarming contributions of the built environment to that carbon footprint. Buildings account for up to 40 percent of energy consumption. Approximately 50 percent of all raw materials humans take from nature are for use in buildings. Construction, rehabilitation, and demolition debris constitutes nearly half of all the waste generated in higher-income countries. Current trends suggest that by midcentury, the built environment will disturb or destroy natural

habitats on more than three-quarters of the earth's land surface.

While heritage conservation is a key player in sustainability planning, it has yet to forge a clear role. This is due, in part, to unresolved tensions that can exist between conservation aims and those of sustainability. Take, for example, recent debates over solar and wind farms. Cape Wind, a pioneering alternative energy project, was proposed off the coast of Nantucket, along the eastern United States. Preservation groups opposed the wind farm, and in an effort to thwart construction, the stretch of water was designated a cultural landscape eligible for the National Register. When wind and solar farms were proposed in California's Mojave Desert along historic Route 66, legislation was introduced to designate the area a national monument, thereby scuttling projects that would have created clean energy and jobs. While one can justify the heritage concerns in both cases, will these interests continue to outweigh the larger sustainability trade-offs in the future?

Effective heritage legislation in many parts of the world and a well-established international conservation community have enabled the field to advance its agenda of protecting important places. However, with changing demographics and diminishing resources, options will become more limited. When weighed more stringently against clean air and water, carbon neutral energy, reduced sprawl and optimal land use, mass transit, jobs creation, and the like, heritage conservation faces difficulties in terms of rationalizing its cause and ensuring the balance of social concerns with environmental and economic interests. To prepare for change, the field must better align its goals and processes with those of sustainability planning for the built environment as a whole. That means questioning many long-held goals and practices about what to preserve and how.

MAPPING A SHARED AGENDA

Consider sustainable management of the built environment as a large system of interrelating subsystems, of which heritage conservation is one. To ensure that conservation remains a relevant social process, its goals must be aligned with those of the overarching system.

Since the publication of the United Nation's Brundtland Commission Report in 1987, the international dialogue regarding sustainability has grown. While Brundtland referred to sustainable development as meeting "the needs of the present without compromising the ability of future generations to meet their own needs," over two decades of scholarship and policy making have refined the concept as one that is both relative and universal. With more awareness of cultural differences about quality of life and the need for integrative approaches to human and natural systems, the concept of sustainability has emerged as an interrelating and adaptable balance of environmental, economic,

and social concerns. Therefore, one must look at the aims and concerns of sustainability writ large, in order to understand how conservation of the built environment supports them at the global and local levels.

Environmental Sustainability

The bulk of sustainability research and policy making has focused on environmental sustainability, within which are two fundamental discourses: mitigation and adaptation. Mitigation focuses on minimizing climate change. Adaptation addresses the effects of climate change.



Urban sprawl encroaching on undeveloped land. Environmental and heritage conservation have viewed landscape conservation as common ground. With rising population size driving urban growth, landscape protection is becoming far more complex. Photo: © Scott Cramer.

Adaptation seeks to prepare and manage places in light of changing environmental conditions. This is where conservation efforts have been largely concentrated. UNESCO and other institutions charged with heritage stewardship have initiated projects to examine risks posed to sites by shifts in temperature, precipitation, groundwater and sea levels, and climatic events. Universities and other research centers are collecting environmental data to monitor trends and to improve prediction of future conditions. Disaster preparedness and response programs are integrating climatic extremes and weather events into their scopes. The outcomes of these initiatives are geared toward more responsive strategies for the conservation and management of heritage sites, buildings, and landscapes in the face of climate change.

Mitigation presents a thornier challenge. An assumption of the mitigation discourse is that dramatic changes are needed in the way we plan, design, construct, and manage the built environment to ensure carrying capacity for a growing population. The built environment contributes significantly to climate change, consumes vast amounts of natural resources and land, and generates substantial landfill waste. Current practices must be altered. Reconciling the sustainability push for drastic innovation with conservation's goal of managing change and preserving existing historic or significant resources poses tensions as well as opportunities. Consequently, efforts to forge common agendas have been fairly ad hoc.

ENERGY AND RESOURCE CONSUMPTION

The energy and resource consumption of buildings, particularly in industrialized countries, has spawned extensive research and policy making regarding energy efficient design and retrofitting. Standards for sustainable construction, such as the LEED green building certification program in the United States, have been developed to improve efficiency. Research has grown to support and inform these systems and standards, generating quantitative information about building performance and energy use. Analytical tools such as energy audits and life cycle assessments (LCAs) are increasingly sophisticated and allow assessment of energy saving options in new design and existing construction.

The heritage field was quick to claim that old buildings are inherently green because of their embodied energy and climatically appropriate designs. However, research substantiating this position has been slow in coming. Some LCA studies have indeed shown the energy savings and reduced carbon impact of rehabilitating a historic building versus building a new one. But these studies are small in scope, and LCA tools in general still have a high degree of variability. Large-scale, multi-typology energy audit surveys are needed to build a body of reliable data, as are more sophisticated LCA tools that address the complexities of existing buildings and historic materials. Innovative, case-by-case integration of conservation and energy efficiency can be found world over, but the heritage field has yet to aggregate the data effectively into

consistent models for design and retrofitting. Such a synthesis would allow architects, planners, and real estate developers to compare more readily the life cycle energy costs of building new versus rehabilitating.

In addition to augmenting the analytical toolbox, the heritage field has much to offer in sustainable design solutions. The built environment in industrialized countries is in dire need of remediation because of high energy consumption and carbon dioxide emission rates. The situation in less-developed regions trends toward similar conditions, but it has yet to reach critical levels. These regions would benefit from a more prevalent use of vernacular architecture, which is generally better adapted to local climate and resources and thus consumes less energy. The heritage field can play an important role by promoting local knowledge and traditional construction techniques in sustainable design solutions that wed the best of new technology with time-honored know-how.

POLLUTANTS AND WASTE GENERATION

As noted, the construction industry is a notorious waste and pollutant generator, especially in industrialized countries. Regulation and disincentives, primarily at the municipal level, help to reduce waste generation at the back end by creating incentives for recycling and disincentives for not recycling (for example, high fees for dumping construction and demolition waste).

The heritage sector plays its part through architectural salvage operations and through the management of historic toxic materials. However, as more twentieth-century buildings join the inventory of historic structures, effective strategies for managing diverse waste products will be critical.

LANDSCAPE DESTRUCTION

The environmental and heritage conservation establishments have long viewed landscape conservation as common ground. The preservation of forests and open space enables the sequestration of carbon and the protection of ecosystems; the conservation of cultural landscapes can bolster that process. However, with rising population size and rural-to-urban migration driving increased urban growth around the world,



Modern construction replacing older structures in Shanghai, China. Construction, rehabilitation, and demolition debris constitutes nearly half of all the waste generated in higher-income countries. Photo: © Nikada.



Development outside the historic walls of the World Heritage City of Avila, Spain. Densification of historic centers often runs counter to conservation goals, but decentralized development can destroy open space and create sprawl. Photo: Begoña Bernal/World Monuments Fund.

land use planning and landscape protection are becoming a far more complex endeavor. Sustainability concerns compel the need to curb suburban sprawl and to densify existing urban centers instead. Such densification, along with the infrastructure development that accompanies it, often runs counter to heritage aims in older, historic cities. As communities and metropolitan regions grapple with the need to develop more robust economies and greener built environments, difficult trade-offs must be made regarding the historic urban fabric.

In Spain, for example, where many historic cities and sites benefit from heritage protection, a number of conflicts have ensued. The World Heritage City of Avila has a designated core, bounded by medieval ramparts; with protections in place for the historic center, new development has been pushed into surrounding open space, creating sprawl. A proposal for construction of an office tower, which would have concentrated development outside of Seville's World Heritage boundaries, has been opposed by preservationists because of its negative impact on the historic skyline. While these instances represent commendable efforts to preserve important heritage, they also illustrate ways in which conservation aims can bump up against sustainable urban growth.

Economic Sustainability

The terrain of intersection between the built heritage and environmental concerns offers relatively clear paths toward mutual aims, rocky though they may be. The links between cultural heritage and economic and social concerns are more established but ill defined. Forging common ground is no less challenging.

An underlying aim of heritage conservation is to protect important sites, buildings, and landscapes for future generations. However, strains on public funds, a shrinking supply of buildable land, real estate development interests, job creation, and other factors have required conservation to rationalize its work in economic terms. These forces, along with others, have spurred

the commodification of heritage. Thus, economic development agendas have found natural (though not always willing) partners in the heritage sector, particularly through tourism, compelling conservation to take up its role in a sustainable political economy and its contributions to quality of life.

There is growing research regarding the economics of conservation that aims to assess preservation's benefit to society and to understand its function in the marketplace. With tourism representing more than 10 percent of GDP worldwide and creating more than 200 million jobs, heritage conservation and related tourism have received increased attention as economic development tools. Lawmakers and policy makers seek hard numbers to quantify conservation's economic effects and weigh it against other investments. At the same time, economists, preservationists, and others grapple with developing methodologies for valuing cultural resources and conservation and assessing their effects on quality of life. However, there remain gaps in knowledge. The full-range costs and benefits of conservation are not fully examined so as to promote understanding of conservation's function in the broader realm of land use economics and sustainability—as well as its impact on society. Therefore, the basis for promoting broader preservation policy reform and further developing economic incentives and other interventions in the market remains limited. As with environmental sustainability, the more that conservation's goals are aligned with those of improving economic conditions and opportunities through the built environment, the more likely it will be that heritage concerns will be integrated into sustainability planning.

Social Sustainability

World population growth has been coupled with significant demographic changes. Industrialization and globalization have contributed to international and rural-to-city migration, post-colonialism, the resurgence of indigenous peoples, and the rise

of organized civil society. These changes make for much more heterogeneous and urban societies, and they engender profound changes in negotiations about the built environment and the increasingly diverse memories associated with it.

As noted, the sustainability discourse has prompted more environmentally responsible land use and construction practices in many places. Growth management strategies are becoming common tools for planners and policy makers. Yet, while there are clear environmental and economic rationales for increased density and a more energy-efficient building stock, community preferences for downzoning and preservation pose interesting challenges. Communities are trying to combat the pressures for redevelopment and densification, adapt to the influx of new populations, apply sustainability principles to land use decisions, and yet still encourage growth. As a result, conservation is becoming an increasingly important aspect of planning and managing urban change.

Among the most substantive contributions the heritage field can make to sustainability is its work with communities. By focusing on cultural contexts and social relationships, the heritage field has developed effective tools for engaging stakeholders in value-driven planning that helps shape collective visions for communities and their environments. These processes foster civic participation, identify diverse and shared views, and ensure long-term sustainability by responding to local conditions. As the environmental field shifts toward engaging communities in stewardship, these cultural heritage methodologies become increasingly germane. Whether through incorporating energy-saving vernacular traditions into sustainable design, determining which buildings are most important to reuse, or deciding which cultural resources will be preserved and how to preserve them after devastating climate events, heritage conservation offers ways to improve planning and to negotiate change in the built environment, so as to ensure balance among ecological, social, and economic concerns.

At the end of day, a very significant historic structure may not be the most energy efficient, may not represent the best land use, or may not generate the most revenue. Its fundamental value is in the social benefits its preservation provides. So while it is important for conservation to contribute to environmental and economic sustainability, its social contributions are the linchpin. It is our work with people, memories, and their codification in places that differentiates heritage conservation within the broader realm of managing the built environment. However, the social benefits that conservation engenders are not well articulated or substantiated. Though these social benefits are intuitively understood by all of us who believe in the value of heritage, much depends on the field's ability to communicate widely and to demonstrate effectively—through interdisciplinary research, integrative practice, and an updated policy agenda—its utility in promoting social sustainability.

AN ALTERNATE FUTURE FOR HERITAGE

The future of built heritage conservation hinges on the field's establishing itself as a component of the larger system of managing a sustainable built environment. We can do that by contributing to all three areas of the sustainability tripartite (that is, environmental, economic, and social benefits) and by demonstrating why social concerns must sometimes trump economic and environmental ones.

The conservation field should continue to plug away at environmental, economic, and social research and devise metrics for analyzing and amalgamating these data into frameworks for decision making. It must likewise place more emphasis on social research itself, to ensure that the core values of heritage conservation have credibility when weighed against environmental and economic concerns. A difficult challenge in achieving this will be the need to reexamine and reestablish these core values and the methodologies they engender. Given current realities and the dire need for a sustainable built environment, the following are important considerations:

Think beyond the building. While making individual buildings more energy efficient does reduce greenhouse gas emissions, sustainability of the built environment cannot be achieved building by building. Broader land use and urban community issues are equally critical—if not more critical—to an integrated approach to mitigation. It is important that historic buildings be retrofitted for energy efficiency and that analytical research better inform life cycle assessments and design decisions. However, the heritage conservation field must move beyond its traditional site-by-site approaches to ensure that it grapples with sustainability at citywide and region-wide levels.

Reinforce local-global connections. If nothing else, the climate change dialogue has demonstrated the profound correlation between local action and global effect. Heritage researchers and practitioners are compelled to contextualize their localized work with places and communities within increasingly international and cross-cultural frameworks. Thus, the heritage field has an acute understanding of how traditional built environments are a direct product of local culture, climate, and resources. It likewise has well-established global networks for information sharing about vernacular knowledge and new technology, and about innovative solutions that might be achieved by merging the two. Thus, the heritage field can help bridge the divide between industrialized and less developed regions and generate new knowledge from their respective sustainability weaknesses and strengths.

Engage in the creative process. Those in the heritage field often view themselves as stewards of the historic built environment, rather than as creative contributors to it. Decisions about which places to preserve have a profound effect on the shaping

of landscapes and the development of communities. Embracing that role means more engagement in design and planning, whether through the development of new construction hybrids combining vernacular and new technology or through regional planning analyses to determine where redevelopment and densification are acceptable. The heritage field has important knowledge that should be integrated into those processes—knowledge that can better inform sustainability decisions.

Focus on quality, not quantity. A significant focus of the heritage field is on inventorying and documenting historic properties. However, a bigger heritage inventory does not necessarily translate to a better heritage environment—or a more sustainable one. Conservation will need to prioritize and compromise with regard to what is preserved, and with regard to what is acceptable in terms of alterations, additions, and infill development. The capacity to distinguish between what should change and what should not (and why) will be crucial to legiti-

mizing conservation's role in sustainability planning. Focusing more on the quality of heritage conservation—its positive effects on communities and the benefits derived—rather than on the quantity and condition of protected sites will go a long way toward aligning heritage concerns with sustainability.

Now, more than ever before, the heritage field is faced with the need to qualify and quantify its fundamental contributions to society and sustainability. Whether through environmental, economic, or social benefits, the field must robustly demonstrate how it improves quality of life for communities. Realigning the goals of heritage conservation to ensure that they serve the greater good of the sustainability cause is an important first step.

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Owners of historic homes in Haiti mark their earthquake-damaged houses on image maps at a community meeting to advance repair efforts. Heritage conservation serves as an important tool for reinforcing collective identity and ensuring social continuity and sustainability in disaster recovery efforts. Photo: Kevin Rowell/World Monuments Fund.

IMPACT OF CLIMATE CHANGE ON CULTURAL HERITAGE

From International Policy to Action

BY MAY CASSAR

RECENT INTERNATIONAL POLICY INITIATIVES by the UNESCO World Heritage Centre and the Council of Europe¹ on the impact of climate change on cultural heritage have shown that while it is possible to identify individual climate parameters and the associated risks, the issues cannot be considered in isolation. Cultural heritage exists among people and communities—and because it is linked to social interactions and to ideas of cultural identity and cohesion, it is not possible, in response to climate change, to separate the physical, cultural, and social dimensions of cultural heritage. A multidimensional understanding of the impact of climate change on cultural heritage is required, and decisions on the actions necessary to mitigate the effects—and to adapt to climate change—depend on the input of disciplines that include the arts and humanities and the social sciences, as well as science, technology, and engineering.

PAST INITIATIVES

Implementing policy requires the application of knowledge to understand problems and to design solutions. When new problems emerge, knowledge needs to be created—and the engine that drives its creation is research. To date, research initiatives on the impact of climate change on cultural heritage are primarily occurring in the United Kingdom and Europe; no concentrated research effort on this subject is happening elsewhere.

The first and most significant research project has been *Noah's Ark: Global Climate Change Impact on Built Heritage and Cultural Landscapes*.² The project, undertaken by a consortium of European institutions, produced predictions of the impact of climate and pollution on cultural heritage by investigating the response of historic materials and structures to future climate scenarios for Europe. The research has also helped to improve practice by developing and utilizing heat and moisture movement computer models to examine the effect of climate change on built cultural heritage; by validating model predic-



Flooding in St. Mark's Square, Venice. Rising sea levels—a result of global warming—threaten this World Heritage site. Photo: © RelaxFoto.de.

tions against existing measured data in real buildings; and by using the models to examine the effects of different drying strategies. All of the project's research results were gathered together in a published atlas.³ The project's impact was recognized by the award of the Europa Nostra Grand Prix for Research in 2009.

Implementing policy also requires education and training activities to support the understanding of research outcomes by students and the application of research by practitioners. Recently there have been a number of educational and training initiatives with different emphases on the arts and science disciplines. The Ename Center for Public Archaeology and Heritage Presentation in Belgium held an international colloquium in 2009 on public engagement and social innovation in response to global climate change and heritage conservation.⁴

Climate change is now among the strategic orientations of the Council of Europe, which sustains the activities of the European University Centre for Cultural Heritage in Ravello, Italy—especially the organization of courses since 2007 on the risks of climate change to cultural heritage.⁵ Courses are beginning to reflect current thinking about the need to integrate the cultural, social, and scientific dimensions of climate change in order to deliver sustainable solutions on both the human and technological level. In other words, course content is beginning to evolve from being largely science based to include changes in cultural values as a result of climate change.

PRESENT ACTION

Moving ahead, we should consider what is promising and what further actions are required.

We need to develop our interdisciplinary approach to research and training.

Social and demographic trends are shaping the future, as are environmental factors. The physical effects of climate change are likely to become increasingly significant as a risk multiplier that can exacerbate existing tensions around the world. The 2007 floods in the United Kingdom—which caused the largest civil emergency response since the Second World War—highlighted the impact that natural disasters can have, even on a fully developed, networked society. Our ability to remain adaptable will be fundamental, as will be our ability to identify risks and opportunities at the earliest possible stage. Recognizing that risks to tangible, intangible, and digital cultural heritage will increase, the European Union's Heads of State and Government launched a Joint Programming Initiative on Cultural Heritage and Global Change, in which the value of relevant national and EU research and development funding will be increased by joint planning among European Ministries of Culture and Ministries of Research.⁶

We need to focus on damage risks to collections.

This issue was raised by the International Institute for Conservation (IIC) roundtable discussion "Climate Change and Museum Collections," held in London in 2008 as part of the IIC's Dialogues for a New Century. While outdoor materials are affected by changes in temperature, relative humidity (RH), precipitation, wind speed, solar radiation, salts, pollutants, and biomass, collections are altered by somewhat different factors—mold, pollutants, and the rate of fluctuations and extremes of indoor RH and temperature.

An expression used by scientists working in the natural environment and on outdoor cultural heritage is the "damage function." Most of the damage functions that exist for cultural heritage relate to outdoor conditions: chemical attack, heating and cooling cycles, and freeze-thaw cycles for stone and masonry materials, metals, glass, and wood. These do not translate meaningfully to indoor conditions. The IIC roundtable recognized that an intellectual step change is needed in our understanding of damage to cultural heritage caused by climate change. Scientists, working alongside conservators, must develop a range of damage functions for collection materials. The links between damage and climate change can then be modeled for a range of scenarios. But it is important to keep in mind that all models are analogues of reality and cannot replace real data.

We need to influence public behavior.

To do this, we have to go beyond the application of science,

technology, engineering, and mathematics. There is a wealth of knowledge and understanding in the arts and the humanities that is helping to broaden the debate on climate change by exploring cultural values, creative endeavors, ethics, aesthetics, critical reflection, and historical perspectives. We need to discover the creative meeting points between the arts and humanities and the physical and social sciences in conducting our research on the impact of climate change on cultural heritage.

COMBINING EFFORTS

Climate change is one of the most important issues facing society in the twenty-first century. It poses significant challenges for cultural heritage that are beginning to be tackled by high-quality research, practitioner training, policy initiatives, and public engagement. Yet efforts to improve our understanding through both the application of scientific research and initiatives to influence a behavioral response to climate change with artistic and creative activities (such as exhibitions) have, with a few exceptions, developed on separate tracks. In the future we must concentrate on bringing these separate elements together. To quote Peter Gingold, executive director of Tipping Point, an organization at the intersection of culture and climate change, "This issue is about the way we live, it is about who we are, what our relationship is with each other and the planet. And the cultural sector is perfectly positioned, I believe, to hold up a mirror to that and actually show us how we live, [and] ... help us develop insights in that."⁷

May Cassar is the director of the UCL Centre for Sustainable Heritage and director of the AHRC/EPSRC Science and Heritage Programme at the Bartlett School of Graduate Studies of University College London.

1. For UNESCO and Council of Europe documents, see Key Resources, page 24.
2. European Commission, *Noah's Ark: Global Climate Change Impact on Built Heritage and Cultural Landscapes*. <http://noahsark.isac.cnr.it/>.
3. *The Atlas of Climate Change Impact on European Cultural Heritage: Scientific Analysis and Management Strategies*, edited by C. Sabbioni, P. Brimblecombe, and M. Cassar (2010). www.anthempress.com/index.php/subject-areas/books-0/area-studies/the-atlas-of-climate-change-impact-on-european-cultural-heritage.html.
4. *5th Annual Ename Colloquium, Climates of Heritage Conservation: Responding to the Challenge of Global Climate Change through Public Engagement and Social Innovation*, 18th–19th March 2009, Ghent and Ostend. http://translate.google.co.uk/translate?hl=en&sl=nl&u=http://www.enamecenter.org/&ei=ynuITdreGpOXhQfJr_iLBQ&sa=X&oi=translate&ct=result&resnum=5&ved=0CEgQ7gEwBA&prev=/search%3Fq%3Dename%26hl%3Den%26prmd%3Ddivns.
5. European University Centre for Cultural Heritage (CUEBC) and the Council of Europe (COE), "Master Course on Vulnerability of Cultural Heritage to Climate Change." www.preventionweb.net/english/professional/trainings-events/academics/v.php?id=9750.
6. Council of the European Union, "Conclusions on the Launching of Joint Programming Initiatives on 'Agriculture, Food Security and Climate Change,' 'Cultural Heritage and Global Change: A New Challenge for Europe,' and 'A Healthy Diet for a Healthy Life,'" 3035th Competitiveness Council meeting, Luxembourg, 12 October 2010. www.researchprofessional.com/media/pdf/JP3527.pdf.
7. Victoria and Albert Museum, "Peter Gingold Focuses on Climate Change and the Cultural Sector." www.vam.ac.uk/future_museum/future_museum/peter_gingold/gingold_video/modem.html.

SUSTAINABILITY AND COLLECTIONS

BY SARAH STANIFORTH

TODAY, ALL OVER THE WORLD, museums are thinking about what sustainability means for them.

In the United Kingdom, the Museums Association has begun a dialogue about the economic, social, and environmental dimensions of sustainability. Economic issues have dominated museum concerns in the past two years, as governments have cut budgets for national and locally funded public museums and as independent museums have also struggled financially. Nevertheless, the social mission of museums remains strong, with education still at the heart of their purpose.

Environmental issues, on the other hand, have taken a backseat—until now. Increasing awareness of climate change, coupled with dwindling fossil fuels and spiraling energy costs, are causing museum managers to consider ways of reducing the carbon footprint of their institutions.

When the UK government signed the Kyoto Protocol, it agreed to reduce 1990 levels of carbon dioxide emissions by 12.5 percent by 2012. The long-term targets are a reduction of 42 percent by 2020 and 80 percent by 2050. Achieving these goals will require dramatic changes both in energy consumption and in the types of energy used. In 2007 the proportions were as follows:

oil	37%
natural gas	36%
coal	17%
nuclear	8%
renewables	2%

The national goal is to have 20 percent renewables by 2020. Museums have to play a part by fulfilling their own targets for energy reduction. The UK's National Trust for Places of Historic Interest or Natural Beauty aims to reduce energy consumption by 20 percent by 2020 and to increase the use of renewables from 1 percent to 50 percent, compared with 2008.

ENERGY USE IN MUSEUMS

There are many ways to reduce energy use in museums, and there are also opportunities to generate energy on-site by micro-



Historic house Coughton Court in Warwickshire, England. Photo: © Steve Geer.

generation systems, such as wind turbines and solar panels.

Heating, ventilating, and air-conditioning (HVAC) systems are the greatest consumers of energy in many museums, particularly when temperature conditions inside differ significantly from those outside, and also when tight conditions of relative humidity (RH) are required. The typical environmental specifications that emerged in the second half of the twentieth century reflected what equipment could achieve—rather than what was necessary for collections. Because HVAC systems were capable of delivering RH and temperature control within tight limits (typically $\pm 2\%$ RH and $\pm 1^\circ\text{C}$), the precautionary principle was adopted, and what actually constituted acceptable conditions for the conservation of collections was, for a time, ignored.

Ultimately, scientists conducting research into the museum climate—led by David Erhardt, Charles Tumosa, Marion Mecklenburg, and Mark McCormick-Goodhart at the Smithsonian Institution—revisited the issue of environmental specifications and concluded that greater flexibility was appropriate. In 1994 the Smithsonian issued a press release suggesting that a wider range of RH and temperature conditions, with fluctuations as great as $\pm 15\%$ RH and $\pm 10^\circ\text{C}$, would be acceptable for the majority of collections.

The Getty Conservation Institute has focused on these issues for many years. In the late 1980s the GCI commissioned research that looked at reducing energy consumption in museums.¹ The Institute's preventive conservation training courses, held during the 1990s, debated appropriate environmental conditions for collections housed in museums in different parts of the world and looked at models of traditional building design as a way of informing new design. More recently, it has been researching museum lighting—work that is reevaluating current illumination guidelines and demonstrating that energy conservation and artifact conservation are fully compatible.²

Those of us who work with collections housed in historic buildings recognize that a wider range of environmental conditions does not dramatically increase damage to collections. In the United Kingdom, historic buildings are damp—particularly

buildings that are not heated in the winter. Biological deterioration—rather than mechanical damage from RH fluctuations—is the biggest challenge for collections. Solar gain can reduce RH to below 65 percent in the summer. Conservation heating is used in National Trust and many other historic UK buildings to keep the RH below 65 percent in the winter. Apart from that, there is little active control of RH levels.

Discussions have been held among heads of conservation at UK national museums and heritage organizations, and in 2008 a set of principles was embraced for reducing a museum's carbon footprint.³

- ◆ Environmental standards should become more intelligent and better tailored to clearly identified needs of collections and visitors.
- ◆ Care of collections should be achieved in a way that does not assume air-conditioning.
- ◆ Natural and sustainable controls should be explored and make maximum use of buildings with high thermal mass, high thermal insulation, low air exchange rates, local control using microclimates, glazed and backed paintings, and the maximizing buffering effect of building materials.
- ◆ Architects and engineers should be guided to reduce significantly the building's carbon footprint as a primary objective.



A view of an inundated Coughton Court during July 2007 flooding caused by a one-in-two-hundred-year storm. Photo: National Trust.



A restored nineteenth-century waterwheel provides hydroelectricity for the National Trust visitor facilities. Museums and other heritage sites should consider switching to renewable energy sources as part of capital expenditures. Photo: © NTPL/Andrew Butler.

As part of these principles, interim guidelines for environmental conditions have been proposed. For the majority of objects containing hygroscopic material, a stable RH is required in the range of 40 to 60 percent and a stable temperature in the range of 16°C to 25°C. More sensitive materials will require RH control that is tight and specific—specific according to the material. Less sensitive materials can have wider parameters for RH and temperature.

Some commentators have described these proposals as a relaxation of environmental conditions. However, in actuality, these are appropriate environmental conditions for the majority of objects in collections. Indeed, these proposals have been accepted by the Bizot Group of museum directors involved with international loan exhibitions in 2009. They have been discussed at a number of international conservation meetings, including in Copenhagen in March 2010 at the Museum Climate and Global Climate Change Symposium; at a meeting coorganized by the Boston Museum of Fine Arts and the Getty Conservation Institute for heads of conservation in North American museums in April 2010; and at the IIC roundtable discussion at the AIC conference on “The Plus/Minus Dilemma: The Way Forward in Environmental Guidelines” in May 2010.

However, we should not let environmental specifications distract us from other measures that can be used to save energy. Simple measures such as turning off equipment, using more

energy-efficient equipment such as condensing boilers, increasing thermal insulation, reducing air leakage, and not using highly processed materials can all contribute. Any opportunity to switch to renewables as part of capital expenditure projects should be considered. Museums in sunny parts of the world could use their roofs for solar panels; it is now possible to get transparent solar panels that can be used to replace glass in skylights. In addition, land around museum buildings can be used for ground source heat pumps, and fossil fuels can be replaced with biomass.

SUSTAINABILITY OF MUSEUMS

Many museums are suffering under extreme weather conditions as a result of climate change, most recently in northern Australia, where a particularly strong El Niño effect this year caused torrential rain and strong typhoon weather systems. Emergency procedures are put into action more and more often, even in the United Kingdom, where our temperate climate has protected us from extreme weather until the past five years; increasingly severe rainfall has flooded numerous museums and historic buildings with rainstorms occurring at the one-in-one-thousand-year level. This rainfall not only floods buildings at ground level but also overwhelms the capacity of gutters and downpipes to disperse water off roofs.

We need to find ways to adapt to a changing climate, to make museum buildings more resilient in the face of extreme weather events, and to mitigate further climate change by reducing energy consumption and changing from fossil fuels to renewables.

The future for collections and museums can be seen as gloomy or as an exciting challenge, but we need to take action now. In the words of Johann Wolfgang von Goethe, “What is not started today is never finished tomorrow.”

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1. J. Marx Ayres, J. Carlos Haiad, and Henry Lau, *Energy Conservation and Climate Control in Museums* (Marina del Rey, CA: Getty Conservation Institute, 1988).
2. See Museum Lighting Research at www.getty.edu/conservation/science/lighting/index.html.
3. See National Museums Directors' Conference Guiding Principles for reducing a museum's carbon footprint at www.nationalmuseums.org.uk/media/documents/what_we_do_documents/guiding_principles_reducing_carbon_footprint.pdf.

UNCOMFORTABLE TRUTHS

BY JOHN FIDLER, GEORGE WHEELER,
AND DWAYNE FUHLHAGE

FORMER UNITED STATES VICE PRESIDENT Al Gore's 2006 documentary film about global warming, *An Inconvenient Truth*, is credited with raising international public awareness of climate change and reenergizing the environmental movement. The film was a catalyst for political action and helped propel efforts on a broad front. These included initiatives to limit heavy metals and other hazardous materials in the environment, including volatile organic compounds (VOCs), that influence global warming.

It has taken time for the tenets of the U.N. Brundtland Commission (1983–87) to reach a point where most people would embrace its oft-quoted definition that sustainable development should “meet the needs of the present without compromising the ability of future generations to meet their own needs.” In that time, the cultural heritage conservation community has come to realize that its work not only adheres to this philosophy but predates it by over 130 years. The preservation and rehabilitation of existing buildings are generally seen as beneficial, not least because the embodied carbon in the buildings is retained and utilized over long time spans. However, not all building conservation is green in the currently understood meaning of the term. There are some uncomfortable truths that we cannot ignore in the hope of being completely aligned with the influential green movement.

So in this paper we try to articulate some of the issues involved, in order to show that environmental concerns are being met in trade-offs—but not in the straightforward ways most people would expect.

LEAD PAINT

The heavy metal white lead carbonate (PbCO_3) has been used in artists' and house decorators' paints for many centuries. When white lead is added to linseed oil, the two materials dry together to form a highly flexible adhesive film. Small additions of turpentine and driers make for an extremely successful coating and protection for exterior woodwork. Rather than becoming brittle and cracking, the paint gradually weathers, or chinks away, until the surface has a matte texture that allows for easy recoating in subsequent years. White lead's chalking capability led to its increased use as a fashionable interior paint in the eighteenth century, because of its flat, nongloss appearance. Used as a paste

on the internal tenon joint surfaces of window joinery, the lead also limited capillary uptake of moisture at the most sensitive positions in the construction, and thus it doubled as a fungicide, improving durability.

No modern paint can perform as well as lead-based paint in terms of robustness and appearance. Original lead paint applications have saved carbon loads by continuing to function, and by reducing the need for additional carbon to be expended on new paint manufacture and frequent repainting. On the other hand, long-term exposure to white lead is known to be toxic, causing chronic illnesses among lead workers, painters, and children. From the 1970s onward, lead paints were banned in many administrations, or their use was drastically curtailed and regulated.

In September 1989, the European Parliament permitted

lead paint use for works of art and historic buildings on the grounds that no other paints were compatible, or as durable, or had the same qualities of appearance; controlled specialist use could continue. The UK government allowed the manufacture and use of lead paint only for the restoration of Grade I and II



A half-timbered Tudor house in the village of Lacock, Wiltshire, England. Effective maintenance and repair of a historic building such as this—in a manner that retains original physical materials—often requires the use of potentially harmful materials. Photo: © Jayne McCarthy.

Listed Buildings and Scheduled Ancient Monuments through a licensing system run by English Heritage and its sister heritage bodies in Scotland and Wales. English Heritage argued that there was no substitute for lead paint; that the continuing lead load on the environment was *de minimis* compared to other sources; and that less than 8 percent of the listed historic buildings in England (0.32 percent of the total building stock) warranted such special paint finishes. These buildings also tended not to be residential accommodations that might put children at risk.

ETHYL SILICATE STONE CONSOLIDANT

Silicate-based treatments for decaying stonework have been around for nearly 150 years. Ethyl silicates have been used successfully in stone conservation since at least the 1920s. From the 1970s onward, ethyl silicate-based consolidants have become the material of choice of professional conservators. No other consolidants match their low viscosities and surface tensions, the stability of the gel they form with respect to damaging ultraviolet radiation, and their relative effectiveness across stone types. A key feature of their use is the moderately slow gelling reactions that allow the liquid to penetrate decayed stonework and then convert to the stable solid that provides consolidation. However, these gelling reactions produce ethanol, which eventually off-gases. The measured VOCs of most of these consolidants range from 40 to 45 percent (similar to a martini), whereas many regulating agencies impose upper limits in the 10 to 35 percent range. Realistically, ethanol is low in toxicity and in ozone-formation potential compared to many other materials, but regulations treat all VOCs the same.

Although these consolidants have a negative environmental impact, what advantages accrue from their use? First, they extend the lifetimes of heritage materials and their embodied energy. Second, many monuments, sculptures, and buildings are constructed with limestone and marble, which, when exposed to acid rain, themselves give off carbon dioxide. Several ethyl silicate consolidants also act as water repellents, which limit the dissolution of these carbonate materials in acid rain. When evaluating the environmental impact of ethyl silicate stone consolidants, one should consider the volume of material consumed in heritage conservation and consider how that volume compares to other common human activities. Based on industry estimates, without current restrictions the total U.S. national emissions from these consolidants would not even account for 0.05 percent of annual California coatings VOC emissions—less than that from recreational watercraft in the state (which are less regulated).

Adjustments in the formulations of ethyl silicate-based consolidants could achieve a reduction in their VOCs, but only to a degree that may just meet ever-decreasing regulatory limits.

Finding a water-based equivalent that meets the performance standards of ethyl silicates may be a better option. In the interim, the best approach is for all parties to participate in the regulatory rule-making process to assure availability of current technology. Heritage stakeholder advocacy can make a difference. In California, joint industry and historic preservation-based education and lobbying efforts (including the intervention of the state historic preservation officer) led to the creation of a stone consolidant category in the state's model VOC rule. This rule set a precedent for regulations in northeastern states and ties into the California Green Building Code, as well as the current iteration of the new International Green Construction Code.

PENTACHLOROPHENOL

First produced in the 1930s, pentachlorophenol (PCP), C_6Cl_5HO , is an organochlorine compound used in many industries as a pesticide, disinfectant, and fungicide. The chemical has been one of the most successful treatments against wood decay fungi in damp historic buildings. Compared to the more environmentally friendly fungicides, it is less water soluble and so sustains its fungicidal effect.



View of an arch-braced roof assembly. The brace and the post behind it suffer from fungal attack caused by water infiltration. Pentachlorophenol would have helped produce a fungus-free zone while the area dries after repairs, but this option is no longer available—a situation that leads to more removal of historic fabric. Photo: Ridout Associates, International Timber Decay Consultants (www.ridoutassociates.co.uk).



Field conservators John Stewart (left) and Hiroko Kariya (right) in protective clothing testing alkoxy silane stone consolidant for the block yard conservation project, Luxor Temple, Egypt. Photo: Sue Lezon, courtesy of the Epigraphic Survey, Oriental Institute, University of Chicago.

However, short-term exposure to large amounts of PCP can cause harm to the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract. Long-term cumulative exposure to low levels of PCP is also associated with carcinogenic and neurological effects. General usage is therefore being limited and phased out. Regulators have been concerned about trace evidence remaining, after bans, in water, aquatic organisms, soil, and food.

The European Commission prohibited the marketing and use of pentachlorophenol compounds in a concentration equal to or greater than 0.1 percent by mass in substances and preparations. An exception was given for use in wood preservation for the in situ treatment of buildings of cultural and historic interest, subject to authorization by individual EU member states. The United Kingdom, France, and Spain permitted such uses in licensed forms. Manufacturers of the chemical had until 2006 to either abandon or register continued production. But because there was insufficient continuing construction-industry demand for PCP, it is no longer produced. As a consequence, historic timberwork in ancient buildings risks fungal attack because safer substitute pesticides are less effective, and more ancient fabric has to be replaced.

CONCLUSION

Despite obvious synergies, historic preservation and sustainability sometimes clash at the level of conservation treatments. But perceived conflicts all depend upon how sustainability is defined. In the three treatment cases cited, the use of potentially harmful materials has been justified for conservation purposes on the grounds that no substitutes replicate their effectiveness. The authentic maintenance and repair of historic buildings and the retention of original physical materials are justified (e.g., through the ICOMOS Nara Document on Authenticity, 1994)¹



A technician applies PROSOCO's Conservare OH100 Consolidation Treatment to strengthen deteriorated sandstone at the U.S. Capitol. OH100 strengthens historic stone fabrics by replacing the stone's natural binding materials lost to time and weathering. Photo: Courtesy PROSOCO.

and balanced against other risks. These hazardous materials are eliminated from consumer usage and left in the hands of professionals who take precautions against personal and public safety risks and dispose of waste materials responsibly.

This strategy is predicated on sufficient market demand for the materials to be retained in production. In the case of lead carbonate, ongoing production is safeguarded for the time being because the material is extensively used in plastic pipe production. But the lead paint manufacturers are in decline because of commercial pressures, and the survival of this traditional material is not guaranteed.

Heritage authorities argue that uncomfortable as treatment decisions may be, they are necessary for the survival of finite cultural resources. The hazardous loads on the environment are relatively small compared to other emission sources, and the long-lasting treatments save carbon loads by limiting the need to repair and replace materials in the short to medium term. The cost-benefit analysis weighs in their favor, but is an uncomfortable truth.

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1. www.international.icomos.org/charters/nara_e.htm.

CONSERVATION WRIT LARGE

A Discussion about Sustainability and Heritage

JEAN CARROON is a principal at Goody Clancy, a design firm based in Boston. Nationally recognized for her achievements in integrating sustainable design into historic buildings, she is the author of *Sustainable Preservation: Greening Existing Buildings* (2010), a member of the National Trust for Historic Preservation Sustainability Coalition, and one of the founders of the Technical Committee on Sustainable Preservation of the Association of Preservation Technology.

JERRY PODANY is the senior conservator of antiquities at the J. Paul Getty Museum. He served two terms as president of the American Institute for Conservation and is currently president of the International Institute for Conservation. A University of Southern California adjunct professor and a regular lecturer at Columbia University, he has published widely in the field of conservation, the history of restoration, the relationship of sustainable heritage preservation to the preservation of natural resources, and the changing role of heritage conservation.

CHRIS WOOD is the head of the building conservation and research team at English Heritage, where he has worked for the last seventeen years. The team specializes in dealing with the problems of deteriorating materials in historic structures. Recently he has been working on a number of initiatives that seek to improve energy efficiency in historic buildings without causing harm to their character and appearance.

They spoke with **SUSAN MACDONALD**, head of GCI Field Projects, and with **JEFFREY LEVIN**, editor of *Conservation Perspectives*, *The GCI Newsletter*.

SUSAN MACDONALD What do you see as the relationship between cultural heritage conservation and the concept of sustainable development?

JEAN CARROON Unless we embrace cultural heritage and the concept of stewardship as essential to environmental sustainability, we really are lost. Stewardship means maintaining physical and cultural assets, but it's also about economics and viability. The three parts of sustainability are social, economic, and environmental. Sustainability is a complex entity but it's essentially about creating a healthy world. How can we have an emotionally or physically healthy world if we don't care for things of value within that world?

JEFFREY LEVIN This is a much broader concept than simply reducing energy consumption.

CARROON Yes. The original vision of the United Nation's Brundtland Commission was about holistic health, not just the environment. It was very clear that we cannot sustain the Earth if we don't create a sustainable culture in terms of human spirit, memory, and place. It's unfortunate that climate change has pushed us into thinking only about energy. Clearly our energy policies are wrong and are contributing to global warming. But when you talk about sustainability only in terms of energy, you start to have inappropriate pressures placed on individual buildings and individual sites, rather than looking at the whole picture. As conservation practitioners, we constantly press to get a more holistic conversation. But public opinion and policies have zeroed in on energy.

CHRIS WOOD The reason we concentrate on energy is because it's something politicians understand and something we can respond to. A holistic attitude isn't developing among government decision makers and industry because it appears as a nebulous concept. As I see it, the energy issue is helpful in that it focuses attention on part of the sustainability agenda. In terms of the relationship of cultural heritage to sustainability, the two are inextricably linked. Old buildings are far more than just usable products—they make places and they provide memory. But they're only part of a greater whole.

JERRY PODANY The definitions of sustainability are really broad and might just be boiled down to "making something that lasts." However, it's really more about how we make it last, how much it costs, and if it's worth it. Our place as professionals who deal with heritage conservation is to understand that culture can be seen as a language. If it's a shared identity that this language expresses, that identity ultimately works its way through the world as developing trust—and that trust results in cohesion. We're the ones who are helping steward the products of that culture, whether they're tangible or intangible. And if those disappear, then that cohesion suffers as well. The process of caring for something can filter down throughout society—and throughout the world's cultures—as an expression of caring for all of us and for the planet. We have an important place as role models.



Stewardship means maintaining physical and cultural assets, but it's also about economics and viability.

JEAN CARROON

LEVIN Jean, you've observed that a new building by definition isn't green because you're creating new materials to build it, while often destroying something old. Both of those acts take energy. Why isn't the preservation of existing buildings fully appreciated as an act of sustainability?

CARROON A greater awareness of this is starting to permeate some green building conferences, although it's a battle because of our love of the new. But generally the environmental impacts of materials aren't recognized. Over 50 percent of U.S. resources are used in new construction and in new construction of the infrastructure to support buildings. When you consider that the United States has 5 percent of the world's population, that we use 30 percent of all the resources, and that half of those resources are for new construction—that means we're using 15 percent of the world's resources for new construction. By inference, any new object has a substantial environmental impact. There's no way to make a building that doesn't have an environmental impact, except perhaps a mud house that you make on site. Within our current manufacturing systems, every product has an environmental impact. You can lessen our environmental impact by taking existing objects and extending their service life. The preservation and heritage community has these skills, and that's what we could teach—if people accepted this approach as crucial.

WOOD In the United Kingdom, I see this hypocrisy with respect to being sustainable—which to me means keeping old fabric because there's a lot of embodied energy there. One example is the replacement of windows. A great number of our windows were built with slow-grown, imported Scots pine from northern Europe, which is a soft wood but a wonderful-quality timber. They've lasted for over two hundred years. Ill maintained, but they still work. There's strong encouragement to rip those out and replace them with short-lived double-glazed plastic windows because of supposed energy benefits. We have disputed that, but the perception is there, and building regulations reflect it. And yet when we look at the real life-cycle costs of producing plastic windows, it's astronomical. In sustainable terms, the obvious thing to do is to make the most of what is an incredibly precious asset.

LEVIN Are there other examples of problems with new materials, Chris?

WOOD Well, synthetic internal wall insulation is one. Even some energy-saving advocates admit that the statistics for insulation are very disappointing. In England most of our historic buildings are built with solid walls. Our climate is damp. We get frosts. In a house that is uninsulated, you at least get a sensible relationship between heating, control of moisture, and evaporation—and provided it is not excessively leaky, it works very well. But as soon as you put up this barrier on the inside to prevent that wall from warming, we see brickwork decay very quickly. We see moisture percolating around buildings and causing problems. We see health problems. The whole thing is completely unsustainable. We need to look back at how people lived in these houses when they were built. When we look at nineteenth-century photographs of these grand Georgian terraces, they had external shutters. They had blinds and awnings to control sunlight. People used buildings sensibly. They closed up rooms they weren't using. They had draft excluders at the bottom of doors, which I remember from when I was a kid. It was a more sensible way of living, which we've got to relearn. Having said that, I have to make a plea for new, as well. We consistently encourage the reuse of original materials as a building is refurbished. That's fine. But roofing materials, such as stone and clay tiles, have become very valuable, so they get stolen. There's a huge market for that sort of thing. What we've realized is that by encouraging the reuse of seconds, our original suppliers are going out of business, and the skills for making these things are dying out. So now we support new material coming from as sustainable a source as possible—i.e., local vernacular sources—and produced in the right way.

CARROON But that can't compete in the current market.

MACDONALD Yes, but on the macro scale, local materials often have advantages environmentally over imported ones, when you take into account transport costs and think in terms of sustaining local markets.

WOOD Our stone initiative encourages rejuvenation of old stone quarries because we need the right stone to repair historic buildings. If you use a tougher stone, the old stone around it deteriorates a lot faster. If you repair with the right stone and the right mortar, it works very well. We want to see some of these quarries reopened because they'll provide new materials for buildings in these very sensitive villages. They're highly sustainable because they're local, and they provide local employment in areas where there's virtually none. In terms of a carbon footprint, it's very small because mostly hand tools are used. Unfortunately, we're seeing imports from India and China at basically a quarter of the price. Of course, the distance of some Chinese quarries to the docks is around two thousand miles. There are no health and safety controls over a lot of these quarries, so we're not competing on the same basis. And we're not changing that situation, at least not in the short term, because the great mantra in Europe and North America is free trade, whatever the cost.

An even worse problem is thatching. We have probably fifty thousand rustic thatched buildings. There is no material more sustainable than thatch. It's a by-product of our local farming. In England, our tradition was something called long straw thatching. The conflict we have at the moment with certain thatchers is that some are rejecting the old tradition of long straw thatching. They'd rather use water reed imported from South Africa and China. We are fighting very hard against it. Farmers are being deprived of a considerable amount of potential income—I think they earn four times more per ton than they get for the actual grain growing. It's highly sustainable, but we are losing out.

PODANY I'd like to address the idea of sustainable development. There are some hard-core environmentalists who would say that those two words are contradictory. But it depends on what you mean by *development*. Within the collections world, one could say development might mean the endless expansion of museums and collections. Do we have the carrying capacity to continue to expand, with the design and wastefulness of new museums that are treated more like sculpture than functional architecture? On the other hand, development might also be the continuation of traveling special exhibitions, which are beneficial in many ways. They reduce the number of people who might travel far distances to see these objects. I don't think we should necessarily stop doing that, but at the same time we have not explored how we can make it more efficient and sustainable.

LEVIN As president of the IIC [International Institute for Conservation of Historic and Artistic Works], you organized a roundtable at the IIC's 2008 meeting that addressed climate change and collections. I presume you saw a need for the profession to confront the sustainability issue head on.

PODANY Yes, the IIC roundtable was meant to raise awareness among conservators about their role in the larger issue of climate change and its implications with regard to their professional responsibilities. I would note that the following year, the Salzburg Global Seminar, sponsored by the IMLS [Institute of Museum and Library Services], held an international meeting on the conservation of collections, which included a plenary session on sustainability and stewardship. Both events, I think, helped bring greater attention to these issues.

To be honest, the issue of environmental controls in collections has been driven partly by a responsible professional response to climate change but far more strongly by cost. Museums—which are faced with large energy bills at a time of economic stress—are turning to the conservators and saying, "Do we need these strict environmental controls for our exhibitions and storage?" The profession has been caught a bit off guard, in the sense that there isn't enough research on whether these narrow controls are actually necessary for every object. But to borrow an idea from Tom Friedman's book *The World Is Flat*, these challenges are opportunities masquerading as insurmountable problems, which, if we resolve them, can contribute to the welfare of our planet and also verify what our heritage objects really need for preservation. Many standards aren't based on empirical observation of the response of the object to an environment, and they've gotten narrower and narrower—and more energy wasteful—because we can measure finer and finer changes in relative humidity and temperature. That's resulted in this attitude that we will do whatever it takes to save our cultural heritage. Is there a provable case for doing that? If there is, then we should start looking at more efficient ways to achieve that. But if there isn't, perhaps we should broaden our environmental guidelines. We would save energy while also providing a good example to everyone else about the larger meaning of the term *conservation*. The word *conservation* is, after all, in our title, and we should promote it more broadly.

MACDONALD There's been a repositioning by conservation practitioners in immovable heritage to demonstrate that what they're doing is managing thoughtful change in a way that sustains the heritage significance of the place. Jerry, how do museum conservators think of themselves in relation to that idea of the inevitability of change?

PODANY The collections world is just entering the discussion about the limited time period that we have for all of these objects. The time period is far greater than buildings because use of objects is much more limited. But we need more discussion about what we mean by *the future*. We often say we're conserving these objects for the future—but while we see *the future* as



We don't want to fossilize a place in time. We just want to make sure that when change comes, it's done in a sensitive way.

CHRIS WOOD

a kind of infinite continuum, we evaluate materials we're using in conservation based on known stability for fifty to one hundred years. Unfortunately, we don't evaluate our expectations of how long we think we can help an object last. This idea of managing change is coming into the discussions of collections conservators, but it's a difficult discussion because we've always identified our mission as preserving heritage forever, even if we knew that wasn't possible. I'm not advocating that we relax our effort. I'm simply advocating that we have that discussion, identify how long we think we can help objects to exist, or at least discuss the possibility of a finite lifetime for any given collection. That will influence how we approach conservation, how we use and prioritize our resources, and in the end help us work more efficiently.

CARROON If I could grossly generalize, I don't believe that the U.S. preservation community understands their management charge. The bulk of the preservation community is citizen-driven commissions that often have no formal expertise. It's very common for a commission to have decided what their mandate is, even if it is different from their legal charge. In large part, people who have embraced the idea that they are protecting heritage try to freeze things in place. We're creating historic neighborhoods that don't have corner stores, that don't have vitality, that don't have mixed communities, and that are no longer able to be anything other than gentrified communities. That perception of heritage preservation within the United States is extremely detrimental to what we need to do as a sustainable world that values stewardship and is environmentally responsible.

WOOD Most of my working life has been about managing change in the heritage world. We have protection for buildings with special architectural or historic qualities—the vast majority of which are privately owned—and we try to preserve those qualities. We are perceived as being preservationists who simply want to preserve things in aspic, but that's not what conservation is about. Conservation is active management of our assets. What we have done for years is negotiate. We identify important features of a building and make sure those aren't harmed. The use can possibly change, and alterations can be carried out,

provided they're done in ways that conserve character.

In the last few years, we in English Heritage have been looking more into communal heritage. We've given a lot of guidance on small towns and eulogized about insignificant seaside towns with few conservation areas. These studies have been successful in getting recognition for the town because they've shown its history. Why is the local football club important? It's never achieved anything significant—but generations of fathers and sons have gone there, watched, and suffered watching unsuccessful football teams, like we all have. People have successfully clamored for these places to be protected. What's interesting is the local MP often gets quite enthused and realizes, "My town's on the map." English Heritage is suddenly exciting. What we're now seeing is planning within these towns to maintain shops and pubs for their social and communal value. Even if the building is not significant, the heritage has social significance.

MACDONALD It's recognizing social significance and some of the intangible aspects of significance. You've aligned yourself to sustainability in broad terms and demonstrated the role that heritage might play in sustainable development.

WOOD Yes. There are ten thousand conservation areas in England, and everybody thinks, "Well, that's because that's where the big beautiful Georgian terraces are." In fact, some are broken-down industrial areas. They have heritage significance because of the historic importance of the buildings, but they only work as conservation areas because of their actual use. One of our most impressive is the Jewelry Quarter, a series of little workshops near the center of Birmingham. They were not very special architecturally, but the area was abuzz with activity. About ten or fifteen years ago, it suddenly became very fashionable to gentrify and convert them to apartments. English Heritage designated the whole neighborhood as a conservation area, and Birmingham City Council put in place policies that discouraged changes of use. The Jewelry Quarter has now prospered because it's on the heritage trail. It's partly to do with buildings, but it's mostly to do with the activity—the social and communal aspects.



The message that heritage is not a luxury but an essential—and that we are dedicated to prolonging this essential aspect of our world—also needs to be advanced.

JERRY PODANY

CARROON It's embracing the bigger picture and educating the community about the interaction between these things. From the standpoint of protecting heritage, if we want to implement policies that are good for the environment, they need to be about maintenance and stewardship. If homeowners get a tax credit for repairing their windows, as opposed to replacing them, or get some reward for putting on a one-hundred-year-life roof, even though they're only going to live there five years—those things are good for a community's heritage, as well as the environment and the economy. The heritage community understands some of the economic links and some of the things about extending service life and living in a healthy way. We have a tremendous opportunity to define the conversation and be the leaders of the conversation in tangent with the economic and business world.

MACDONALD Why haven't we been able to do that so far?

CARROON We have to change policies so that there is an ability to do the right thing within the economy. The argument that we run into as practitioners is always that the new is less expensive than repair—even though repair creates more jobs.

WOOD In the United Kingdom we've had major regeneration schemes in areas where developers have wanted to flatten everything. In the last twenty years, there's been an upsurge in building along canals, rivers, and other attractive waterfronts, and we've had major battles to save historic warehouses. Today some of those warehouses are Grade One listed buildings that are being converted for mixed uses and have become wonderful tourist centers. Everybody applauds the developers who did it, forgetting that it was actually only made possible by opposing their demolition—which was tough because the politicians were saying, "Who the hell are you? We need the jobs." But when you look back and see what has been created, it's worth it. It's one of the untold successes of the work our regional teams have done. Regenerating areas around their heritage assets is what draws people. It gives a sense of place to the people who live there. And politicians appreciate the benefits. Their priority is to make sure there's employment, and we support that. The message we keep

sending them is that we're actually oiling these deals. We want jobs. We want buildings to be used. We don't want to fossilize a place in time. We just want to make sure that when change comes, it's done in a sensitive way.

MACDONALD What about the challenges now in the urban environment? Asian cities are going from low-rise, low-density, to having to accommodate an extra five million people a year. How do we deal with that large change?

CARROON The major conversation environmentally and in urban planning and in heritage in the next twenty years is going to be about density. Appropriate density—appropriately located, planned, and designed—can be a complement to heritage, not a cause for demolition. However, it may mean setting up a mechanism for density transfer from one district to another. The National Trust's GreenLab is exploring this in different cities. The conversation about density must also include people within buildings. We forget the fact that people, certainly within this country, are consistently taking more housing space for themselves. The solution is not always to build more. The solution may be to tax more, to say that space is a premium, that you're not allowed to have five thousand square feet per person no matter where it is located—or if you are, you pay this tax. It means changing this assumption of consumption.

MACDONALD Jerry, how does the issue of sustainability enter into the relationship between archaeology and collections? I had a recent conversation with someone from a well-known archaeology institute who talked about a site they were excavating, and the government in the country has asked them to conserve and protect the site and bring tourists to it—tasks they don't have the money or capacity to do. But they want to keep digging because it's a fantastic site with great results potential.

PODANY There is a dialogue that needs to happen among archaeologists, the tourism industry, ministries, and archeological conservators that has to do with sustainable yield. Forestry uses the concept, and I think it has a place in the discussion

about archaeological sites. Sites *are* a far more finite resource, but we treat them like we're harvesting forests—as if sites will go on forever and we can just keep digging the material up. There's an increasing demand by governments to require conservation of sites, a demand driven almost solely by tourism. That's a success, but one that carries with it a lot of complexities. The simple answer is, “yes, we should excavate less”—but that's also saying that we should *know* less, and that's a hard sell. Management of sites can be made more efficient, which might ease some of the negative impact of continuing excavation. Is it fair to say that archaeology should disappear? Or are we saying we should limit it and engage in it more sustainably? Like museums, we have to explore our efficiencies and the best way to utilize the resource, rather than simply always saying no.

LEVIN Jerry, you've occupied leadership positions in the conservation community and you've given a lot of thought to broad policy issues. How do we promote preservation as an important component of sustainability efforts?

PODANY We start first by changing the conversation inside the field. There's a wonderful quote from Sarah Brophy and Elizabeth Wylie in their book *The Green Museum*, in which they call the planet the ultimate museum. Speaking from the collections end, if we start thinking that way, we can become an integral part of this larger effort. A lot of conservation outreach activities have to do with conservators trying to promote their work to the larger community, and it's almost always about technical issues. The before and the after. The real or not real. The hours of patient cleaning with a swab. These are interesting and should be communicated. But the message that heritage is not a luxury but an essential—and that we are dedicated to prolonging this essential aspect of our world—also needs to be advanced to the community. Museums communicate very little about their efforts to join the larger preservation world. We have LEED certification that has led museums to think more about energy efficiency and sustainability—but museums that are LEED certified don't tell people that this is part of the larger picture of conservation. We should. Maybe conservation needs help from the PR people who know how to do this. Maybe that's the part we're missing.

LEVIN The environmental movement has been successful in selling its ideas to a large population, in part because people make connection to the impact of the environment on their lives. How do you help people connect to the notion of sustaining cultural heritage that may be thousands of miles from where they are?

WOOD Look at how successful environmentalists are at getting out the message about polar bears and rhinos. Frankly, I've never

seen any of these things in the wild, nor have a lot of people who get emotionally involved in these things, even though they have absolutely no direct bearing on their lives. Look, there is a huge cultural shift that is needed if we are to be sustainable in the world. The way I see things, you can't change the culture of society very easily. It's going to come with the next generation. The kids of today are being told that their parents are killing the polar bears by wasting energy and not living sustainably. I've been accused of it myself—and I think that's very positive. And that's where the future lies. It will be in the next generation where more meaningful advances take place. We've just got to keep providing the evidence.

PODANY There have been efforts to join natural resource preservation and heritage preservation. At the same time, there is some competition between them because they're competing for the same piece of the pie. But there are some good examples of the two being joined. An archaeologist named Richard Hansen is working in the Mirador Basin in Guatemala, which happens to also be an incredibly beautiful, lush forest that's under threat. He's working to promote both nature and heritage. It isn't “preserve this Maya site”—which is one of the great Maya sites of the world—and it isn't “preserve this forest.” They are the same thing. They are part of your heritage. It is part and parcel, all together. There should be more of that.

CARROON We used to joke in architecture that by quietly putting in water- and energy-saving devices, we could do stealth green without the owner realizing it. In the same way, perhaps it is time to do stealth preservation. If young people who are emotionally attached to the polar bears understand that replacing a wood window jeopardizes the bears, then we start to change attitudes. Young people may not realize that by saving the window they preserve the character of the house or the neighborhood or create more linkage with the stories of the people who used to be in that house—but they might get the polar bear connection. Eventually they will understand the heritage connection. However, for the moment, if they only understand the polar bears, fine—save the polar bears by extending the service life of what we have and avoiding the environmental impacts of new, short-lived products. Not changing the window will definitely help save the polar bear, and someday somebody will be very grateful that they didn't throw out the window. If we can make these linkages and ride on the success of the emotions for the natural world, we'll still have challenges, but at least we'll have started to demonstrate that these two things are inherently connected.

Join the discussion online at
www.getty.edu/conservation/26_1/dialogue.html

Key Resources

Sustainability and Cultural Heritage



ONLINE RESOURCES

APT Bulletin, vol. 36, no. 4 (2005): 2–3. John D. Lesak, “APT and Sustainability: The Halifax Symposium.”

www.jstor.org/stable/pdfplus/40003156.pdf?acceptTC=true

Climate Change and the Historic Environment

<http://eprints.ucl.ac.uk/2082/1/2082.pdf>

Conservation Bulletin, “Adapting to a Changing Climate.”
English Heritage. Issue 57: Spring 2008.

www.english-heritage.org.uk/publications/conservation-bulletin-57/conbull57pp111.pdf

Council of Europe, *Directorate of Culture and Cultural and Natural Heritage (DGIV) European Heritage Network HEREIN Forum: Cultural Heritage and Climate Change—a Call for Action (2009–10)*.

www.coe.int/t/dg4/cultureheritage/heritage/cdpatep/Plenary_Session/3_2010_May/CDPATEP_2010_6_EN.pdf

Council of Europe, *Vulnerability of Cultural Heritage to Climate Change, Report AP/CAT (2008)*, 44.

www.coe.int/t/dg4/majorhazards/ressources/Apcat2008/2008_44_culturalHeritage_EN.pdf

English Heritage on Climate Change and Your Home

www.climatechangeandyourhome.org.uk

Getty Conservation Institute, *Experts’ Roundtable on Sustainable Climate Management Strategies*

www.getty.edu/conservation/science/climate/climate_experts_roundtable.html

Heritage and Sustainability: A Discussion Paper

www.heritage.nsw.gov.au/docs/sustainability.pdf

Historic Environment, “Global Climate Change and Cultural Heritage,” vol. 21, no 1. Australia ICOMOS, March 2008.

<http://australia.icomos.org/get-involved/working-reference-groups/climate-change-and-cultural-heritage-working-group/historic-environment-vol-21-no-1/>

National Trust for Historic Preservation on Sustainability and Historic Preservation

www.preservationnation.org/issues/sustainability/

Report of the World Commission on Environment and Development

www.un-documents.net/wced-ocf.htm

UNESCO, *Case Studies on Climate Change and World Heritage*

<http://unesdoc.unesco.org/images/0015/001506/150600e.pdf>

UNESCO, *Climate Change and World Heritage*

<http://whc.unesco.org/uploads/activities/documents/activity-474-1.pdf>

UNESCO, *Policy Document on the Impacts of Climate Change on World Heritage Properties*

<http://whc.unesco.org/uploads/activities/documents/activity-397-2.pdf>



BOOKS, JOURNALS & CONFERENCE PROCEEDINGS

Earth, Wind, Water, Fire: Environmental Challenges to Urban World Heritage. Proceedings of the OWHC [Organization of World Heritage Cities] Northwest-European Regional Conference in Regensburg from September 16–18, 2008. Edited by City of Regensburg, Planning and Building Division. Regensburg, 2009.

Managing Change: Sustainable Approaches to the Conservation of the Built Environment: Proceedings of the 4th Annual US/ICOMOS International Symposium Organized by US/ICOMOS, the Graduate Program in Historic Preservation of the University of Pennsylvania, and the Getty Conservation Institute, Philadelphia, April 2001. Edited by Jeanne Marie Teutonico and Frank Matero (2003), Los Angeles: Getty Conservation Institute.

“Sustainability,” chapter 4 in *Survey and Repair of Traditional Buildings: A Conservation and Sustainable Approach*, by Richard Oxley (2003), Shaftesbury: Donhead Publishing.

Sustainability and the Historic Environment: Technical Paper. Prepared for English Heritage by Land Use Consultants and CAG Consultants (1996), London: English Heritage.

Sustainable Preservation: Greening Existing Buildings, by Jean Carroon (2010), New Jersey: John Wiley & Sons.

For more information on issues related to sustainability and cultural heritage, search AATA Online at aata.getty.edu/nps/

GCI News

Project Updates

MODERN AND CONTEMPORARY ART RESEARCH UPDATE

Research into the cleaning of acrylic paints is one of the main areas of the GCI's Modern Paints Project. An important aspect of this research has been to ensure that its findings are useful to conservators. To accomplish this, a series of case studies is being undertaken.

In July and August 2010, a large acrylic emulsion painting by Doug Wheeler, *Untitled* (1964), was treated in the GCI's science labs by private conservator Chris Stavroudis and Jennifer Hickey, a graduate student from the training program of the Conservation Center of the Institute of Fine Arts, New York University, supported with analysis from GCI scientists. The predominantly white painting was extremely dirty, and the artist had considered respraying the entire painting in an attempt to re-create its surface. As Wheeler commented during a visit to the GCI labs, "I want my work to feel like you're seeing particles of color in the air very subtly."

A variety of different aqueous cleaning systems were tested and examined. The types of cleaning formulations that performed best in trial tests carried out on acrylic emulsion paint mock-ups appeared to be well suited to cleaning the Wheeler painting. The formulation ultimately chosen for cleaning balanced the need for a workable speed of dirt removal with the ability of conservators to achieve an even, uniform paint surface after cleaning. (Read the Getty's blog, the Iris, at blogs.getty.edu/iris/?s=doug+wheeler, for more about the painting's cleaning.)

Cleaning of *Untitled* (1964) was successfully completed, and the painting will be shown in *Phenomenal: California Light and Space*, opening in October 2011 at the Museum of Contemporary Art San Diego. This exhibition is part of the Getty initiative Pacific Standard Time: Art in L.A. 1945–1980. Pacific Standard Time will also feature the GCI-organized exhibition *Start*



Cleaning of Doug Wheeler's *Untitled* (1964) in the GCI laboratories. Photo: Tom Learner, GCI. Art: © 2011 Doug Wheeler.

to Finish: De Wain Valentine's "Gray Column," which examines the materials and manufacturing processes used in the creation of this extraordinary work (www.getty.edu/conservation/science/pst_gci.html). It opens at the Getty Center in September 2011.

Also in conjunction with research into the cleaning of acrylic paints, the GCI is presenting the workshop "Cleaning of Acrylic Painted Surfaces" (CAPS), as part of the GCI's Science Series Workshops, a collaboration between the GCI Education and Science departments. The first of these CAPS workshops was held at the Getty Center in July 2009. A second workshop is planned for May 2011 in New York.

In other news, the GCI organized a three-day meeting in Brazil in December 2010 to discuss the current state and future requirements of research into the conservation of modern and contemporary art in Latin America. The gathering was the second in the GCI's Conservation Issues of Modern and Contemporary Art (CIMCA) series, and it follows a highly successful meeting held at the Museum of Modern Art in New York in June 2008. CIMCA2 was organized with the School of Fine Arts,

Universidade Federal de Minas Gerais in Belo Horizonte, and the contemporary art organization Instituto Inhotim in nearby Brumadinho. The thirty invited participants—from a range of conservation and related backgrounds—came from countries across Latin America, including Argentina, Brazil, Chile, Cuba, Mexico, Peru, and Uruguay. They were joined by representatives from Spain, the Netherlands, and the United States who are active in the region.

Discussion at CIMCA2 focused on the need for stronger networks, improved pooling of resources, and the building of better partnerships across the region. The need for a series of workshops and/or focused conferences on various aspects of contemporary art conservation was also stressed, as well as the desire to have key publications on the subject translated into Spanish and Portuguese. A full report of the December 2010 meeting will be available on the GCI website in fall 2011.

For more information on the GCI's Modern and Contemporary Art research, visit the GCI website at www.getty.edu/conservation.



Detail of a wall painting with brown spots in the tomb of Tutankhamen. Photo: Lorinda Wong, GCI.

CONSERVATION OF TUTANKHAMEN TOMB

Work on Conservation and Management of the Tomb of Tutankhamen, a joint project of the GCI and Egypt's Supreme Council of Antiquities (SCA), advanced on a number of fronts.

In July 2010, twenty-three microsamples taken from the tomb were brought by SCA staff to the GCI for examination through a battery of analytical techniques. These included a number of wall paintings samples for investigation of original technique, condition, and

composition of the paint ground and plaster layers, as well as samples from Tutankhamen's coffin and sarcophagus. Preliminary results of the analysis of the wall paintings samples are being integrated with results from noninvasive examination of the paintings through in-situ technical imaging using a variety of techniques. Concurrent with the investigation at the GCI, samples and swabs taken from the unique brown spots on the tomb's walls are being analyzed in the Laboratory of Applied Microbiology at Harvard University.

The GCI project team has achieved an un-

derstanding of the stratigraphy of the paintings in the tomb and has identified the pigments, binding medium, and the binder and aggregate of the different plaster types, which include gypsum and clay-bound plasters. In parallel with this work, research is being undertaken into the literature on Egyptian wall-painting technologies and phenomena of deterioration.

In addition to the wall paintings conservation efforts, the project team worked with conservators from the Getty Museum on Tutankhamen's gilded coffin. In November 2010 they lifted the gilded coffin from the sarcophagus in the tomb for technical examination. Further examination and testing of materials for the conservation of the coffin are being carried out by Getty Museum staff prior to a decision on how best to handle the problems associated with the fragility of the gilded wood.

For more information on the Conservation and Management of the Tomb of Tutankhamen, visit the project website at www.getty.edu/conservation/field_projects/tut/index.html.

AMÉRICA TROPICAL UPDATE

In September 2010, officials from the City of Los Angeles and the GCI broke ground for the protective shelter, viewing platform, and interpretive center for the 1932 David Alfaro Siqueiros mural *América Tropical*, the funding of which was made possible through a partnership between the J. Paul Getty Trust and the City of Los Angeles. This event marks the culmination of a long-term effort to make this work of art available to the public.

Located at El Pueblo de Los Angeles, a historical monument and the site of the founding of Los Angeles, *América Tropical*—which measures approximately eighteen by eighty feet and is located on a second-story exterior wall on Olvera Street—is the only extant public work in situ in the United States by famed Mexican muralist Siqueiros. Partially whitewashed soon after its completion and subsequently painted over in its entirety, the mural remained obscured for decades.

Since 1998 the GCI has been involved in the conservation of the mural, including environmental study, materials analysis, digital documentation of the mural's condition, and conservation treatment. In 1990 the first phase of treatment was carried out. In 2002 conser-

vators stabilized the mural, and with the help of the J. Paul Getty Museum, a temporary protective cover was installed over it.

With funding from the City of Los Angeles and the Getty Trust, the city is constructing both a shelter to protect the mural and a viewing platform to make the mural accessible to the public. Additionally, an interpretive center is being created which will tell the story of the mural in the context of the artist's life and work. Once the shelter is completed, the GCI will undertake final conservation of the mural. This will include stabilization, loss compensation, and minimal reintegration in areas of loss and damage to reinstate the legibility of the image. The GCI will continue to assist the city with the monitoring and maintenance of the mural over the next ten years.

NIÉPCE IN ENGLAND CONFERENCE

In October 2010, the National Media Museum (NMeM) in Bradford, England, and the Getty Conservation Institute coorganized a two-day conference focused on results from the first scientific investigation and historical and conservation research findings related to some of the earliest known photographs by pioneer-

ing photographer Joseph Nicéphore Niépce—photographs that he left in England during a visit in 1827.

The conference began with an introduction to the joint GCI-NMeM research project, Niépce in England, and its project team. GCI team members announced research findings that provide new evidence of the significance of Niépce's contribution to the development of photography, including the revelation of a previously undiscovered method of image making dating to the 1820s. NMeM team members presented results of the investigation into the optical capabilities of early camera obscuras available during the early nineteenth century. An independent fingerprint expert working on the project provided insight into the forensic investigation of fingerprints discovered by the NMeM-GCI project team on several Niépce plates. A specialist in nineteenth-century papers discussed findings from the analysis of blue paper material found on the back sides of several existing Niépce plates. Staff from the National Gallery in London contributed provenance information and dated the picture frames of several Niépce images. A member of the NMeM-GCI project team presented a vision of the future steps that should be taken during the conservation of the Niépce plates

from the Royal Photographic Society Collection of Photographs-NMeM collection.

Scientific and technical presentations were counterbalanced by a series of historical and art-historical presentations that focused on the latest research on the provenance of Niépce's photographs, on his activities in England during his 1827 visit, and on the status of the Royal Society of London at the time of his visit.

Staff from the Harry Ransom Center (HRC) at the University of Texas at Austin discussed the work of researcher Helmut Gernsheim, whose perseverance was responsible for the rediscovery of Niépce's *View from the Window at Le Gras* (1826), arguably the world's first photograph. HRC-GCI investigation of the photograph was conducted in 2002, and GCI research resulted in a new, high-tech enclosure for the long-term protection and preservation of the first photograph while it is on a permanent display at the HRC.

A series of roundtable discussions provided opportunities for discussion of Niépce's work and historical and scientific research related to it. Discussions also delineated needs for future research before some parts of the early history of photography are rewritten, based on facts and discoveries presented during the conference.

For more information on the GCI's Research on the Conservation of Photographs project, visit the project website at www.getty.edu/conservation/science/photocon/.

MEGA-JORDAN LAUNCHED

In January 2011, the GCI welcomed officials from the Jordanian Department of Antiquities (DoA)—Director-General Professor Ziad Al-Sa'ad and Chief of Staff Catreena Hamarneh—for discussions on the nationwide implementation of the Middle Eastern Geodatabase for Antiquities (MEGA) in Jordan. MEGA-Jordan, a bilingual Arabic-English, Web-based national GIS (geographic information system), is the primary tool for the DoA to inventory, monitor, and manage Jordan's vast number of archaeological sites. It was developed as a collaboration among the GCI, World Monuments Fund (WMF), and the DoA.

During the visit, the partners discussed maintenance of the system over the next two years and other measures to support the long-



XRF analysis performed on the *Cardinal d'Amboise* plate by Niépce, from the Royal Photographic Society collection at the National Media Museum. Photo: Dusan Stulik, GCI.



Signing of a new memorandum of understanding for MEGA-Jordan. Photo: Department of Antiquities, Jordan.

term use of the system, as well as ongoing work by the GCI and WMF to expand the system's functionality beyond archaeological sites so it may be used to manage other heritage types, such as historic buildings, architectural ensembles, and cultural landscapes and routes. The partners also discussed other potential activities for dissemination of MEGA in the broader Arab region.

On April 12, 2011, under the patronage of Her Royal Highness Princess Sumaya bint El Hassan—who serves as the vice chairman of the board of trustees of the Jordan Museum—the GCI, the DoA, and WMF officially launched the nationwide implementation of the MEGA-Jordan system. The event was attended by numerous guests from neighboring countries.

For more information on the MEGA-Jordan project and to view a video describing the system, visit the MEGA-Jordan project website at www.getty.edu/conservation/field_projects/jordan/.

TEACHING RESOURCES AVAILABLE

The GCI Education department is pleased to make available for the first time online some of the didactic resources that have been produced and used in the Institute's courses, workshops, and field training. These resources are being offered for use by conservation educators and students in the classroom and by professionals for informal personal learning, in accordance with the GCI's Creative Commons license. They include outlines of teaching sessions, bibliog-

raphies, exercises, case studies, and technical notes that can be downloaded.

The first sets of resources were added to the site in April and include teaching materials related to archaeological site protection and management (originally developed for a workshop for southeast Asian professionals), and the conservation of photographs and photograph collections (growing out of a multiyear teaching program for professionals in central, southern, and eastern Europe). Additional materials on these and other topics will be added to the site incrementally over the course of the next eighteen months. By the end of 2012, most of the teaching materials prepared for recent GCI courses should be available.

These teaching materials and other resources can be found at www.getty.edu/conservation/education/teaching/.

Recent Events

MARTHA DEMAS HONORED

In fall 2010, the People's Republic of China honored Martha Demas, senior project specialist at the GCI, with the 2010 Friendship Award, the highest award presented to foreign experts who have made outstanding contributions to the country's economic and social progress. This award was given in recognition of Demas's extensive involvement in the GCI's work on the

China Principles and Mogao Grottoes projects.

The GCI has been involved in heritage conservation in China for more than twenty years on projects ranging from site management (the Mogao and Yungang grottoes) and wall paintings conservation (Mogao) to the development of national guidelines for the conservation and management of cultural heritage in China (China Principles).

GCI RECEIVES NATIONAL SCIENCE FOUNDATION GRANT

In late 2010, the Getty Conservation Institute was awarded a grant from the U.S. National Science Foundation to conduct scientific research on Attic pottery—the iconic red- and black-figure pottery produced in ancient Greece that represents the pinnacle of ancient ceramic craftsmanship. This project—a collaboration of the GCI, the J. Paul Getty Museum, the Stanford University/SLAC National Accelerator Facility, and the Aerospace Corporation—will study the chemical and physical makeup of these ancient ceramics at an unprecedented level of detail using state-of-the-art high-resolution analytical technologies.

This collaborative project will measure the composition, morphology, and chemical-state distribution of iron minerals in the ceramic slips, using the high-resolution techniques of laser ablation inductively coupled mass spectrometry (LA-ICP-MS), X-ray absorption spectroscopy (XAS, inclusive of X-ray absorption near edge structure [XANES] and X-ray absorption fine structure [EXAFS]), X-ray diffraction (XRD), transmission electron microscopy (TEM), and energy dispersive X-ray spectroscopy (EDXS). In addition, as part of this effort, a sub-100 nm XANES microscopy technique for the study of ceramic materials will be refined, providing a means of coupling chemically specific information with micro-imaging. Once mature, this technology will be available to all users of the Stanford Synchrotron Radiation Lightsource, thus enhancing the study of a wide variety of heterogeneous materials.

The Attic pottery study will increase understanding of how ancient artisans created these vessels through their use of deliberately engineered clay compositions and/or complex kiln firing regimens. Stylistic analyses coupled



Scientific examination of a fragment of Attic pottery. Photo: Marc Walton, GCI.

with investigations into the development of this technology within the context of ancient workshop practice will also be evaluated.

The National Science Foundation grant also includes funding for a postdoctoral researcher at the GCI and for educational outreach programs.

VISITING PROJECT PARTNERS

Rasha Kamel, a chemist with Egypt's Supreme Council of Antiquities (SCA), arrived at the GCI in July 2010 for a three-week visit to conduct research related to the GCI-SCA joint project on the Conservation and Management of the Tomb of Tutankhamen. Kamel brought with her samples taken from Tutankhamen's tomb, which were examined by Kamel and GCI scientists using a variety of investigative techniques (see p. 26).

At the beginning of 2011, **Roy Berns**, director of the Munsell Color Science Laboratory at the Rochester Institute of Technology, spent six weeks at the GCI working with GCI Senior Scientist Jim Druzik and members of his research group. While at the GCI, Berns explored future possibilities of using multispectral imaging to augment microfading to produce accurate color images based upon the spectral and colorimetric information derived from microfading, with the goal of producing a visual record of the numerical data to aid curators and conservators.

Berns also provided insights into statistical

approaches with colorimetric data for anoxic light exposure test results and for investigation of the light sensitivity of anthropological, fine-art, and natural history artifacts composed in part, or totally, of feathers—a component of the GCI's Museum Lighting project.

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Tributes

Franciza Lima Toledo, 1959–2010

Franciza Lima Toledo, a former GCI staff member and a longtime project partner of the Institute, passed away in October 2010 due to complications from cancer treatment.

After receiving her PhD at the Institute of Archaeology, University of London, Franciza joined the GCI Science department in 2000 to participate in the Collections in Hot and Humid Environments project, contributing her expertise and continuing her passion for developing climate management strategies that are not based on air-conditioning, for collections and historic interiors in tropical and subtropical regions. She focused her research

at the Jekyll Island Historic District in Georgia in the United States, and at San Cristóbal de La Laguna in Spain.

After returning to her native Brazil in 2002, Franciza continued to work with the GCI on sustainable climate management strategies through the Alternative Climate Controls for Historic Buildings project. Among her major contributions were participation in the project's experts' roundtable held in Santa Cruz de Tenerife, Spain, in 2007, and the successful design and installation of climate management strategies at the Emilio Goeldi Museum in Belem, Brazil, and at the Casa de Rui Barbosa Museum in Rio de Janeiro, as well as the preparation of numerous publications from this work. She also contributed significantly to the GCI's training projects in Brazil. Beginning in 2009, she was a senior lecturer at the Anthropology and Museum Studies department at the Federal University of Pernambuco and continued to be involved in conservation projects of museums and archives in Brazil.

Franciza inspired everyone who worked with her by her belief in preventive conservation, her expertise, and her professional integrity, as well as her warm, generous, and caring personality. The Casa de Rui Barbosa Foundation in Brazil awarded her a posthumous medal of honor for her long and inspiring contributions to the field of conservation in Brazil. It was presented on Brazil's Culture Day, November 5, 2010. Franciza is truly missed by her friends and colleagues at the Getty and by the worldwide conservation community.



Photo: Shin Maekawa, GCI.

Giorgio Torraca, 1927–2010

Giorgio Torraca, brilliant chemist and pioneer of conservation science, died on September 25, 2010, at the age of eighty-three after a brief and unexpected illness. An extraordinary teacher and generous mentor to generations of conservation professionals, he profoundly influenced the field of heritage conservation through his research, writing, and especially his creative, practical, and interdisciplinary approach to problem solving. He played an important role in the professional lives of many at the GCI and, in recent years, collaborated with the Institute on a number of projects, including research on injection grouts for the conservation of architectural surfaces, scientific support for the Herculaneum Conservation Project, and the publication of his teaching notes in English.

Born in Padua, Giorgio Torraca received his degree in chemistry from the University of Rome in 1950 and his master's degree at the Case Institute of Technology (now Case Western Reserve University) in Ohio in 1953. He undertook postgraduate work in engineering at Rome University until 1958 and during this time became a consultant to the Istituto Centrale del Restauro. In this milieu, surrounded by some of the most innovative thinkers in the conservation field, he developed a lifelong

passion for the application of science to the understanding and conservation of the world's cultural heritage.

After a brief period in the materials laboratories of an industrial electronics company, Dr. Torraca was invited by Harold Plenderleith to join ICCROM (the International Centre for the Study of the Preservation and Restoration of Cultural Property), an appointment that, in his own words, "changed my hobby into a job." Over the next twenty years, first as assistant scientist (1965–71) and then as ICCROM's vice-director (1971–86), he dramatically influenced the teaching and practice of conservation. His capacity to explain complex scientific concepts to nonscientists was unparalleled, and his deceptively simple publications, such as *Solubility and Solvents for Conservation Problems* (1975) and *Porous Building Materials* (1981), remain classics in the field that have been translated into many languages. His research also significantly influenced international technical standards—most notably as regards noncementitious mortars and flexible grouts for the conservation of decorated architectural surfaces.

Leaving ICCROM in 1986, he continued to teach at the University of Rome "La Sapienza" and to provide scientific advice on important international conservation projects through ARCOTECH Studio Associates—a multidisciplinary practice of architects, engineers, and chemists—that he established to focus on the study and restoration of monuments. In this period, from 1992, he was consultant to the Vatican Museum on the conservation of the Sistine Chapel, was a member of the committee for the stabilization of the Leaning Tower of Pisa (2004–9), and, from 2005 until his death, provided scientific support to the Herculaneum Conservation Project.

Giorgio Torraca was undoubtedly a giant in the conservation field. A humble and kind man with a dry wit and an insatiable curiosity, he consistently challenged assumptions and developed innovative solutions to complex problems. He was a gifted scientist but also a humanist with a profound appreciation for all aspects of life. He leaves behind an exceptional body of work and will be greatly missed by all who had the good fortune to know him.

New Publications



Changing Views of Textile Conservation

Edited by Mary M. Brooks and Dinah D. Eastop

This fourth volume in the GCI's Readings in Conservation series aims to promote critical thinking about the concepts and practices of textile conservation and to encourage engagement with new issues. The volume draws attention to the cultural significance of textiles and dress and to the importance of textile conservation in fostering understanding and use of collections.

The eighty-one readings illustrate not only the intellectual foundations but also the important changes in conservation practice, and they contribute to the growing historiography of textile conservation. The book includes many significant texts translated into English for the first time, reflecting practice in Belgium, Denmark, France, Germany, Hungary, Italy, Norway, Poland, Russia, Singapore, Sweden, Switzerland, and the Netherlands.

Mary M. Brooks, textile conservator and educator, works as a museological, conservation, and textile consultant for universities and museums. Dinah D. Eastop, textile conservator and educator, works as a consultant in conservation and material culture studies for universities and heritage organizations worldwide.



Photo: Giacomo Chiari, GCI.

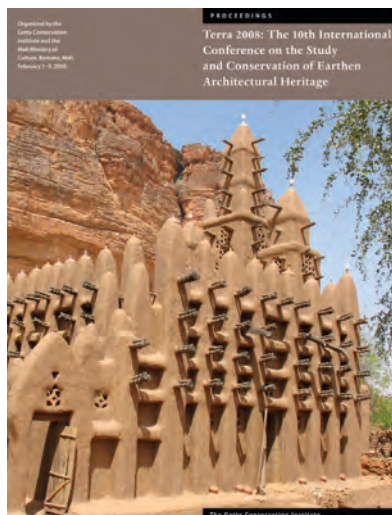


House Paints, 1900–1960: History and Use
By Harriet A. L. Standeven

The versatility of modern commercial house paints has ensured their use in a broad range of applications, including the protection and decoration of historic buildings, the coating of toys and furniture, and the creation of works of art. Historically, house paints were based on naturally occurring oils, gums, resins, and proteins, but in the early twentieth century, the introduction of synthetic resins revolutionized the industry. Good-quality ready-mixed products became available and were used by artists worldwide. Such paints pose unique challenges, including the need to establish exactly what materials are present.

This book traces the history of the household paint industry in the United States and United Kingdom over the first half of the twentieth century. It includes chapters on the artistic use of commercial paints and the development of ready-mixed paints and synthetic resins; oil paints, oleoresinous gloss and enamel paints, water paints, nitrocellulose lacquers, oil-modified alkyds, and emulsion paints; and the conservation implications of these materials.

Harriet A. L. Standeven is a freelance conservator specializing in the care of modern and contemporary art.



Terra 2008: The 10th International Conference on the Study and Conservation of Earthen Architectural Heritage

Edited by Leslie Rainer, Angelyn Bass Rivera, and David Gandreau

Earthen architecture constitutes one of the most diverse forms of cultural heritage and one of the most challenging to preserve. It dates from all periods and is found on all continents but is particularly prevalent in Africa, where it has been a building tradition for centuries. Sites range from ancestral cities in Mali to the palaces of Abomey in Benin, from monuments and mosques in Iran and Buddhist temples on the Silk Road to Spanish missions in California.

This volume's sixty-four papers address such themes as earthen architecture in Mali, the conservation of living sites, local knowledge systems and intangible aspects, seismic and other natural forces, the conservation and management of archaeological sites, research advances, and training. The contributors represent a wide range of international institutions.

Leslie Rainer is a senior project specialist at the Getty Conservation Institute. Angelyn Bass Rivera is a principal of Conservation Associates in Santa Fe. David Gandreau is an archaeologist and researcher at the Center for the Research and Application of Earth Architecture in Grenoble.

Getty Conservation Institute publications can be ordered online at <http://shop.getty.edu/books.html> or by calling 800-223-3431 (United States) or 310-440-7333 (international).

CONSERVATION PERSPECTIVES THE GCI NEWSLETTER

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Conservation Perspectives, The GCI Newsletter is distributed free of charge twice a year to professionals in conservation and related fields and to members of the public concerned about conservation. Back issues of the newsletter, as well as additional information regarding the activities of the GCI, can be found in the Conservation section of the Getty's website, www.getty.edu/conservation/.

The Getty Conservation Institute works internationally to advance conservation practice in the visual arts—broadly interpreted to include objects, collections, architecture, and sites. The Institute serves the conservation community through scientific research, education and training, model field projects, and the dissemination of the results of both its own work and the work of others in the field. In all its endeavors, the GCI focuses on the creation and delivery of knowledge that will benefit the professionals and organizations responsible for the conservation of the world's cultural heritage.

The GCI is a program of the J. Paul Getty Trust, an international cultural and philanthropic institution that focuses on the visual arts in all their dimensions.



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Participants in a December 2010 meeting, co-organized by the GCI, which focused on the conservation of modern and contemporary art in Latin America. The group gathered in front of Chris Burden's *Beam Drop Inhotim* (2008) in Inhotim, Brazil. Photo: Rosa Lowinger. Art: © Chris Burden.



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