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on Preservation and Conservation



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## Tourism and Preservation: Some Challenges



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In this month of December 2010, we have no reason to be optimistic as regards cultural heritage preservation. Alas, we experienced a year of major natural disasters, not to mention the world economic crisis which did not contribute to improve the budgets dedicated to cultural heritage, quite the contrary!

Within the framework of IFLA-PAC Core Activity, we wished, last January, to end the year with an issue dedicated to the economic aspects of preservation and conservation, by particularly focusing on Tourism. To what extent could tourist activities help to increase awareness of our cultural heritage fragility? Could this awareness give rise to a better preservation of the works and sites? By a sort of “return on investment”, could tourism generate economic resources to support preservation activities and even development aid?

As often reminded in these pages, the pure preservation of works and sites, without any communication, does not make any sense. But preservation has a cost, higher and higher, as time goes by and as environmental conditions are degrading; as the requests for communication and access, rightly, increase; as the concept of cultural heritage mirrors to the people's identity and as this very concept is quite expanding. Today the public is not only interested in the preservation of the Mona Lisa, the Sistine Chapel or the Land of Dogons. The regularly widening list of the

works and sites registered on UNESCO “Memory of the World” and “World Heritage” programs gives evidence of this growing interest. The local authorities understand right away the opportunity given through this “Oscar nomination” to obtain a better promotion of their territory and new job creation in various areas.

At the same time, “enhanced communication”, “repeated exhibitions”, “mass access” also mean increased risks of damages for cultural assets.

After a general introduction by World Bank Consultant-Expert Valéry Patin about the economy of cultural heritage, tourism and conservation, Prof. Miloš Drdácý, from the Academy of Sciences of the Czech Republic, presents his studies concerning the potential risks due to mass tourism and environmental deterioration. To illustrate these topics, we are pleased to propose papers about libraries in Mauritania, the Dead Sea scrolls, the Lascaux Cave and a new gallery project in the BnF.

We wish you again an excellent reading and, obviously, a happy new year 2011. We still hope to get together next Spring to explore the new topics chosen for the following issues of *IPN*: Dust, cleaning and housekeeping in library repositories, Preservation in a tropical climate and Future of optical archiving media.

**Christiane Baryla**  
*IFLA-PAC Director*



**E**n ce mois de Décembre 2010, nous n'avons pas toutes les raisons d'être optimistes en ce qui concerne la conservation du patrimoine culturel qui a connu, hélas, une année de catastrophes naturelles majeures. Surtout, la crise économique mondiale n'a pas contribué, loin s'en faut, à une amélioration des budgets dédiés au patrimoine.

Dans le cadre du PAC, nous avons souhaité, dès janvier, terminer l'année par un numéro consacré aux aspects économiques de la conservation, en faisant porter l'accent, notamment, sur le tourisme. Dans quelle mesure les activités touristiques peuvent-elles aider à une prise de conscience de la fragilité de notre patrimoine ? Cette prise de conscience peut-elle engendrer une meilleure préservation des œuvres et des sites ? Comme par une sorte de « retour sur investissement », des développements touristiques pourraient-ils générer des ressources économiques afin de soutenir la conservation et, au-delà même, l'aide au développement ?

Nous l'avons souvent évoqué dans ces pages, la conservation pure, sans communication, des œuvres ou des objets, n'a pas de sens. Mais la conservation a un coût, de plus en plus élevé au fur et à mesure que le temps passe et que les conditions environnementales se dégradent ; au fur et à mesure que s'amplifient, à juste titre, les demandes de communications et d'accès aux œuvres ; au fur et à mesure que le concept de patrimoine renvoie davantage à l'identité des peuples et que le concept même de « patrimoine » s'élargit nettement. Le public ne s'intéresse plus seulement à la conservation de la Joconde, de la Chapelle Sixtine ou du Pays Dogon : pour nous le rappeler il n'est qu'à voir la liste de plus en plus large des sites de l'UNESCO inscrits aux programmes « Mémoire du Monde » et « Patrimoine mondial ». Les autorités locales ne s'y trompent pas qui voient dans ces nominations aux « Oscars » la possibilité d'une promotion accrue de leur territoire et des emplois générés dans des domaines variés.

En même temps, qui dit communication intense, expositions répétées, accès en masse dit aussi risques accrus de dégradation des œuvres et des sites.

Ainsi avons-nous souhaité interroger un expert auprès de la Banque Mondiale, Valéry Patin, sur les questions liées à l'économie du patrimoine, le tourisme et la conservation. Quant aux problèmes scientifiques et techniques posés par les risques induits par le tourisme de masse et la dégradation de l'environnement, c'est le Professeur Miloš Drdäcký, de l'Académie des sciences tchèque, qui nous présentera ses travaux. Pour illustrer ces thématiques, nous avons le plaisir de proposer des textes concernant les bibliothèques de Mauritanie, les manuscrits de la Mer Morte, la grotte de Lascaux et la nouvelle galerie des trésors projetée à la BnF.

Nous vous souhaitons une très bonne lecture et une excellente année 2011 au cours de laquelle nous espérons vous retrouver pour explorer les thèmes retenus pour nos prochains numéros : la poussière et le nettoyage des magasins de bibliothèque, la conservation en climat tropical et l'avenir des supports optiques d'archivage.

**Christiane Barylà**  
*IFLA-PAC Director*

# The Economy of Cultural Heritage, Tourism and Conservation

by Valéry Patin, World Bank/UNESCO Consultant-Expert,  
Associate Lecturer of the University of Paris 1 Pantheon-Sorbonne, France

## 1. The economy of cultural heritage, a recent theoretical approach

Awareness of the economic role of cultural heritage is relatively recent. It principally stems from the rapid growth of tourism (roughly 1 billion international tourists worldwide in 2010), which is irrigating this sector intensely. This new approach entails reviewing the traditional status of cultural heritage, which until recently was partly not subject to the usual rules of competition-based economy. Cultural heritage is now considered as a form of enterprise and, especially, is solicited to become a key instrument to increase local development. Beyond direct site revenue (ticketing and ancillary revenue), expenditure on nearby facilities and services provides the most resources. These resources encompass indirect expenditure (purchases to companies working directly with the sites) and induced expenditure (in facilities near the sites, such as restaurants, shops and hotels, on services, and real-estate acquisitions).

## 2. Financing and managing cultural heritage

### 2.0. The new trends

The relative economic autonomy that cultural heritage recently acquired, paired with broader megatrends (the economic downturn and globalisation), has stretched the financial constraints that weighed on cultural assets. The institutions – the largest ones, principally – have embarked on a wide variety of initiatives to generate new resources. Engineering and franchises are two examples. The Louvre Museum, Guggenheim Foundation and Beaubourg Centre are supporting the creation of new museums that will use their names in exchange for substantial compensation. Others, which are not creating new institutions, are letting out works of art on long-term leases, either in existing museums (e.g., leases of works of art from the Louvre Museum to the Atlanta Museum, USA) or in newly-built museums (Louvre Abou Dabi). The obvious increase in admission prices, in particular for temporary exhibitions (which sidestep the rule of free admission for people under 18 in France) is another clear sign. The larger business areas in cultural sites are also driving this movement. Large-scale works in Europe's leading museums (the Louvre, British Museum and Prado) led to noticeable extensions in shop, café and restaurant areas. Managing derived rights (image) more efficiently via international photo banks (Corbis) has also opened up new revenue streams. Large-scale temporary exhibitions, which often generate net profits besides encouraging people to visit the permanent collections as well, are now commonplace.

We can also see a concurrent and symmetrical trend as regards the financing practices. French legislation is adjusting itself to promote private-sector financing (laws passed in 2003 and 2008) via patronage and associated management conditions. From this perspective, the recent creation of *fonds de dotation* roughly mirroring Anglo-Saxon endowment funds (enshrined in the 2008 law to modernise the economy) reflects a new understanding of cultural heritage management. The use of subsidiary revenue earmarked for cultural heritage is developing, belying the principle that bans allocating tax revenue such as taxes on online gambling (poker), based on a model involving levies in several countries, and in the UK in particular (the Lottery Fund). The para-fiscal option that is already being used to acquire and protect natural areas (Departmental Tax for Sensitive Natural Areas) does not yet seem to be making significant inroads as regards cultural-heritage buildings, in spite of a few attempts (proposition to tax luxury hotels). Other more administrative decisions (transferring monuments that belong to central government to local authorities, and creating *Etablissements Publics de Coopération Culturelle* - EPCC) are reinforcing this drive to redistribute roles. Other different trends are emerging as well. There are efforts to make old monuments more profitable by building hotels and restaurants on the model of Spanish *paradores*. The French *Centre des Monuments Nationaux* is seriously studying this option. The sacrosanct principle of inalienability is starting to splinter. And, if the market-economy rule takes over, it will not hold for long in current conditions. In the Anglo-Saxon world, where most sites are free of charge for the visitors, it is the opposite: private-sector management (trustees and foundations) are clearly the majority and are calling on public-sector institutions to protect their balance increasingly often. Naturally, earmarking cultural heritage as a real option to reinforce local development has kick-started a flurry of efforts to protect and promote the first to support the second. These operations have worked very well in some cases (Cathar Country), but failed to deliver the expected results in others. Failures are often due to an overestimation of the expected profits or to projects inappropriate to the local reality.

### 2.1. Conflicts of understanding

Since economy has burst into the cultural heritage field, misunderstanding between actors from this sector and economic players has get worse. Their respective formations did not generally prepare them for dialoguing. Whereas the cultural heritage actors understand with difficulty the economic aspect of their activity, with its procession of constraints, the economic players

do not still understand all the dimensions of the cultural object (historic, emotional, social, identical, etc.), have difficulty in defining clearly its place as “capital”, “resource”, or “production”, and do not know where to classify its preservation, whether in the “investments” or in the “non-productive expenses”...

For the first ones, the cultural heritage, priceless by definition, should escape the trivial contingency of the imperatives of profitability and competition. This collective feeling has been disseminated everywhere in France. The notion of “cultural exception” has maybe also intelligently educated it while inviting it to evolve since in fact it makes the cultural heritage actors get into the boxing ring of the competitive economy, while stressing its specificity and affirming the necessity of regulations, a notion we seem today to rediscover everywhere else...

For the second ones, it is urgent to improve the econometric tools and the modelling regarding cultural heritage and the returns expected from enhancement and particularly tourist one. In spite of recent but real progress, as we shall see, the contribution of cultural heritage to a certain quality of life for the usual users of a territory, to its image and to the feeling of belonging, is still insufficiently taken into account.

Finally, all share a real difficulty: reconcile the long term of cultural heritage preservation, which has to be passed on, thus preserved infinitely, with the short term of its economic operation and expected profits.

**“[R]econconcile the long term of cultural heritage preservation, which has to be passed on, thus preserved infinitely, with the short term of its economic operation and expected profits.”**

## 2.2. The risks

In this situation and given recent developments, which have not always been properly managed, abuses can sometimes occur. This is at least the case in the light of the traditional and essential roles of cultural heritage, namely conservation, scientific research, knowledge dissemination and cementing social links. These abuses can take different shapes. Firstly, the quest for financing may lead to questionable schemes.

To pay for refurbishing work on the Doge’s Palace in Venice, for instance, the city council rented a section of the monument outside walls and a facade of the Bridge of Sighs to Coca-Cola, which set up massive promotional billboards on them.

Poor visitor-flow management can damage sites and the visitor experience. Also in Venice, the city council allowed up to 300 metre long cruise ships to dock in Tronchetto port. These ships pour out several thousand visitors a day, and there is now way of channelling them. This city had managed to stem tourist flows by limiting the number of new hotels in it, but has moved into a new cycle now that it has agreed to plans to build new capacity (turning the former mill on Guidecca Island into an upmarket hotel). On specific days, the visitor crowds in certain sites (Versailles, the Louvre) make visiting conditions unacceptable.

Seeking short-term profits can also contribute to deteriorating cultural heritage. Renting out works of art for more or less long

exhibitions, shooting films in monuments and renting spaces for events (which is occurring increasingly often) can cause damage to certain objects and places, which restorers do not always have time to prevent or repair.

Local populations may feel dispossessed of their cultural environment. Foreigners buying up real-estate en-masse can lead to excess. That is the case in Morocco in general and in Marrakech in particular, where national legislation entitles foreigners to buy freeholds. In that same vein, efforts to protect and promote heritage, in particular in character-filled historical town centres and villages, can lead to speculation on real-estate and land. In both cases, the local populations are faced with very fast and destabilising changes in their economic and cultural environment.

One of the risks that have made the most media headlines is the reproduction of sites and historical monuments. This trend is not new and has to be distinguished from the copying of fragile sites, validated by the scientific community and which

contributes to their preservation (Lascaux, Egyptian tombs), whereas reproductions are more and more often aimed to create attractions and thereby generate quick profits in more favourable conditions than in the original sites. The Japanese, for instance, have reproduced part of The Hague (The Netherlands)

in Omura Bay, paired with a large-scale property development and marina, all of which did not turn out to be a great success. The Syrians created a fake Palmyra at the entrance to Damascus, which is on the contrary attracting a large number of visitors – who also flock to the restaurants and cafés around it. It is interesting to note that the international law is really uncertain in that field, which often leads to excesses. Abusive restoration for imperatives of comfort, modernization, or quick profits, constitutes another important risk.

Management basically geared to generate short-term profit can also in a way drain meaning out of sites and works. In a number of well-known sites, literature is wanting or unavailable, there are too many visitors, the area is heavily built-up and commercial, the staging modest and the visitor circuits constraining. The Sphinx of Giza (Egypt) is one example.

## 2.3. Sustainable management of cultural heritage: methods and techniques

### 2.3.0. Methods of economic assessment of cultural heritage

Given those risks, authorities have set up a number of assessment methods and systems to step in.

One of the first measures involves evaluating as accurately as possible the economic reality of the operations and the resulting proceeds involving cultural heritage. *“This approach spurs concerted protection and promotion strategies and partnerships. It sharpens professional skills and decompartmentalises practices and partnerships between the cultural and tourism realms (coproducing data and pooling resources). Furthermore, highlighting the economic and social stakes associated with*

*cultural heritage is a factor that contributes substantially to the acceptability, appropriation and support for local preservation and promotion strategy.*" Hervé Passamar, Director, Agence pour le Développement et la Valorisation du Patrimoine

In this area, the most traditional assessment methods combine approaches focusing on land and real-estate value, and on the balance sheet. These approaches are strictly limited to the site itself and to its financial dimension. It is therefore a fairly restrictive approach. It considerably undervalues fragile cultural assets, that required heavy conservation investment, and pays little if any attention to the social and cultural dimensions.

Methods stemming from economic theory nevertheless provide an option to assess cultural assets from a development and investment perspective. These methods are used by international backers, for instance. This is in particular the case for Contingent Valuation Methods (CVMs), which take into account non-monetary value such as image of the site or the destination. It involves measuring the theoretical contribution that popula-

tions are willing to make (whether or not they use the site, and whether they live in the city or country or further away) to protect a component of cultural heritage. Other methods, such as relocation costs, costs versus advantages, hedonic costs and multi-criterion appraisals, are also sometimes used.

Lastly, assessing indirect proceeds from cultural-heritage management most often involves the 'impacts' method which gauges the number of jobs, cash flows (wages, taxes) and social impacts (awareness of cultural heritage, the people's contribution to safeguarding and promoting cultural assets, the sense of belonging it nurtures, transmission, citizenship, etc.) generated by what visitors do and what they spend, in the area near the site (i.e. spanning transport, accommodation, restaurants, shops and services), as well as public and private investment to protect and promote cultural heritage. At the initiative of the Ministry of Culture (Heritage Department), France has been running a national assessment system via the *Agence pour le Développement et la Valorisation du Patrimoine* since 2007. The result can be found on line at <http://www.agence-patrimoine.eu>.

**Passamar, Hervé. *Retombées économiques du patrimoine public en France*, Agence pour le Développement et la Valorisation du Patrimoine, Mars 2009.**

[www.agence-patrimoine.eu](http://www.agence-patrimoine.eu)

**1 – Key figures in mainland France**

42 644 protected monuments (registered and listed as historical monuments)  
124 Cities and Countries of Art and History (French label: *Villes et Pays d'Art et d'Histoire*)  
97 preserved sectors  
34 national museums

**2 – Employment in mainland France**

**Total : about 500 000 jobs**

Among which:

33 000 direct jobs (site staff, civil servants, guides)  
280 000 indirect jobs (among which 162 000 local tourist jobs)  
187 000 induced jobs (services, local tourism)

**3 – Economic impact of cultural heritage in mainland France**

**Total economic impact: 21.49 billion €**

Among which:

Direct revenues on sites: 520 million €  
Ticketing: 260 million € de billetterie  
Shops: 92 million €  
Guided visits: 16 million €  
Audioguides : 2 million €  
Exhibitions: 12,5 million €  
Sundries: 139 million € (site rental, exhibition, image rights, filming rights)  
Indirect revenues (cultural heritage and tourism sectors): 20,61 billion €  
Restoration: 5,1 billion € (specialized firms: roofing, masonry, furniture – paintings, tapestries, gold works...)  
Regional tourism: 15,51 billion €  
Artistic profession: 3,6 billion €

**4 – Public expenditures on cultural heritage in mainland France**

About 720 billion € (about 220 spent by the state and 500 by local authorities)

### 2.3.1. Sustainable management techniques

To preserve cultural heritage, guarantee visitor comfort and spur indirect returns, managers and administrators use the specific techniques that provide the basis of the Site Management Plan recommended by UNESCO (World Heritage Centre).

#### a) Visitor flow management

Visitor flow management contributes to site preservation and management. Several systems are now up and running, including visitor-number forecast analysis on new sites. This technique makes it possible to assess a site's attendance over time, using a direct approach by analysing the territorial catchment, using a comparative approach, or combining both. The results are generally reliable. This assessment zeros in on "peak days" and peak times (visitor-number snapshots) to provide the maximum visitor numbers. Then it is used to assess daily and hourly visitor numbers during the 30, 40 or 50 busiest days of the year (design days). These estimates provide the raw material we need to devise the protection and promotion programme by calibrating facilities and amenities as effectively as possible. Some of the newly-built museums programming has been made on this basis, as in the Louvre Museum in Lens (France).

In existing sites, there are also several techniques to support visitor management: group bookings, individual bookings (increasingly often), tariff schedules, longer opening hours, smaller guided-tour groups, quotas (in very fragile sites such as the Villa Borghese Gallery in Roma) and visit paths to deal with short-stay visitors (tourist groups) and long-stay visitors (groups with specialist lecturers and enthusiasts) separately. These strategies rely on the assessment of the site capacity (acceptable number of visitors depending on the site surface) in exterior as well as interior spaces. Then, a minimum surface per visitor is calculated. This surface can go down to 1,50m<sup>2</sup> in very popular exhibitions. Such a technique can be difficult to apply in complex sites (archaeological/natural ones) but can often provide useful elements of management.

Providing information before visitors reach the site (via the Internet, smartphone applications, visitor guides) also plays a role. Negative marketing (momentarily withdrawing communication) to contribute to limiting the number of visitors in a site at the same time is very rarely used. Lastly, networking sites into package deals such as the *Carte Musées Monuments* providing access to 70 museums and monuments in and around Paris, and sharing literature and road signs, can contribute to easing pressure on the main highlights. A beautiful example of this flow-management strategy was used in the Alhambra in Granada (Spain), which combines measures to restrict automobile traffic and visitor numbers, requires individual and group booking, limits group visit time slots, and associates the city's companies working with tourists (taxis, restaurants and hotels), entitling them to distribute top-priority visit bookings. The site attending which rose to 2,8 million of annual visits has come down to a little bit more than 2 millions. In terms of capacity, the average surface per visitor which was 3,44m<sup>2</sup> has been turned into 5m<sup>2</sup>.

#### b) Preventive conservation associated with tourist numbers

Action on this front is still modest and mainly experimental. As it has been already noted, copies (Lascaux, Valley of the Kings) can contribute to the preservation of very fragile sites and monuments. Copying gets a lot of media attention but is still rare since these techniques are difficult, as the different attempts to reproduce the Lascaux cave has showed it. Reproduction of furniture or decoration occurs more often thanks to the two different techniques of copy and casting. When the copy or catering substitutes to the original in situ, it serves to protect the original value. When this is the original which stays in situ, the copy and catering have a cultural memory value, when the original has lost its representative value or has been destroyed (for instance, Roman copies of Greek works of art or the catering preserved in the Musée des Monuments français, such as the statues of the Reims cathedral or the Roman fresco of Saint-Savin sur Gartempe).

Regarding tourism and housing, these trends led to successful economic realizations. New tourist resorts are borrowing local architectural and decorative vocabulary (Le Crouesty in Morbihan and Valmorel in Savoy are two French examples). It is also the case of rebuilt buildings inspired by traditional buildings, for instance in Beirut or Tunis (the Hafsia Quarter).

This trend combines traditional charm with modern-day comfort and convenience. Cultural heritage becomes a backdrop stripped of some of its meaning but serves a profitable economic purpose. This also applies to urban revamps that involve keeping nothing but façades (façadism).

The most common intervention consists in mapping out visit circuits in sites, and indeed in cities (Strasbourg) to provide tourists with an overview of the highlights while avoiding the more fragile spots by providing visitors with free documentation and informative marking. When this option is unfeasible, the classical measures such as closing off areas to visitors, permanent or temporary embedding objects (mosaics, in particular), adding security systems around attractions and indirectly around visitors (barriers, fences), are used. There are also specific measures for site fringes, in particular as regards automobile traffic and parking, such as moving them further away from the site, blending them into the natural environment, establishing the principle of non co-visibility (facilities and historical sites should not be visible at the same time) and segregating areas (several little parking areas instead of a big one close to the site and too visible). Human risks can stretch beyond tourism-related concerns to urban issues. Here, it is rarely balanced. Site outskirts protection often involves legal measures that are difficult to apply. They often stem from contracts between site managers and owners (Hadrian's Wall in the UK, Cyrene in Libya).

#### c) Integrating local populations

This approach concurrently stems from sustainable-development ideology and a more efficient strategy to protect and promote cultural heritage. It contributes to preventive conservation. There are two main trends at work here: one to maintain cultural usage and the other to bolster economic activity. In the

**“Visitor flow management contributes to site preservation and management.”**

first case, it is a question of protecting site traditional use, which can range from mere walks to religious or 'magical' practices. In both cases, measures that do not necessarily rank profit cost-efficiency at the top of the list take precedence. It sometimes entails sidestepping fences (Palmyra in Syria, Petra in Jordan, Dougga in Tunisia) to allow people to cross the site to get to their workplace. In Chellah (Rabat) the site is accessible free of charge on Fridays to allow local people to reach natural springs that, according to local tradition, help women to give birth to their first child. Tour operators are also involved in efforts to raise visitor awareness via codes of conduct prescribing adequate behaviour ([www.tourism-responsible.org](http://www.tourism-responsible.org)). Naturally, school trips and attractions for local people can only strengthen the appropriation bond.

Integration, however, necessarily also entails supporting local economic development, which can be done in several ways such as training craftsmen, shopkeepers, hotel staff and innkeepers in visitor expectations, supporting exports, distributing micro-credit to small-scale local producers and, if possible, employing on the site the local population (security, guiding, maintenance).

**“This approach concurrently stems from sustainable-development ideology and a more efficient strategy to protect and promote cultural heritage.”**

### 3. The example of the World Bank in Mauritania

#### 3.0. The World Bank and the Cultural Heritage

The World Bank (International Bank for Reconstruction and Development - [www.worldbank.org](http://www.worldbank.org)), created in 1945 (December, 27), is an intergovernmental agency of the United Nations Organization. Its mission is to help states to finance actions of development. Since 1975, the Bank has developed a strategy to support projects in the cultural heritage sector to serve as a basis for local growth. It intervened in Jordan, Lebanon, Morocco, Tunisia, Honduras, Russia, Mauritania, China, Peru, Ethiopia. It provides loans, which is the most frequent case, or grants, according to the economic level of countries.

#### 3.1. Conditions of intervention of the World Bank

The recipient countries also give counterparts to the loans provided by the Bank (direct financing, allocation of staff, fiscal adjustments). This financing is used to rehabilitate or create museums or cultural institutions (such as conservatoire of music), to restore and renew historic centres, to produce cultural events, to strengthen the conditions of protection and preservation of cultural assets, to improve the economic and cultural integration of the local populations.

#### 3.2. The case of Mauritania

The case of Mauritania is particular because the Bank intervention focused partly on the protection/enhancement of World Heritage sites (Caravan cities of Ouadane, Chinguetti, Oulata and Tichitt) and partly on the protection of the libraries and the numerous ancient manuscripts present in the country. These surprising libraries were constituted on the occasion of the pilgrimage in Mecca, but also by exchanges between the inhabit-

ants and the caravanners coming from Mali or from Arabia and Egypt.

These libraries are not under common law. They are family's properties and cannot be sold or donated. They traditionally go to the leader of the family owner who keeps watch over them and is answerable for them to the main family's members during annual stocktaking. The most important among them, the library of the Habott family in Chinguetti, includes more than 1 500 manuscripts mainly of the XIX<sup>th</sup> century -some of them are much more ancient (exegesis of the Koran, astronomy, mathematics and logic, law). Some of these libraries are preserved in boxes by the nomad tribes living in the north and east of the country. The intervention of the Bank took place between 2001 and 2005.

A project unit (*Projet de Sauvegarde et de Valorisation du Patrimoine Culturel Mauritanien* - PSVPCM) gathering Mauritanian specialists was in charge of the on-site actions conception and management. The Bank regularly sent missions of evaluation to follow their progress. Punctually international institutions also provided a scientific and technical support: UNESCO regarding the operations of preserva-

tion and training dedicated to the caravan cities; the French Ministry of Culture and the Bibliothèque Nationale de France for the manuscripts preservation and cataloguing. The financing was assured through a subsidy to the Islamic Republic of Mauritania.

The strategy adopted by the Project with the support of the Bank consisted in implementing a series of actions of protection intended to strengthen the heritage knowledge and the associated know-how. Complete building surveys and inventories were made in the world heritage cities. Training courses on the restoration of dry-stone buildings were organized for the young local population. A former military building in cob was restored at Atar (front door of the cities of the North) with the support of the French experts of the research laboratory of the *Ecole Nationale Supérieure d'Architecture de Grenoble* – CRAterre in order to create the future museum of Adrar, one of the favourite desert land of Theodore Monot. In Oualata, famous city for the inside and outside decorations of houses, an emergency action allowed to train girls in painting these very codified patterns and to preserve this knowledge about to disappear.

Concerning manuscripts, the Bank financing was used to make an inventory of the private libraries (more than 600 on a total estimated at 700/750) and to catalog more than 40 000 works (on a total estimated at 50 000). These research works allowed to elaborate a computerized data bank of which the BnF (French National Library) has a copy (Department of manuscripts, Service of Arabic manuscripts). The service of restoration of the BnF assured the training of a group of owners of private libraries. Finally the Bank acquired neutral cardboards to distribute in libraries. But the political situation which became unstable in 2005 did not allow to finalize this initiative. A second project of reprinting the ten more important Mauritanian manuscripts suffered the same fate.

This first phase of consolidation was completed by the publishing of travel guides in partnership with the Cultural Service of the Embassy of France in Nouakchott, the organization of trainings intended for the caravan cities innkeepers, the realization of a festival of nomadic musics in Nouakchott and punctual actions of support for the craft sector, in particular for the traditional hairdressers who have an exceptional know-how and were gathered within very dynamic associations of women entrepreneurs. As in any project of the Bank, an important aspect of the program was dedicated to the institutional and legislative framework intensification.

This Bank program certainly allowed to produce information and documents essential to the cultural heritage preservation (surveys, inventories, cataloguing, long-term preservation of know-how) and to the information circulation about the country (publishing of travel guides) without durably modifying the situation of the Mauritanian cultural heritage. The tourist flows, directed first and foremost to the visit of the caravan cities of the North (Oudane, Chinguetti), hiking in

Sahara and the natural site of the Banc d'Arguin, registered as a world heritage site, benefited from these interventions, but the degradation of the political situation and the security conditions in this zone compromised the project results. On the other hand, the country limited institutional and economic capacities make it difficult to follow up these operations. Mauritania mainly progresses in this domain at the rate of international supports, while many Mauritians have the skills required to assure a wider development of the cultural and tourism economy.

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# Risks Generated by Tourism in an Environment with Cultural Heritage Assets

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Cultural heritage and the historic environment around us result from actions and traces of the past, and also from ongoing changes in political, social, philosophical, cultural and many other conditions. The historic environment developed spontaneously and naturally. A modern conservation approach attempts to replace traditional static preservation and protection by more dynamic and proactive change management control. In order to prepare for such management, we need, among other things, to analyse the risks for cultural heritage and the impacts on it due to tourism.

However, we cannot give a serious answer to the question “Is tourism a factor for development or a factor for deterioration?” without first making a thorough study. No sufficiently detailed study has been made so far. The problem is extremely complex, and involves much more than the functional character of an environment with cultural heritage assets. Nevertheless, some knowledge, experience and indicators are available that enable us to state that tourism has both strong development features and strong deterioration features, namely in historic cities.

## Benefits from tourism in historic environments

According to the French philosopher Claude Karnouh “economic exploitation of heritage serves other ends than heritage” and “heritage economics can be only a loss-making activity”. Our experience shows that such statements have a reasonable basis.

In the Czech Republic, national income from tourism forms a very substantial percentage of the GNP. However, the direct benefits associated with individual cultural monuments are not sufficient to cover the maintenance and operating costs. For example, the ratio of income generated by the World Heritage Site of Telč Château (mostly from entrance fees and rents), to the maintenance and operating costs is around 40%. State subventions increase faster than local direct income, an important part of which comes from the use of the Château for historic movie productions, which may in turn limit its availability for visitors and may generate an adverse marketing impact.

However, millions of visitors per year are attracted to the most important World Heritage sites, and in some cases such numbers are concentrated in very small areas or in a single building. This brings substantial income to the “industry” associated with tourism, and has a positive impact on employment, often in regions or countries that are less developed. Tourist activities are considered to be environment-friendly, as regards air pollution and energy consumption. Nevertheless, there are also substantial risks associated with cultural tourism, which may

easily convert this “renewable” resource into the category of vanishing, permanently lost or exhausted resources.

## Impact of mass tourism on tangible cultural heritage

The impact of mass tourism on individual objects or buildings can be observed relatively easily by monitoring their state and changes. Much research has been carried out in the last 30 years on the impacts of mass tourism on historic towns. Some projects have been funded by the EC Framework Programmes such as IMPACT, PICTURE, AMECP, ERA, MIMIC, LiDo, VIDRIO, which study problems related to tourism as both a source of potential risks or benefits to cultural heritage (Chapuis et al., 2009).

Nevertheless, there have been very few studies clearly linked to tourism that provide reliable data on the impacts and risks generated by large numbers of visitors. Most conclusions are based on monitoring environmental or societal changes only, and on general knowledge or statistical data on the general development of tourism. Long-term direct measurements and studies describing the development of deterioration and damage and changes to surfaces and structures are rare or even lacking. Increasing traffic, and the consequent increase in deposits and in air pollution, is a typical example where it is difficult or impossible to identify the proportion of traffic that is directly related to tourism.

In relation to historic objects it is useful to distinguish six groups of impacts and risks generated by visitors: i) environmental aspects; ii) mechanical damage and wear; iii) intentional damage; iv) ignorance and negligence; v) transformations and vi) conflicts of use, (Drdáký M. and Drdáký T. 2006 - where there are many examples and references to the data presented below).

## Environmental impacts

Environmental impacts include namely moisture and temperature changes, (dust) deposits, air pollution and radiation (light). These cause mechanical damage due to constant volumetric changes, create an environment suitable for biological or electrochemical deterioration, and together with dust deposits may intensify staining. Light mainly attacks the stability of colours. Biological impacts on cultural heritage are not analysed in detail and in their complexity here, though they are a very important phenomenon with either degrading or protective impacts.

Environmental considerations tend to be underestimated. In some countries, important cultural heritage buildings need to be continuously monitored and their indoor climate regularly evalu-

ated or even controlled. The effects of environmental considerations and microclimate requirements for cultural heritage in museums have been thoroughly described, and guidelines have been produced for the design or refitting of museums, taking into account environmental considerations. However, visitors and their movements are usually not taken into account, or there is only very basic information on "occupation patterns".

#### *Moisture and temperature changes*

Moisture and temperature changes have been identified in numerous cases as the cause of substantial damage or failures in historic monuments. Some monitoring projects have provided evidence that moisture and temperature levels are elevated due to the high number of visitors. It should be added that in most cases environmental changes act in synergy, and the impacts result from the simultaneous action of several environmental factors, together with other physical and chemical conditions. There have been a few examples of serious failures caused by moisture and temperature changes generated by tourists. However, even in this case it is difficult to separate indoor climate changes directly caused by visitors from the effects of outdoor climate situations. This can perhaps only be done with much certainty in the case of caves or tombs. Sudden changes are, generally speaking, potentially very dangerous. Sudden shocks may occur due to large-scale ventilation or air-flow through open gates. It seems that daily variations are more harmful than long term changes. Damage in the Sistine Chapel in Rome can be presented as an example of high moisture effects (Camuffo and Bernardi, 1991). Here, the damage of frescoes was studied, and it was found that high humidity can hydrolyse residual crystals of calcium oxide and transform it into calcium hydroxide. As a result noticeable pitting was generated by the growth of these crystals. The huge influx of visitors in modern times has completely changed the rate of variations of microclimatic conditions, which initiated research into the microclimate and microphysical processes. Changes in space gradients and time evolution of air temperature, specific and relative humidity, dew point spread, evaporation potentials, air micro-currents close to the walls and through the openings and solar radiation from the windows, were identified and measured. Damage due to higher moisture caused by crystallisation/hydration of salts in porous materials has been referred to also by Häfner (2004) in Bavarian monuments, e.g. at Linderhof Castle (630,000 visitors per year) and the Bayreuth Opera House.

On the basis of historical investigations, standards or guidelines have been issued in some countries, and these help to control tourist access. It is estimated that the vapour gain due to visitors reaches a value of 0/02 g/s/visitor, which usually sets the number of visitors recommended for a small room to 20 persons, taking into account the technical capacity of facilities for constant humidity control (about 0.4 g/s). It is estimated that visitors to Notre-Dame Cathedral in Paris respire about 600 litres of water per day when attendance levels are highest (Boyer, 2000). Regulating the number of visitors is a safe approach that also has other positive consequences for cultural heritage protection. Several other methods have been developed to improve the indoor conditions in historic buildings. Some experts

prefer natural ventilation over air conditioning systems, combined systems with low-velocity ventilation, conditioned display cases, or even visitor cases.

#### *Deposits on surfaces*

Deposition processes are significantly influenced by currents and flows in the interior, around the walls and near windows. The deposition depends on the roughness of the wall, its inclination, wetness and temperature. According to research carried out for the National Trust (UK), the nearly constant growth of attendance has been having a significant influence on the amount of dust in historic interiors: in other words, the more visitors the more dust is created, and this increases the physical damage due to cementation and/or microorganisms. In addition, frequent cleaning damages historic objects and surfaces. Dust removal accounts for more than 75% of all maintenance activities in terms of time, and it costs between 0.6 pence and 1.5 pence per visitor.

#### *Air pollution*

Air pollution in museums has been systematically studied in numerous projects, (e.g. Camuffo et al., 2004), and it is known that air pollution due to large visitor numbers is related mostly to carbon dioxide emissions inside buildings, nitrogen oxides from car fuel in the surroundings of the monument, and ozone generated by various external and internal sources.

#### *Radiation*

Light effects are very harmful for colours, and direct sunlight should be avoided in particular. Direct damage depends on several factors, and there is no lighting threshold that has been proven to be safe against colour change. Total light exposure is therefore a controlling factor for attendance management, as with moisture supply, see above. In fact, direct sun warming associated with light is one of the most harmful radiation effects, again indirectly caused by mass tourism.

#### *Mechanical damage and wear*

Movement of visitors is accompanied by increased mechanical wear of historic structures, which decreases their life cycles. There have been many instances of damage caused by visitors accidentally abrading fragile surfaces, or deliberately touching tactile materials such as textiles and wallpapers. The passage of feet causes erosion of carpets and hard floor surfaces. Fortunately, typical historical floor and ceiling structures are mostly sufficiently robust and sustain these situations without critical damage.

Frequent damage to hard floors is caused by heels, and to walls due to corners being kicked off or walls being touched. This damage may be unintentional, but it can cause serious damage to some materials. This is unfortunately quite frequent, especially in the case of famous monuments that have a "magic effect" when they are touched. Stories of magic effects are mostly passed on by tourist guides reporting on religious or traditional customs.

Catastrophic levels of wear have been observed in Carnac, where thousands of tourists (about 1 million per year) caused

**"Some monitoring projects have provided evidence that moisture and temperature levels are elevated due to the high number of visitors."**

soil erosion 5 cm in depth around the menhirs, which loosened them and threatened their stability. Similar problems have been experienced in over-visited parks, e.g. Versailles, (Boyer, 2000).

**Vibration and dynamic effects**

Vibration is most commonly encountered in museums and in historic houses, as a consequence of visitor circulation. It can be particularly pronounced on poorly supported wooden floors, and it is extremely expensive to reduce the effect of such vibration. Visitor movement is the main source of vibration to which most objects in museums are exposed, and it may also damage the fabric of the building itself, namely the ceiling decoration or rendering. Historic premises that are used by tour groups for dancing or theatre performances can also be exposed to dangerous additional sources of vibration.

**Intentional damage**

Unfortunately, intentional damage also has to be taken into account. Graffiti damage in the interiors of cultural heritage objects is clearly related to tourism. Many exterior objects are also damaged, but not only as a result of mass tourism. This is also true in the case of vandalism to religious objects, which damages paintings or sculptures or even erases faces and inscriptions from them.

Sculptures, towers, ruins, caves and natural heritage objects are also frequently damaged by visitors climbing on them to take photographs, to be photographed, or in order to have a better view over the space during performances. As a consequence, fragile details of stone sculptures, slender metallic parts or architectural elements are easily destroyed.

Tourism facilitates access to valuable objects and provides potential thieves with information, increasing the danger of theft,



1. "Magic effect" - results of touching Juliet monument.



2. Tourists climbing on a sculpture on the Charles Bridge in Prague (left) and damaged figures of a deer and Turk's sabre (right).

especially in countries and locations where there are inadequate supervision systems and/or high levels of poverty. Many tourists feel an urge to remove and take possession of small parts of monuments or the natural environment. This "souvenirism" creates similar problems to graffiti.

The fact that some cultural heritage buildings and areas are of great importance for tourists and other visitors makes them potential targets for terrorist attacks, which not only damage or even destroy monuments but also severely affect the social and economic stability of large regions.

**Ignorance and negligence**

Considerable damage is also caused by ignorance and negligence of tourists, especially by groups of youths. Typical problems are associated with soiling of floors, carpets and objects by leftover food, cigarettes and chewing gum. Chewing gum and also cigarette stubs can be found in curious places, e.g. inside historic furniture in castles. Many sites are littered with tons of waste per year in open and insufficiently guarded places. Problems of ignorance are intensified during anniversary celebrations or during "historical performances", when alcohol is usually consumed.

Pollution of monuments due to ignorance and negligence also involves noise. This is typical with groups and namely foreigners, who assume that no-one except their companions understands their language.

**Transformations**

Accommodation for large numbers of tourists generates pressure for demolition and new construction in historic centres, or for transformation and modern refurbishment of historic buildings. Transformations can include maintenance of pavements and of exterior walls of buildings, sometimes leading to "prettification". Changes, repairs and strengthening work aimed at increasing the safety of visitors and meeting modern standards (elevators, ramps for people with disabilities) can also be carried out inappropriately.

A special group of transformations finds new uses for cultural heritage objects, sometimes converting even a place with an

unpleasant history into a museum or tourism accommodation. Finding a new use for an heritage object safeguards its future.

### **Conflicts of use**

Conflicts of use occur especially in places with a special and permanent use, namely churches, cathedrals and monasteries. It is difficult to ensure a balance between churches as places of prayer and as tourist sites for visitors of many nationalities and religions, namely during religious ceremonies. The public needs to be divided into worshippers and non-worshippers. Non-worshippers can be subdivided into three types of tourists: i) those who "have to visit Notre-Dame" as a tourist obligation; ii) educated tourists with cultural interests, and iii) believers. There is also the problem of balancing the integrity and atmosphere of the site with the need to provide information and interpretation, as well as standard facilities such as kiosks and toilets, which visitors have come to expect.

### **Risk reduction measures**

Risk reduction measures can be applied to reduce the dangers generated by visitors. First of all, the number of daily visitors should be limited. Their number can be regulated by issuing entrance tickets with a fixed entry time. Guided visits are the best tool for controlling the movement and behaviour of visitors in the cultural heritage environment. Guided visits facilitate supervision, regulate the velocity of movement, and can also give warnings to visitors.

Risks from mechanical wear and from intentional damage can be reduced by protecting the historical fabric from close contact with a harmful environment or with visitors. Sensitive materials must be appropriately covered, either permanently or temporarily, light should be reduced and its intensity kept below recommended levels (50lux). Dust and cloth fibre deposits decrease rapidly with increasing distance between exposed objects and moving visitors. Objects should be covered during out-of-season periods. Soiling can be reduced by limiting visits during climatically unsuitable periods (rainy spring and autumn months), and also by educating visitors.

These impacts on visitors and risks to their health can be mitigated by means of passive (technical) measures: by installing railings and elevators, providing well-marked painted warnings and signs. Here again it is very useful to use active measures, namely spoken explanations and warnings by properly trained and educated guides.

### **The risk of converting a historic environment into an object for tourist consumption**

The first risk from tourism is the danger of breaking historical continuity, context and memory. Tourism has a negative impact on the stability that is necessary for protecting the natural and viable way of life and the traditional ways in the historical core of the town. Private and personal profit is often the only goal of entrepreneurial citizens, and they have no regard for protecting the public interest. This is evident in the care given to historical monuments and also in the approach to the development of tourism which gradually destroys the natural functions in the historical town. In its first phase, this approach trans-

forms the historic town into a cheap attraction, usually featuring markets, tourist shops, festivals and theatrical illumination of monuments. This drives the natural life out of the town, which may even please some businessmen and some citizens who live outside the historical core. The historical part of town thus becomes a mere object for tourist consumption.

Tourism has a very strong impact on the infrastructure in historic sites. It demands a special infrastructure which is not useable in other areas of the life of a small town. This infrastructure lies idle for much of the year, in cases when tourism is seasonal, and requires costly maintenance. The capacity for accommodation and board is a major issue. A bigger problem is parking, and perhaps the worst consequence of tourism for the infrastructure is the remarkable change in the composition of the business network in the historical core. Tourist shops gradually drive out of the centre an assortment of goods necessary for residents, and this inhibits the year-round liveliness of the business spaces.

### **Integration of cultural tourism into a historic environment**

Cultural heritage issues and their utilisation for tourism also have many positive consequences. Cultural tourism can increase the attractiveness of the place, it can improve the conditions for cultural life and enrich life in the town by supporting many activities and events. Socio-economic impacts can be controlled by proper development planning and tourism management, based on integrating cultural heritage into the life of society.

It is possible to manage a historical town and keep it permanently liveable, but this requires a complete knowledge of the town's interior development potential (and limits) for tourism, and a well-prepared strategy. It is necessary to support activities that satisfy the needs of tourists while attracting the participation of residents.

It is necessary to stabilise the natural way of life in the historical environment, and also to balance the infrastructure at least in i) the composition of services and shops in historical areas and ii) the special needs for transport. The "map" of development potential and the strategy that has been created is then reflected in land use plans and urban planning documents.

### **Recommendations for a sustainable tourism management policy**

#### *Targeted and interdisciplinary research*

Many consequences of cultural tourism remain not well known, and some are experienced only in a narrow field. For this reason, we consider it necessary to carry out special inquiries and focused research in order to define the problems comprehensively and find appropriate solutions for a wide range of social, economic, technical, cultural and political issues. In many cases, the problems of tourism are still being dealt with only monothematically and by amateurs.

#### **Tourism strategy on all territorial levels**

A tourism management strategy should be prepared not only on the level of towns, regions and nations, but also on an international level, e.g. in cooperation with the UNWTO Department for Sustainable Tourism. Travel and tourism has become a profitable industry, and travel agencies operate in a space with no borders and often without due consideration for the local culture.



3. Decent Christmas illumination of Telč - a World Heritage City in the Czech Republic.

### **Scaling and dispersion on all levels**

The general policy for cultural heritage regions should be to prevent the creation of mass tourism centres, villages or enormous hotels. The aim is to be scaled according to the sustainable capacity of the places of interest. Support should be given to efforts at dispersing cultural tourists over a larger area and offering them places to visit other than the most famous monuments e.g. those inscribed in the UNESCO list.

### **Reflecting the needs of tourism in urban planning**

It has already been mentioned that all planning documents in territories with important cultural heritage characteristics should contain measures reflecting the needs of sustainable tourism. Specific tools have been developed within EC supported research projects, e.g. cultural tourism impact assessment procedures and criteria for consideration (Dupagne et al. 2007).

### **Training for professionals**

Educated experts are essential for successful tourism management. It is not enough to organise conferences and publish declarations. It is necessary to prepare tools and educate professionals who will implement appropriate tourism management.

### **Involving the public**

Local communities and residents play a key role in maintaining sustainable tourism on an appropriate scale. Public participation in planning tourism projects leads to more harmonic relations and a welcoming atmosphere in the host town.

### **Quality rather than quantity in cultural heritage tourism**

It is believed that the social and economic impact as well as the sustainability of cultural heritage tourism can be substantially improved by seeking quality measures rather than by continuously seeing to increase the number of visitors to cultural heritage sites. It is also necessary to strike a balance between the use of modern information technology and simple human interaction when enjoying and learning about the cultural heritage environment.

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## Los riesgos generados por el turismo sobre los bienes de patrimonio cultural

Aun cuando no se ha realizado hasta ahora ningún estudio suficientemente detallado acerca de los riesgos vinculados al turismo y a un gran número de visitantes, existen algunos datos e indicadores que nos permiten afirmar que el turismo conlleva un fuerte desarrollo y deterioro, específicamente en las ciudades históricas.

En relación con los objetos históricos, es útil distinguir seis grupos de impactos y riesgos generados por los visitantes: aspectos ambientales, daño y desgaste mecánico, daño intencional, ignorancia y negligencia, transformaciones y conflictos de uso.

### Impactos ambientales

Los impactos ambientales incluyen la humedad y los cambios de temperatura, los sedimentos (de polvo), la contaminación del aire y la radiación (de luz). Éstos causan daños mecánicos debido a los constantes cambios volumétricos, los cuales crean un ambiente propicio para el deterioro biológico y electroquímico, y junto con los sedimentos de polvo podría intensificar la aparición de manchas.

#### *Humedad y cambios de temperatura*

Algunos proyectos de monitoreo, tales como el estudio que se llevó a cabo en la Capilla Sixtina en Roma (Camuffo y Bernardi, 1991), han arrojado evidencia de que la humedad y los niveles de temperatura se elevan debido al alto número de visitantes. La regulación del acceso es una propuesta segura. Se han desarrollado otros métodos para mejorar las condiciones internas en los edificios históricos. Algunos expertos prefieren la ventilación natural sobre los sistemas de acondicionamiento del aire, sistemas combinados con la ventilación de baja velocidad, vitrinas climatizadas, o incluso vitrinas para visitantes.

#### *Sedimentos sobre las superficies*

Los procesos de deposición están significativamente influenciados por corrientes y flujos en el interior, alrededor de las paredes y cerca de las ventanas. Según la investigación que se llevó a cabo por el National Trust (Reino Unido), el constante incremento del número de visitantes tiene una influencia significativa en la cantidad de polvo en los interiores históricos. La limpieza frecuente también daña los objetos y superficies históricos.

#### *Contaminación del aire*

La contaminación del aire en los museos se ha estudiado sistemáticamente en numerosos proyectos, (por ejemplo, Camuffo et al., 2004), además se ha comprobado que la contaminación del aire debida al gran número de visitantes se relaciona principalmente con las emisiones de dióxido de carbono que se producen dentro de los edificios, óxido de nitrógeno del combustible de los automóviles que circulan en las cercanías del monumento, y con el ozono generado por diversas fuentes externas e internas.

#### *Radiación*

Los efectos de la luz son muy dañinos para los colores, se debe evitar en particular la luz directa del sol.

### Daño y desgaste mecánico

El desplazamiento de los visitantes conlleva un mayor desgaste mecánico en las estructuras históricas, el cual acorta sus ciclos de vida.

### Efectos de la vibración y dinámica

La vibración se produce comúnmente en museos y en casas históricas como consecuencia de la circulación de los visitantes. Puede que se intensifique particularmente en los suelos de madera con soportes deteriorados, y es extremadamente costoso reducir el efecto de tal vibración.

### Daño intencional

Desafortunadamente, también se debe tomar en cuenta el daño intencional como graffitis, objetos exteriores dañados, vandalismo, etc. Con frecuencia, las esculturas, las torres también resultan dañadas por los visitantes que se suben en ellas para tomar fotografías o para ser fotografiados.

### Ignorancia y negligencia

La ignorancia y negligencia de los turistas, también ocasiona daños considerables, como por ejemplo cuando ensucian el piso, las alfombras y los objetos con restos de comida, cigarrillos y goma de mascar.

### Transformaciones

La necesidad de albergar un gran número de turistas genera presión para la demolición y la nueva construcción de centros históricos, o para la transformación o la modernización de los edificios históricos.

### Conflictos de uso

Los conflictos de uso se presentan especialmente en lugares como las iglesias, catedrales y monasterios. Es difícil asegurar un equilibrio entre las iglesias como lugares de oración y como sitio turístico para los visitantes. También está el problema de equilibrar la integridad y la atmósfera del sitio con la necesidad de proveer información e interpretación, así como también facilidades de soporte tales como kioscos y baños, que los visitantes esperan encontrar en esos lugares.

### Recomendaciones para una política de gestión de turismo sustentable

- Emprenda una investigación interdisciplinaria dirigida para estudiar las consecuencias del turismo cultural con el objeto de definir los problemas de manera amplia y encontrar soluciones apropiadas;
- Desarrolle una estrategia de turismo en un nivel internacional, por ejemplo: en cooperación con el departamento para el turismo sustentable de la Organización Mundial del Turismo (OMT);
- Refleje las necesidades de turismo en una planificación urbana;
- Organice la capacitación para profesionales para una gestión exitosa del turismo;
- Involucre al público;
- Busque calidad más que cantidad en el turismo de patrimonio cultural.

# Cultural Heritage and Tourism: A Complex Management Combination

## The Example of Mauritania

by **Jean-Marie Arnoult,**

Inspector-general Emeritus of Libraries, France

Mauritania is still enduring the long-term effects of the weather phenomena that have befallen that region since the late 1960s. The vanishing palm groves and hordes of people abandoning rural areas to thicken the impoverished belt circling the capital, Nouakchott, have drained life out of small communities, which are seeing their ties with the vital centres becoming frailer. The main old cities (Oualata, Chinguetti, Tichit and Oualata), which had thrived on trade in days gone by – the salt trade in particular – are now facing desertification and a number of their people are simply walking away from them. The only vestiges of these long-gone activities there are the dry-stone and mud buildings, various everyday objects, and manuscripts possessed by families (from handfuls in poorer homes to more than 1,000 in the richer families' homes). The weather and sand have naturally damaged the books, as they are more vulnerable than the stone, but their latest owners cared for them – and that care, more often than not, was the only one those books got.

Contrary to what we sometimes read, these private manuscript collections have been well-known for a long time. In the first half of the 20<sup>th</sup> century, prominent intellectuals such as Théodore Monod, Albert Leriche, Moktar Ould Hamidoun and others showed the historical value of these documents for a then barely known part of the African continent. But it was in the decades after Mauritania's independence (1960) that interest in this young country's ancient cultural heritage blossomed – in a country that nevertheless lacked the wherewithal to shoulder such responsibility in that area single-handedly. Growing awareness of these issues materialised in UNESCO's appeal in 1981 (which it renewed in 1988) to funnel international solidarity to protect ancient sites in general, shield urban areas from the sand threatening to engulf them (especially Chinguetti and Oualata) in particular, and to revive the palm groves to allow the population to grow roots (4).

Initially, the drive to save those manuscripts attracted little interest in the West, aside of microfilm transfers in Tübingen University (5, 6), and efforts to gather, study and restore manuscripts in a single location in Nouakchott, the *Institut Mauritanien de la Recherche Scientifique*, which stood in for the National Library (which lacked the scientific and technical capabilities, and was relocating before moving to a completely new building after that). Admittedly, those efforts did not all end well, in a country where the bulk of national cultural heritage is in private or religious hands. Contrary to appearances, the books had not

been forsaken or escheated. The necessary transportation precautions were not always taken in the past, and their owners understandably grew wary. This negligence did little to allay their distrust, and they indeed refused to cooperate with any initiative from central authorities – which, in any case, lacked the resources to deliver its grand plans.

UNESCO's second appeal (1988) kick-started studies on a range of options to safeguard those manuscripts, but never led to concrete measures. Time does not have exactly the same value in the desert as in western societies but owners nevertheless started losing interest – and becoming increasingly aware of the fact that their books had value as cultural heritage, tipped off by tourists who were surprised to find those precious documents in desert areas. All things considered, and relatively speaking, it was no more surprising to find manuscripts in Chinguetti (which was once home to a university) than in a small provincial city in France, Germany or Italy. But lack of knowledge on the part of most of the visitors and tourists, and their unawareness of the conditions their own cultural heritage was in, and their ignorance of what these cultural and religious testimonies meant to Mauritanian families, often entailed misunderstanding, compounded with unrealistic humanitarianism driven by good intentions and little else, which upset and distorted the landscape and relations between the players. The "touristic" appeal of the manuscripts and "desert libraries" (an expression that reveals the original misunderstanding: they were libraries *in* the desert), which several leaflets flaunted, mostly stems from the mere fact that tourists were surprised to find these unexpected documents in seemingly inhospitable places, and the emotion that they sparked. That phenomenon is part of the history of these manuscripts, and it is important to take it into account.

The actual appeal of these manuscript is indeed dubious because, aside of their geographic isolation, their content is not easy to broach. With a few exceptions, they are often austere documents with no particular embellishments. They are mostly religious texts (commented Korans, the Prophet's biographies, legal documents, etc.), a few of them are about science (mathematics, medicine), and a few are literature (poetry). The bulk of these collections fall into those categories. Many of the bindings are in poor condition and the few that have survived, while probably enthralling codicology experts and antique-binding enthusiasts, hardly rouse laypeople's interest.



1. Modern binding protective folder, Chinguetti (1996).



2. Binding protective folder, beginning of the 20<sup>th</sup> century, Chinguetti (1989).



3. Ancient binding: its cold stampings could have been used as ornamental elements for the binding folder (Chinguetti, 1989).

The main stumbling block that every effort to protect these manuscripts and private collections in the past several years has run into is the lack of accurate information about the collections themselves and indeed about most of the documents. That was the starting point for the original approaches (2, 3): the first step to preserve something properly is to find out what to preserve. Compiling descriptive catalogues is of course the goal in the perfect world. But, from a more down-to-earth angle, it made more sense to analyse the difficulties and provide suitable solutions. That was why the summary-inventory principle was adopted: it is a way of identifying and locating, and of paving the way for scientific catalogues – which are famously complex to elaborate.

In this vein, and without lapsing into touristic emotionalism, different initiatives were taken and undertaken – with commendable abnegation and without yielding excessively to the spell of the economy of cultural heritage. It started with an operation by Nouakchott and Paris X-Nanterre university academics, and the French newspaper *Le Monde*, which set up an interesting and original programme to protect and draw up an inventory of manuscripts from the libraries in Tagant (in the Tidjikja region, in central Mauritania), actively involving the local population, without which nothing lasting can be built.

That was how 1996 brought the beginning of a large-scale drive to preserve documents in Ouadane and Chinguetti, two towns that count roughly 4,000 manuscripts, the oldest of which date back to the first centuries of the Hegira. The Rhône-Poulenc (since renamed Aventis) corporate foundation teamed up with other organisations (FNAC, the *Bibliothèques du Désert* association and French cooperation ministry) and decided to contribute to financing a project that combined safeguarding the collections where they were being preserved, and rekindling cultural life and the economies in those two towns. The funds were deposited in a trust administrated by UNESCO, which was running the project alongside Mauritanian authorities (in particular the *Fondation pour la Sauvegarde des Villes Anciennes de Mauritanie*, an interdepartmental organisation to preserve that country's old cities).

Their multiyear action plan around three main goals sparked the ensuing initiatives: refurbishing or building facilities to house the books and the equipment required to deal with them scientifically and technically, the summary inventory as a prerequisite for working on the document scientific catalogue, and training Mauritanian staff to handle, clean and protect the documents in specifically designed containers. Other issues were also under review at that time: transferring knowledge in cultural-heritage economic management in line with the rapid growth in tourism and to limit increasing heritage-site fragility, as mismanaging or mishandling curiosity could dramatically destabilise those sites.

Combined, these initial recommendations led to a broad-based convention in 1999 (1), which in turn sparked awareness of the needs associated with Mauritania's cultural heritage and provided the foundations for Mauritanian authorities to establish an official cultural-tourism policy. A decisive step followed: a convention specifically on the manuscripts in 2003, which was a temporary culmination, so to speak, of discussions about the philosophy underpinning Mauritania's written cultural heritage. It was discussions during those meetings that mapped out the action plan to secure consensus around answers to the questions from the national and international scientific community, and from the owners themselves, with cultural economy expanding rapidly in the background.

At the end of the 1999 convention, the World Bank supported efforts to create an interdepartmental organisation called the PSVPCM (*Projet Sauvegarde et Valorisation du Patrimoine Culturel Mauritanien*, a project to protect and promote Mauritania's

cultural heritage). That project's main goal was to provide the main guidelines to shape Mauritania's cultural policy, based on consensus, and accommodating the inherent constraints (protecting and promoting cultural heritage) and the hopes of deriving economic benefits from intelligent tourism development.

The inventory drawn up during this initiative (9) was indeed a curtailed and frustrating episode in the manuscripts' long history. It was not an end in itself: it was a step towards compiling reliable data about how many manuscripts there were, and where. The following step, compiling the scientific catalogue, is opening up new research endeavours and feeding other work. Its nature is not yet very clear but its importance as regards knowledge of Mauritania's history is already unquestionable.

The simultaneous operation to physically protect the manuscripts from a preventive-conservation perspective – this was not a restoration campaign – was not considered complementary or accessory: it was a very desirable and carefully planned operation to protect the intrinsic informative value of these collections. It was not a question of fossilising them, as some believed: it was a question of avoiding the destruction of the wealth of information they contain and which has fortunately and singularly survived until our day. Besides their intellectual content, these documents are also interesting as archaeological objects, as they harbour amazing wealth in terms of knowledge about the materials they are made of, their history, bygone-day techniques, and economic and commercial history. Also fortunately and singularly, these documents still have visible and palpable traces from their travels through time and space.

Preventing-conservation training courses were organised, not without a measure of reticence on the part of the people who owned the private libraries, who were convinced that restoration was the only option to safeguard their books. A bespoke-designed box was developed by a *Bibliothèque Nationale de France* technician and manufactured for the World Bank by a Swiss provider. It is made simply by folding a sheet of thick permanent paper. It requires no glue or metal fastening systems,



4. Traditional tanning of goat skin with local plants, mainly four varieties of acacia (Quadane, 1989).



5. Traditional work of blacksmith women from Chinguetti: preparation of leather pieces, decoration with a stylus with colouring made on site. Patterns and colours used are on the worker's initiative, reproducing only from memory the ornamental elements (1996).

and provides full guarantees as regards long-term protection against the outside environment in general, and against dust and sand in particular. These boxes were created for all the private owners and should contribute to preserving the manuscripts in a preventive conservation approach, which is the only available option in the toughest areas (10).

This operation's ultimate goal was therefore to promote these collections, and to help their owners to protect them by providing all the necessary assistance as per today's conservation requirements, to make them directly or indirectly available, and follow traces back through time to their former owners and to how they used these books. It was the opposite of a conservation-gear approach, or at least a static approach to cultural heritage, as it integrated the technical knowledge and skills of women's cooperatives that are particularly active in Mauritania. It was the logical next step for the drive dating back several decades to contribute to rebuilding Mauritania's cultural landscape accommodating the economic and human aspects.

It is nevertheless sometimes good to have a diachronic view of events to take a step back and understand the surrounding phenomena without realising their effects or consequences as regards progress in meticulously mapped out programmes. Two variables insidiously altered the landscapes: the effects of the Paris-Dakar and the rapid rise of the Internet.

The fresh revival in interest in Mauritania's ancient libraries is the logical if distant outcome of the selfless purely scientific work by scholars in the first half of the 20<sup>th</sup> century, mirroring



6. Traditional leather key rings (right) now made in wool from old jumpers (left).

the 1980s ambitions based on the principle of precaution. It is the tangible upshot of growing awareness, which also ties in with the possibility of reaching remote areas that match today's aspirations to discover nature, which are completely at odds with contemporary urban landscapes. We cannot, however, overlook the utilitarian deviation in these initiatives, even though the term is sometimes veiled by philosophical logorrhoea to justify a very real economy of cultural heritage. The automotive rally between France and Dakar regularly cut through Mauritania during several years, without however providing an accurate evaluation of the tangible benefits for cultural heritage. But it has played a significant role in raising awareness of these areas and cities among audiences that do not specialise in manuscripts. It has also played a role in a deep transformation of the desert micro-societies that were abruptly confronted with certain aspects of western life. They were brutally shunted into the limelight without really understanding how to handle the technical wonders they fleetingly glimpsed. Tour operators added Chinguetti and the Adrar to their programmes, offering a choice of deals ranging from eminently comfortable to downright sporty options. A first-class hotel opened in Chinguetti, and another opened in Ouadane. Other projects are already coming out of the ground or are on the plans in other towns. People flocked in en-masse and their ranks have been swelling regularly, even though their wherewithal and agenda were not the ones that had been set originally. Chinguetti used to be a two-day drive from Nouakchott, but is only half a day away from Atar airport today. Adapting the hotel environment to western tourism standards has completely altered the relationship with the populations, and the exchanges between the visitors and the objects.

There has been another chain reaction: the production of everyday objects was one of that first enterprises hit by these changes and the slippery slope towards industrial crafts for tourists. The

production of certain traditional objects has changed, sometimes irreversibly: the baskets and other containers yesteryear woven with palm leaves (local raw materials, local expertise) is one example. At the initiative of certain NGOs, palm leaves have been replaced with PVC strips that fade very fast and deteriorate even faster due to the heat. The traditional elaborate leather key rings, which Mauritians are so proud of, are now made with reclaimed wool from old jumpers supplied by other NGOs. With this situation in the backdrop, leather production even for local use is shrivelling away, replaced by hides from other African countries – which are making up for the gradual disappearance of their own traditional crafts. The processing industry working on these raw materials is perceptibly in decline (spanning the objects themselves and the decorative motifs). Quantity is on the rise to meet soaring visitor demand, undermining quality, which has been reduced to a fading trace of traditional handed-down family expertise.

The manuscripts therefore promptly joined the ranks of exotic tourist attractions, on a par with palm-grove tours and camel rides across the dunes including nights in khaimas (Mauritanian tents). The upside is that it provides visitors with a chance to cultivate themselves but the major downside is that it is accelerating manuscript deterioration phenomena. The lack of a framework for private-library visits, competition between private libraries (which are this phenomenon's first victims), the hardly controllable tourist craving for "souvenirs" to take home (or the absolutely essential one-of-a-kind snapshot) are the variables that have shaken up the environment in which these century-old manuscripts have been kept until our day, and there is no hope that the original conditions will return.

The Internet boom also created an irrational infatuation, which contributed to the already hardly controllable upheaval. It is impossible to list all the websites created by tourists captivated by

their travels in Mauritania and eager to share their emotions and fantasies. The most unusual images naturally sit alongside images of the manuscripts. The lack of control over these shots “on the fly” very soon raised library owners’ eyebrows, and prompted most of them to administrate those images with a view to deriving profits from them. Another angle on the manuscripts – a business perspective rather than a protective approach – emerged.

Cultural economy can be heaven or hell. In particular, it can spawn uncontrollable and irreversible risks. The people who carved out these projects in the late 20<sup>th</sup> century were intent on both sharing knowledge and protecting the objects that contained it, making it accessible to scientific research and promoting human genius, and on safeguarding the objects to contribute to safeguarding people. They were intent on reconciling intelligent conservation of these books while integrating a dynamic, cultural and social conception of thankless urban planning. Their objective was no doubt too ambitious for this initial phase.

One of these towns and region main assets – if not their main one – and one that fascinates many of our contemporaries, is that they are “*gisements de silence*” (springs of silence) to borrow a beautiful expression from a desert historian (7). In a country that still ranks among the planet’s poorest, tourism is an economic opportunity that other countries have tapped into with varying consequences in terms of the survival of their cultural heritage.

But, like several other economically fragile countries subject to haphazard weather, Mauritania is not yet equipped to deal with the overwhelming pressure to harness and promote its cultural wealth without running the risk of dilapidating it. It is a concrete example of the merciless strife between the paradoxes and dilemma of the globalised economy of cultural heritage.

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10. This box, in several configurations, was delivered to Nouakchott but inadequate logistics in Mauritania made it difficult for them to reach private libraries, and the objectives were unfortunately not achieved.

## Patrimoine et tourisme : une gestion complexe

### L'exemple de la Mauritanie

Dans les décennies qui suivirent l'indépendance de la Mauritanie en 1960, une curiosité de plus en plus grande s'est manifestée pour son patrimoine ancien, notamment ses collections privées de manuscrits et ses bibliothèques dans le désert, qui ont très vite intégré le périmètre des attractions touristiques exotiques.

Suite à l'appel de l'UNESCO lancé en 1981 et 1988, plusieurs initiatives afin de sensibiliser et de mobiliser la solidarité internationale à la sauvegarde de ce patrimoine ont vu le jour, notamment pour accompagner l'évolution rapide du tourisme et limiter la fragilisation de sites patrimoniaux qu'une curiosité mal gérée et mal maîtrisée risquait de déstabiliser gravement.

À l'issue d'un colloque généraliste sur culture et tourisme en 1999 et d'un colloque spécifique aux manuscrits en 2003, fut créé, avec l'appui de la Banque mondiale, un organisme interministériel dénommé « *Projet Sauvegarde et Valorisation du Patrimoine Culturel Mauritanien* » dont le principal objectif fut de mettre en œuvre les grandes lignes de la politique culturelle de la Mauritanie, consciente des contraintes patrimoniales (conservation et valorisation du patrimoine) et des espérances économiques fondées sur le développement intelligent du tourisme.

Dans ce cadre, plusieurs actions ont pu être mises en place :

- établir un inventaire et initier le catalogage scientifique ;
- lancer une opération de protection physique des manuscrits dans une logique de conservation préventive ;
- organiser des formations à la conservation préventive.

L'objectif final de l'opération était donc bien de valoriser ces collections, d'aider leurs propriétaires à les conserver en leur apportant toute l'aide nécessaire en conformité avec les exigences actuelles de la conservation, de les rendre accessibles, directement ou indirectement, de retrouver les traces des possesseurs anciens et de l'usage qu'ils firent de ces livres.

L'économie de la culture peut le meilleur et le pire, et notamment engendrer des mécanismes d'apprentis sorciers incontrôlables et irréversibles. La hausse de la fréquentation touristique a joué par exemple un rôle important dans la transformation profonde des micro-sociétés du désert et la modification de leur artisanat. Pris entre le désir de faire connaître et de protéger, le défi est de concilier la conservation intelligente des livres en l'intégrant à une conception dynamique, culturelle et sociale de l'aménagement de territoires difficiles. Dans un pays encore classé parmi les plus pauvres de la planète, le tourisme constitue une chance sur le plan économique mais la Mauritanie n'est pas encore armée pour faire face à des sollicitations trop pressantes d'exploitation et de valorisation de ses ressources culturelles sans courir le risque de les dilapider.

## Patrimonio cultural y turismo: una gestión compleja

### El ejemplo de Mauritania

En las décadas posteriores a la independencia de Mauritania (1960) floreció el interés por el patrimonio cultural de este joven país, particularmente en sus colecciones privadas de manuscritos, que rápidamente integraron el círculo de las atracciones turísticas exóticas.

A raíz de convocatorias lanzadas por la UNESCO en 1981 y 1988, aparecieron varias iniciativas con el fin de sensibilizar y de movilizar la solidaridad internacional para la salvaguardia de este patrimonio, particularmente para acompañar la rápida evolución del turismo y limitar la debilitación de los sitios patrimoniales que una curiosidad mal administrada podría desestabilizar gravemente.

Luego de un convenio en 1999 sobre cultura y turismo y de un convenio más específico sobre los manuscritos en 2003, el Banco Mundial respaldó los esfuerzos para crear una organización interdepartamental llamada PSVPCM (*Projet Sauvegarde et Valorisation du Patrimoine Culturel Mauritanien*, un proyecto para salvaguardar y promover el patrimonio cultural de Mauritania).

La meta principal de este proyecto era establecer las principales líneas que constituyen la política cultural de Mauritania, basada en consensos, dando cabida a las restricciones inherentes (protección y promoción del patrimonio cultural) y las esperanzas de obtener beneficios económicos a partir del desarrollo del turismo inteligente.

En este contexto, se realizaron varias acciones:

- inventario de las colecciones privadas de manuscritos, como un primer paso para la catalogación científica;
- proyectos para la protección física de los manuscritos desde una perspectiva de la conservación preventiva;
- cursos de capacitación en conservación preventiva.

La meta final de estas acciones era promover estas colecciones y ayudar a sus propietarios a protegerlas suministrándoles toda la asistencia necesaria según los requerimientos de la conservación de hoy en día.

La economía cultural puede ser lo mejor o lo peor. En particular, puede producir riesgos incontrolables e irreversibles. Por ejemplo, la subida de la frecuentación turística desempeñó un papel importante en la transformación profunda de las microsociedades del desierto y de su artesanía. Constituye un verdadero desafío intentar, al mismo tiempo, compartir el conocimiento y proteger los objetos que contienen dicho conocimiento, conciliar la conservación inteligente de los manuscritos integrándola en una concepción dinámica cultural y social de la ordenación de los territorios difíciles.

El turismo constituye una oportunidad para muchos países económicamente frágiles expuestos al azar del clima, pero Mauritania aún no está dotada para lidiar con la abrumadora presión de aprovechar y promover su riqueza cultural sin correr el riesgo de dilapidarla.

le secret  
des manuscrits  
de la mer Morte



# Qumrân

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# The Challenge of Exhibiting Dead Sea Scrolls: Story of the BnF Exhibition on Qumrân Manuscripts

by **Laurent Héricher**, Head of Oriental Manuscripts Division,  
Department of Manuscripts, National Library of France

The discovery between 1947 and 1956 of some 900 parchment scrolls, most of them highly fragmented dating back from the 2<sup>nd</sup> century B.C to the 1<sup>st</sup> century A.D., comprising all the books of the Old Testament as well as hundreds of unheard religious masterpieces<sup>1</sup>, right in the region where the Bible was born, is considered in the Occidental world mainly, as the most important manuscript find of all times<sup>2</sup>.

1. That is apocryphal works, prayers and legal texts and “sectarian” documents.

2. For a full and detailed story see: Fields, Weston. 2009. *The Dead Sea scrolls, a full history*. Leiden/Boston: Brill.

1. Fragments of manuscripts from the Cave 1 of Qumrân, preserved at the BnF. Photo BnF. Hébreu 1427.



The Bibliothèque nationale de France (BnF) purchased in 1953 from Father Roland de Vaux, director of the French Biblical and archaeological school in Jerusalem, some three hundred and seventy five fragments of the precious Dead Sea scrolls discovered by the French archeologist in Cave 1 in 1949. This invaluable treasure slept in the BnF stacks squeezed between glass plates until Weston Fields from the Dead Sea Scrolls (DSF) foundation contacted the BnF soliciting our collaboration for his exhibition projects<sup>3</sup> and aroused our interest for this grand but forgotten part of our patrimony.

The DSF's main purpose is to support scientific publications around the DSS<sup>4</sup>. The Foundation also helps with the conservation and preservation of the scrolls. In addition to this, the Foundation is involved in facilitating international exhibitions of scrolls. In 2007, it helped setting up at the San Diego Natural History Museum a DSS exhibition that attracted nearly 5 million people. It is probably the largest and most comprehensive exhibition of Dead Sea Scrolls ever assembled in the world: 15 big fragments of the most significant scrolls together with hundred of unique archaeological artifacts were on show.

The BnF could not possibly compete with such an ambitious project for several reasons. French audience although usually inquiring and aware of the significant discovery of the scrolls is more secular than the American one and probably would not have visited by millions the exhibition. The BnF, although granted with a generous donation from the EDF “Diversiterre” Foundation<sup>5</sup>, didn't have the few million dollars necessary to bring significant manuscripts and archeological artifacts from the Israel museum or elsewhere in the world.

Besides, our tiny little fragments are not really visually appealing – although comprising some of the most important texts – to an audience eager to see sensational manuscripts. As wisely staged as it could be, they could not pretend to be the only leading attraction. We needed a guest star.

Therefore, the BnF solicited an important loan from the Israel Museum (Shrine of the book). I went to Jerusalem to negotiate the loan. I met with James Snyder, the Head of the Israel Museum, who generously spent a great amount of his precious time helping me elaborating my project. He also addressed me to Adolfo Roitman, the curator of the scrolls at the Shrine of the Book.

3. Lending to them our fragments.

4. The official publication of the scrolls in the *Discoveries in the Judaean Desert* (DJD) Series by Oxford University Press since 1951.

5. EDF Valectra laboratory financed the restoration and the creation of a fac-simile of the Copper Scroll.



2. Jar excavated from Qumrân ruins. Qumrân caves. Palestinian territories. Photo of the French Biblical and archaeological school, Jerusalem, n°13941.



3. Roll of copper broken into two pieces. Qumrân caves. Palestinian territories. Photo of the French Biblical and archaeological school, Jerusalem, n°13299.

The Dead Sea scrolls are kept at the Shrine of the Book, at the Israel museum whereas the thousands of fragments are kept at the Israel Antiquity Authority, formerly Rockefeller Museum. The Shrine of the book exhibition hall currently showed the Isaiah scroll from cave one totally unrolled whereas, in the cases around, the Peshier Habbakuk and other significant works were displayed. Unfortunately, the scrolls displayed, and particularly the Isaiah scroll, suffered severely from being vertically and completely unrolled for display. The decision was therefore made to replace the original scroll with a high resolution facsimile image the size of the scroll.

Actually none of the original scrolls are displayed anywhere anymore in the world including Israel and the Shrine of the book. The fragility of the scrolls requires keeping them delicately lying flat in hermetic vault.

I, a "mortal", was given a chance to get into the "Holy of the Holies". Adolfo took me to the vault where the scrolls are kept by extremely high demanding preservation standards. Adolfo Roitman got very interested in our project, and provided me with some very interesting piece of advice. But most of all, he agreed to lend to the BnF an important fragment of the Temple scroll whose "conservation history" is absolutely incredible as I will tell it later.

Setting up such an exhibition was indeed a challenge. Financial, conservation, ideological, scientific and geostrategic issues were all to bear in mind, the ideological or scientific conflicts being sometimes fiercer than the geostrategic ones.

The nine most important scrolls discovered in Cave one<sup>6</sup> and eleven<sup>7</sup> as well as some very important fragments are kept today at the Israel Museum. The question "who owns the scrolls" is a complex one since the property issue is linked to the many geopolitical changes in the region. For instance, three of cave one scrolls were found by Bedouins in the Dead Sea region under Jordanian sovereignty and were purchased by Sukenik in

1947 and 1948. The other four had been bought by the Archbishop Mar Athanasius but were purchased by Yadin in 1956 in New York City. The 500 or so fragments discovered in Cave four that were housed at the Rockefeller Museum were seized by Israel in 1967 when the Israeli army invaded Eastern-Jerusalem. Very recently, in 2009, the Canadian government was required upon by Jordan who claimed their ownership, to seize the DSS fragments exhibited at the Royal Museum<sup>8</sup>. These fragments came mostly from the controversial cave four.

First, we had the raw material... Our trump so to speak was our collection, the fact that the entire collection of fragments had never been shown to the public in France. Thus took shape the project to set up an exhibition dedicated to all the aspects of this major archeological adventure<sup>9</sup> with a serene and neutral approach.

In many respects, the Dead Sea scroll saga can be regarded indeed as an astonishing, puzzling, mysterious, challenging subject. And one of the most puzzling aspects is linked to the preservation of the scrolls.

How not to wonder today about their rather good, not to say miraculous, state of conservation? For nearly two thousand years, those hundred of several meter long rough parchment scrolls written with carbon ink made of soot mixed with water or wine, laid in a very inhospitable environment not suitable for their preservation : blazing hot in summer and damp in the winter rain season, most of the eleven caves home to the precious scrolls, housed innumerable insects and rodents as well which had by the time of the first excavations ingested a probably greater amount of scrolls than what was actually preserved to us.

But weren't those precious manuscripts protected by high cylindrical sealed ceramic jars? Indeed, the Bedouins on the one

6. Two scrolls of Isaiah, Peshier (explanation of the prophetic book) Habakkuk, Genesis Apocryphon, Community Rule, War Scroll.

7. The Temple scroll.

8. CBS News online, January 3rd 2009 : "Canada refuses to seize Dead Sea scrolls" at <http://www.cbc.ca/canada/toronto/story/2010/01/03/scrolls-jordan-canada.html>

9. *Qumrân : le secret des manuscrits de la mer Morte [exposition, Paris, Bibliothèque nationale de France, 13 avril-11 juillet 2010]* / sous la direction de Laurent Hérischer, Michael Langlois et Estelle Villeneuve. Paris : Bibliothèque nationale de France, 2010.

hand and later on the archeologist (Father Rolland de Vaux) on the other hand, unearthed many jars at Qumrân, either in the caves or on the archeological site. All of them present the same morphology, and seem to have been produced exclusively at Qumrân for the use of its inhabitants and those who, for unknown reasons, deposited the scrolls in the caves. Nonetheless, until today, no one has proved irrevocably that the jars commonly called "scroll jars" were aimed at preserving them, for, apart from the Bedouins who testified under oath that they extracted the three first and best preserved scrolls out of a jar, none of the remaining scrolls were discovered in these artifacts. More troubling, in the eleven caves, the fragments were very often discovered on the ground. In a few instances however, as in cave 4, the archeologists discovered holes in the walls showing that some caves were equipped with wood shelves. The archeologists sometimes unearthed vessels too showing that the caves may have had many uses<sup>10</sup>.

The damages caused by men and even by archaeologists themselves to the scrolls, as soon as they were extracted from the caves and came to light, have been to a certain extent greater than the ravages of time, Mother nature, the atmospheric variations of the Dead Sea area, or the fauna of the Judaeen desert. Indeed, as soon as they were taken out of the caves, the scrolls came into great trouble.

Unaware of the importance of the discovery they had made, the Bedouins tore and threw on the ground the two thousand year old fragile linen that had protected some of the scrolls. Not having the slightest hint of how to handle antique dried out parchment documents which had been kept rolled for two thousand years, they would unroll and roll them back each time they wanted to show someone their discovery...

It is believed the scrolls most probably ended up at the Bedouin encampment where they were kept in a bag hung on a tent pole outside for a few months before being showed to the Bethlehemite dealer and middleman Kando. Kando took the scrolls around with him looking for someone to help him to identify them. Ohan Nasri, the Armenian antique dealer who met Eleazar Sukenik across the barbed wire, handled the fragment of the book of Daniel with probably as little care as Kando, not to mention Sukenik who took them home to identify them. It took at least two years for the first three scrolls to find a safe harbor in the safer hands of the Jerusalem university librarians.

The four scrolls, and among them one of the two famous Great Isaiah Scroll, Mar Samuel the Jerusalemite Jacobite archbishop and his business partner Anton Kiraz<sup>11</sup> had bought from the Bedouins by 1949 were not that lucky. They traveled restlessly through the Middle East from Jerusalem to Beirut, Turkey and Syria before crossing the Mediterranean and the Atlantic Ocean. After stopping by at the Library of Congress for a few months exhibition, they took some rest, so to speak, in New Jersey. Nevertheless, occasionally, Mar Athanasius Samuel took

great pride in letting himself photograph grabbing with his thick fingers rubbing the carbonic ink the Isaiah scroll almost entirely unrolled. Sukenik's son, Yigael Yadin, succeeded in tracing back the existence of the « lost » four scrolls his father had failed to purchase before he died -and nearly ten years after they had been discovered in the Judaeen desert, the scrolls returned to Israel and were deposited under the white rotunda of the newly built shrine at the Israel Museum.

The ninth and last scroll, the Temple Scroll, the longest (9 meters long) and one of the most important scroll belonging to the vast corpus of biblical literature completely unknown until Qumran discoveries, has a savory story.

It was the last to join the shrine in 1967. It had been discovered by the Bedouins and bought by Kando. After the creation of the state of Israel, Bethlehem where Kando had his business as well as Qumrân was located in Transjordan.

Kando, who hoped to sell it for one million dollar, kept it hidden in a primitive cache, under... floor tiles, in a BATA shoe box, wrapped in a paper. His wife, unaware such a valuable manuscript was located under the floor kept spilling buckets of water on the floor until 1967 when Yigael Yadin having been told Kando hid another important manuscript, forced the antiquity dealer to sell it to the Israel Museum<sup>12</sup>. Unfortunately, the Temple had been irreversibly damaged. Column one was lost, and the rest of the scroll has been severely damaged by humidity.

I will always remember the day the Temple scroll arrived at the BnF. A journalist was interviewing me about the exhibition when someone announced me I was required to supervise the arrival of the Temple scroll in some other place. The journalist followed me "live" to the place where the scroll was. It had been escorted all the way from Charles de Gaulle airport in a bullet-resistant armored truck which is used to carry money and valuable goods. The couriers were exhausted but Michal Dayagi Mendels, archeology department chief curator, and I were so excited to pull out of its cradle the Temple scroll to put into the case.

Last but not least...

Post-discovery restorations or attempts to enhance the reading proved in some cases to have a catastrophic impact on the scrolls.

Indeed, from 1950 and on, as N. Caldaro points out<sup>13</sup>, "... text analysis and attribution of the fragments were the main concern of the scholars dealing with DSS and no special attention was paid to their preservation".

All kinds of hazardous treatments were inflicted upon the fragments. Fragments were destroyed when being infrared photographed for publication. In other cases, castor oil was used to enhance the contrast and allow a better deciphering. And above all, scotch tape was used extensively to hold the fragments together or, as it is the case at the BnF and the Israel

**10.** For more information about the archaeological debate about the interpretation of the findings at Qumrân, see: Magness, Jodi. 2002. *The Archaeology of Qumran and the Dead Sea Scrolls*. Grand Rapids: Eerdmans.

**11.** Kiraz, Georges A. (ed.). 2005. *Anton Kiraz's archive on the Dead Sea scrolls*. Piscataway, NJ: Gorgias Press.

**12.** Roitman, Adolfo. 2003. *Envisioning the Temple: Scrolls, Stones and Symbols*. Jerusalem: The Israel Museum.

**13.** O. Han, I. Rabin et al. "Non-destructive investigation of the Dead Sea Scrolls". Papers of the 9<sup>th</sup> Int. Conference on NDT of Art 2008, Jerusalem, Israel, May 2008, [www.ndt.net/article/art2008/papers/209Hahn.pdf](http://www.ndt.net/article/art2008/papers/209Hahn.pdf).

Antiquity Authority (IAA) collection, to keep the joints fixed on glass plates destined to maintain them.

Moreover, as Caldaro points out, the atmospheric pollution, the day or artificial light and the changing climatic environment between the different conservation locations aggravated the original decay and caused a speedy degradation.

Ira Rabin's recent microscopic examination<sup>14</sup> of the BnF's fragments shows that Father de Vaux' team not only used the well known scotch tape but also glues that would need to be identified and analyzed. Unfortunately, one should think twice before opening the glass plates. An attempt was made to restore BnF plate five fragments<sup>15</sup> in the sixties which proved to have a catastrophic effect on the fragments. The plates were opened, the scotch tape removed and the fragment thoroughly washed with an aggressive solvent. The fragments were then squeezed back between the glass plates. The parchment preservation state worsened: the fragments became drier and darker.

By the beginning of the 1990, scientists and restorers noted the deterioration process had worsened. It appeared urgent to act to stop the degradation process. In Israel, at the Israel Antiquity Authorities where the collection is mainly made of hundred of fragments and where the scotch tape was widely

used to keep a few thousand fragments on the 1270 glass plates, it was urgent to find a solution to halt the deterioration process. Four women in charge with the Dead Sea fragments, all of them originating from the former Soviet Union, under the supervision of Pnina Shor, discovered a solvent that would not deteriorate the parchment of the scrolls. They started the slow restoration process: scrapping with a scalpel the adhesive tape, washing the fragments with a mild chemical solvent and then pour over the fragments a powder which they elaborated that neutralizes the effect of adhesive, blotting the glue out of the parchment. They have already been solicited to share their "savoir-faire" with scientists around the world, but due to the amount of fragments to be restored, it is going to take years before the Israel fragments are out of danger.

As the digitizing of the Dead Sea scrolls and fragments is progressing, it is now urgent to fasten the restoration process and extend it to other collection. The two main issues and challenges restorers have to face today is to first identify the precedent treatments and then "cure", that is neutralize the noxious effects of the precedent restorations. In the case of the BnF's fragments it is really urgent, sixty years after the fragments were unearthed from cave one's dust, to start cooperating and acting to save them from total destruction.

<sup>14</sup>. Ira Rabin, Fritz-Haber-Institut der Max-Planck-Gesellschaft spent one week examining with a microscope camera BnF fragments.

<sup>15</sup>. 1Q24 and 25: Aramaic apocrypha.

# The Treasures Gallery of the National Library of France

**I** by **Sébastien Gaudelus**, Richelieu Project Deputy Manager, National Library of France

Since 2010, an important and whole renovation project has been launched on the historical site of the National library of France (in Richelieu street) and will last until the complete re-opening in 2017. Built and transformed through several steps since the beginning of the 18<sup>th</sup> century, the whole building has not known such large-scale works until now. The construction of the François-Mitterrand building near the Seine river and the transfer of the books and periodicals collections to this new site in 1998 left unoccupied spaces in Richelieu. It allowed us to start this important renovation.

At present, 20 million documents are preserved in the five specialised collections departments remaining on the Richelieu site: Performing arts, Maps and Plans, Engravings and Photography, Manuscripts, and Coins, Medals and Antiquities. With the renovation works, those departments will have more spaces in a building redesigned for the 21<sup>st</sup> century safety and conservation standards, more comfortable and more open. But the BnF is not the only institution to be touched by this whole renovation: the library of the National Art History Institute, already on the site since 1993, will have more space in and around the historical Labrousse reading room; the Ecole des Chartes library, at present time in the Sorbonne building, will also join the site.

The modernisation of the whole site with new standards is the main aspect of this project, but the collections valorisation is an important one too.



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Within the free circulation open to all visitors in the building to see historical rooms, the BnF and Bruno Gaudin, the architect, decided to use one of the temporary exhibitions gallery as a Treasures gallery. It will take place in the Mazarine gallery (registered historical monument) built in the 17<sup>th</sup> century by François Mansart for the cardinal Mazarin and decorated with frescos about Ovide's *Metamorphosis* by the Italian painter Romanelli.

In this free access Treasures gallery, a new presentation adapted to the space and to the collections will allow to show rare and precious documents from the departments located in the building, but also from the Music department (located on the other side of the Richelieu street), from the Opera library, from the Arsenal library and from the Rare and precious books reserve. A major place will be taken there by the Coins, Medals and Antiquities collections. The actual presentation of those collections in the Museum will be also renewed and modernised.

This new presentation, within the whole free access lap through the historical spaces of the building, raises some difficulties to be considered, especially about conservations themes.

Actually the objects from the Coin, Medals and Antiquities department will be exhibited in this gallery in an almost permanent way. On the contrary, the major part of the documents from the other departments is more fragile (manuscripts, engravings, drawings, photography, etc.) and cannot be exposed to the light more than 3 months. So we will have to work with different durations and diverse temperatures and humidity constraints: a 19<sup>th</sup> century photography or an illuminated manuscript cannot be presented with the same conditions than an antique coin. According to the presentation that will be adopted, each type of document will be presented with the best adapted conditions. But even for one type, the size can be very different from one document to another. So the glass cases will have to deal with those various sizes.

Another important point to consider is the lighting. The Mazarine gallery has a beautiful and natural light because of several large windows opening on the east. This lighting has to be adjustable, and completed by artificial lightening sources to be adapted to the more or less fragile collections that will be exhibited here.

It is also clear that all the technical solutions that will be adopted for the general presentation must not be an obstacle for the valorisation of the exceptional decoration of the gallery itself, which is also one of the treasures of the site.

All those questions will be debated and decided during the future years to permit in 2017 the opening of a free lap revealing the most precious masterpieces of the National library of France.

## La galerie des Trésors de la Bibliothèque nationale de France

par **Sébastien Gaudelus**, Adjoint au chef de projet Richelieu, Bibliothèque nationale de France

Depuis 2010, le site historique de la Bibliothèque nationale de France, situé rue de Richelieu, a entamé une importante et complète campagne de rénovation qui durera jusqu'en 2017, date de réouverture du site. Occupé et agrandi par étapes successives depuis le début du XVIII<sup>e</sup> siècle, le quadrilatère Richelieu n'avait jusqu'à présent jamais bénéficié de travaux de cette ampleur couvrant l'ensemble du site. La construction du site François-Mitterrand sur les quais de Seine et le déménagement de l'ensemble des collections de livres imprimés et de périodiques vers ce nouveau site en 1998 ont laissé des espaces vacants à Richelieu qui ont permis de lancer cette importante rénovation.

Actuellement, 20 millions de documents extrêmement divers sont conservés à Richelieu dans les cinq départements de collections présents sur le site : Arts du spectacle, Cartes et plans, Estampes et photographie, Manuscrits, Monnaies, médailles et antiques. A la faveur des travaux de rénovation, ces départements vont pouvoir se redéployer dans un bâtiment remis aux normes du XXI<sup>e</sup> siècle, plus confortable, plus sûr et plus ouvert. Mais la BnF n'est pas le seul établissement à bénéficier de cette complète remise aux normes, puisque la bibliothèque de l'Institut National d'Histoire de l'Art, déjà présente sur les lieux depuis 1993, va également pouvoir se redéployer dans et autour de la salle Labrousse, et la bibliothèque de l'École nationale des chartes, actuellement logée dans les locaux de la Sorbonne, rejoint le quadrilatère.

Si la mise aux normes complète du site constitue l'axe principal de cette rénovation, la valorisation des collections en est un autre aspect important.

Il a donc été décidé par la BnF, dans le cadre du parcours de visite des espaces patrimoniaux imaginé par l'architecte du projet, Bruno Gaudin, de transformer l'une des galeries d'expositions temporaires du site en galerie des Trésors de manière permanente. Il s'agit de la galerie Mazarine (classée Monument historique), construite au XVII<sup>e</sup> siècle par François Mansart pour le cardinal Mazarin et décorée de fresques du peintre italien Romanelli sur le thème des *Métamorphoses* d'Ovide.

Cette galerie des Trésors, en accès libre et gratuit, présentera dans une scénographie adaptée aux lieux et aux collections un ensemble de documents exceptionnels des départements du quadrilatère, mais aussi du département de la Musique (situé de l'autre côté de la rue de Richelieu), de la Bibliothèque-Musée de l'Opéra, de la bibliothèque de l'Arsenal et de la Réserve des livres rares et précieux. Une grande place y sera faite aux collections du département des Monnaies, médailles et antiques dont la présentation sera entièrement repensée par rapport à l'actuel musée.



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Cette nouvelle présentation, qui s'inscrit dans un parcours global de visite libre des espaces remarquables du site, implique une réflexion approfondie et pose des questions complexes à résoudre, notamment en termes de conservation.

En effet, les objets des Monnaies, médailles et antiques seront présentés dans cet espace de manière quasi permanente. En revanche, la majorité des documents des autres départements, plus fragiles (manuscrits, estampes, dessins, photographies, etc.) ne peuvent y demeurer que pour une durée limitée à trois mois. Il faudra donc gérer et articuler entre elles de manière cohérente des temporalités différentes et des contraintes de température et d'hygrométrie hétérogènes : on n'expose pas de la même manière des monnaies antiques, une photographie du XIX<sup>e</sup> siècle ou un manuscrit enluminé. Selon la scénographie qui sera retenue, chaque type de document pourra bénéficier de conditions de présentation pleinement adaptées. Mais, même pour un type de document donné, les formats peuvent être très différents. Les vitrines devront donc prendre en compte la taille variable des collections.

Autre élément d'importance : la lumière. La galerie Mazarine bénéficie d'un bel éclairage naturel grâce à une série de baies vitrées orientées plein est. Cette lumière devra pouvoir être modulée et complétée par un apport de lumière artificielle pour s'adapter à la plus ou moins grande fragilité des collections qui seront exposées.

Bien entendu, tous ces dispositifs ne devront pas empêcher la mise en valeur de la galerie elle-même et de son cadre exceptionnel qui représente à lui seul un des trésors du site.

Toutes ces questions seront progressivement précisées et tranchées dans les années à venir pour permettre, en 2017, l'ouverture au grand public d'un parcours révélant pleinement les plus grands joyaux de la Bibliothèque nationale de France.

# The Lascaux Simulator, a Numerical Tool for Preventive Conservation

by **Delphine Lacanette**, Researcher, TREFLE (TRansferts, Ecoulements, Fluides, Énergétique), Inter-institution Laboratory, CNRS, ENSAM, ENSCPB, Bordeaux 1 University, France

## Introduction

Simulation is widely used in various domains such as aeronautics and spatial, iron and steel industry, or environment and sustainable development. Experiments and theory allowed the development of scientific concepts. Nevertheless it is still difficult to access to very small space scales –atomic scales– in molecular dynamics or large ones –light years– in astronomy. The problem is similar concerning time, short times or very long ones –geological scales– are easier to reach by simulation. Besides, simulation is a major tool in non-destructive testing or for the study of fragile backgrounds as the Lascaux Cave. The environmental simulation is useful to study the spreading of pollutants, the movement of air masses or oceans for example, and gives weather forecasts. Simulation concerns very different fields. Numerical simulation in fluid mechanics has a particular interest, it concerns study of air flows, heat and mass transfer, particle transport phenomena taking place in the Lascaux Cave.

## Contribution of the simulation to the heritage conservation

Simulation has a major asset for decision-making in terms of heritage conservation, it is non intrusive. Modifications are tested on the computer, in the cave in a virtual manner, and their influence is evaluated before taking the decision to apply them or not in the reality, in the cave.

The numerical simulation applied to the heritage conservation and more particularly to the Lascaux Cave involves several advantages. Firstly, the simulator has to maintain a scientific high level, rely on the best numerical tools to solve the equations, the best numerical schemes, and the best models, hence a research in physics, for example about the heat and mass transfer at the walls, and more numerical projects, raising complex and new problems to the numerical community.

Secondly, the simulator is also dedicated to the research in archaeology. It is possible to modify the topology of the cave, and to study the repercussion on its climate. The archaeological grounds could be replaced virtually to deduce the flows at this

time, considering the temperature conditions. The opening of the discovery hole has been simulated to display the evolution of the flows in this configuration.

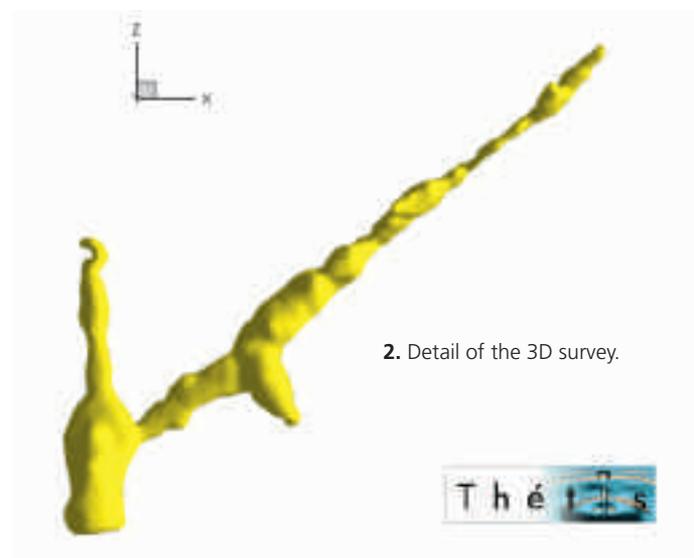
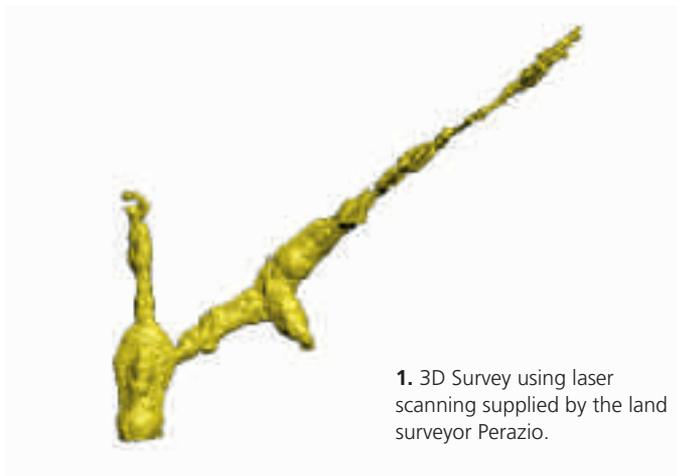
Thirdly, the Lascaux simulator has been conceived to answer the questions of the International Scientific Committee of the Lascaux Cave. It gives information about limited problems depending on the condition of the cavity and the planned fittings. A typical example is the realisation of scenarios about fittings (partitions, scaffoldings) or distribution of human presence in the various areas and in time as a function of the climatic configuration considered.

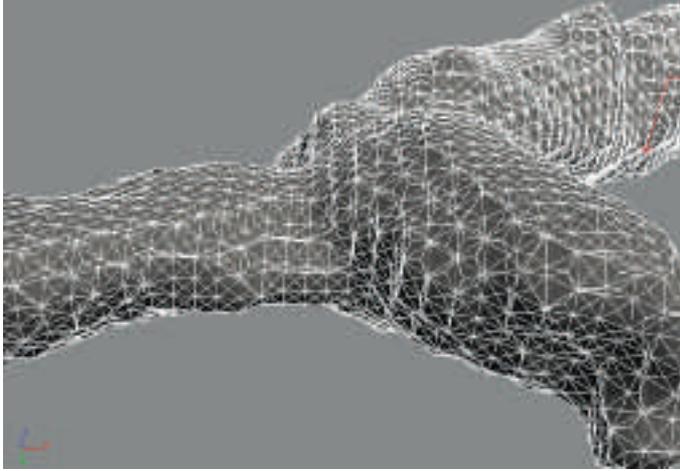
Fourthly, the simulator is also dedicated to the understanding of the climate. It is employed to validate or invalidate hypothesis of modifications of thermal and hydric states of the cavity and contribute to improve the comprehension of the climate of the cave. A typical example is the inversion of the temperatures and its impact on the flows in the cavity.

Finally, the longer-term scope is to extract correlations between the climate of the cave, the microclimate at the walls, and biological developments, to make the Lascaux simulator a predictive tool of the apparition of microorganisms and avoid the conditions favourable to their apparition.

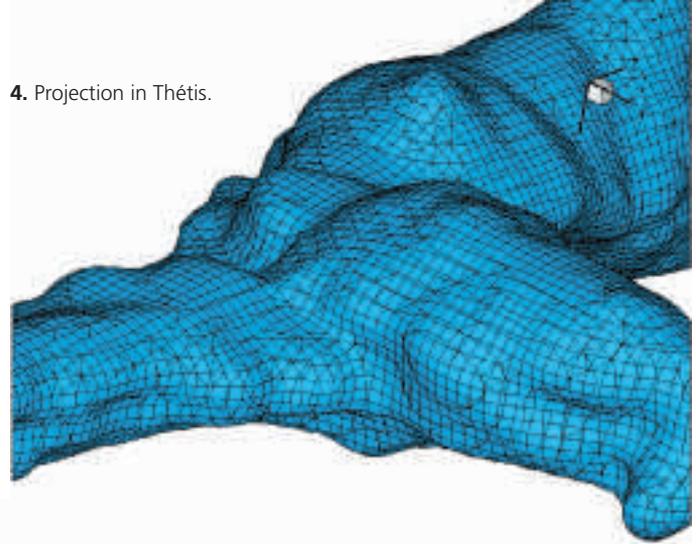
## The Lascaux Simulator

The Lascaux simulator is based on a Computational Fluid Dynamics (CFD) code and takes into consideration the complex geometry of the cave. The first simulations by numerical models allowed to check the relevance of the assumptions selected by the first scientific commission. The various stages of this work make it possible to set up a methodology of help with the conservation. By simulating scenarios having already taken place, assumptions put forth by observation or by analysis of data can be established or cancelled numerically. It was conceived to be applied easily to other painted cavities. The models are common to every underground area, the geometry is the only parameter to modify in the simulator.





3. Detail of the projection in Thétis.



4. Projection in Thétis.

### Mesh: structure of the simulator

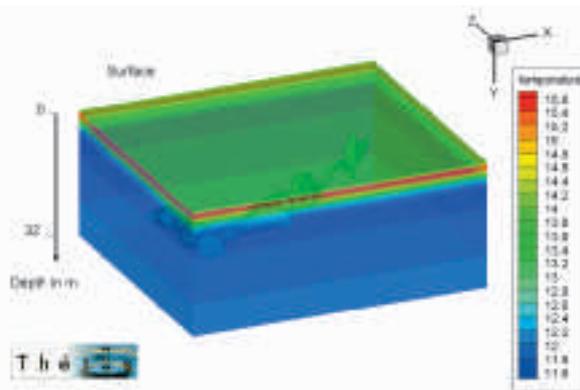
The first step of the simulation is the generation of a mesh which constitutes the basis of the simulator. A three-dimensional (3D) survey has been achieved by the land surveyor Perazio using laser scanning. It is visualised in figure 1 with the software 3Dmax, a computer-generated imagery software. The 3D survey is triangulated on its surface as it can be seen on a detail in figure 2, each triangle is composed of 3 nodes. Then, each node is projected on a cubic mesh of a structured cartesian grid, and the new mesh is shown on the same view as before in figure 3. Finally the projection in our CFD code, developed in the laboratory TREFLE, and named Thétis [1], is presented in figure 4.

On each node of the Cartesian grid composing the mesh are solved the governing equations of the fluid mechanics and the various parameters (temperature, velocities, moisture rate content) are provided on these nodes.

An overview of the Lascaux Cave is presented in figure 5 as it is taken into account in the Simulator in which reference marks of the different places have been added.



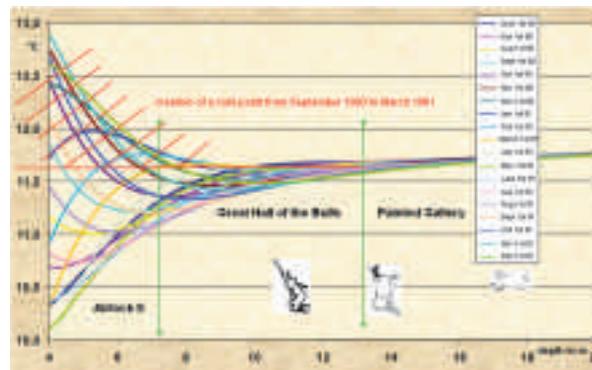
5. General view of the Lascaux Cave in the Simulator.



6. Profile of temperature as a function of depth in the hill surrounding the cave.

### Boundary conditions defined by measurement data

Boundary conditions must be added in the Simulator to create the real conditions of temperature in the cave. In order to take into account more precisely as possible the boundary conditions at the walls of the cave, we consider the surrounding hill and we initialize a temperature gradient extracted from measurement data in it. Thus, each point of the wall of the cave will be associated to the value of temperature corresponding to its depth.



7. Evolution of temperature in the ground as a function of depth from June 1980 to December 1981.

The profile of temperature as a function of depth introduced in the simulator has been calculated thanks to a theoretical Fourier model starting from measured temperatures at the surface of the hill above the cave and is presented in figure 6.

### Improvement of the tool

The numerical tool is in improvement thanks to the requirements of the various applications. The Lascaux case induced a work on the way of considering objects in Thétis. Simple geometrical shapes are not sufficient to describe the complexity of the cave. A numerical method has been settled to project a triangulated surface on a Cartesian volumic mesh. Details are given in ref. [2].

### Choice of two thermal cases of study

Thermal configurations have to be chosen and their corresponding initial conditions and boundary limits introduced in the simulator. Starting from the measurements realised in the cavity for 50 years, we choose cases of study which are typical of periods when the cave had characteristic behaviours.

In the cave, the relative moisture content is constant and near of 100%. In each configuration, the condensing area is the colder zone, in which the air condensates. The location of the condensing area is moving along the cave during the year. It is located at the colder point of the curve of temperature.

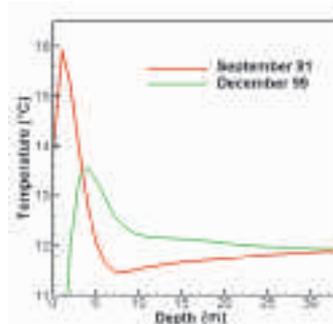
In the thermal configuration of September 1981 when the condensing area reaches the Great Hall of the Bulls, from September 1980 to March, this constitutes a problem of conservation. Figure 7 synthesizes these cases and presents the evolution of temperature in the ground as a function of depth from June 1980 to December 1981. In this figure, it can be seen that creating a cold point in the Machinery Hall from September to March allows the motion of

the condensing area towards the airlock II, by falling the temperature in the less deep area, in the airlock II.

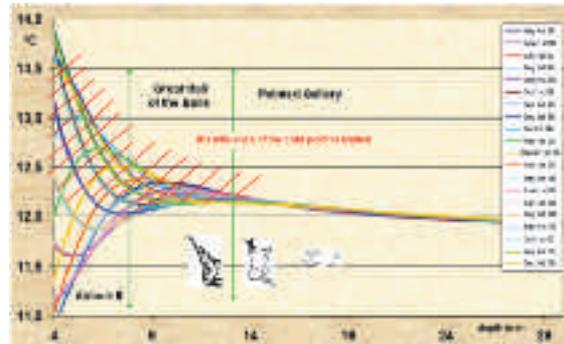
The thermal configuration of December 1999 is approached in figure 8. In this case we are facing a conservation problem in the painted area (Painted Gallery) due to the inversion of the slope of temperature resulting in a different location of the condensing areas compared to the thermal configuration of 1981. It presents the evolution of temperature in the ground as a function of depth from May 1999 to December 2000. The condensation in the Great Hall of the Bulls is limited, there is no action of the machinery in the Painted Gallery, or it would occur to an excessive drying of the air in the Great Hall of the Bulls.

Basing on measurement data and the analysis seen before, we chose two thermal configurations corresponding to two very different periods. The first one is September 1981; at this date the behaviour of the cave is apparently stable. The second one is December 1999, before the works of replacement of the machinery.

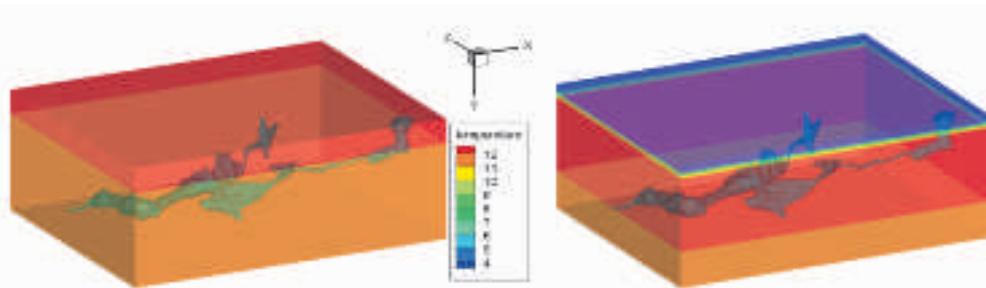
The figure 9 represents the temperatures as a function of depth following a model of conduction of the heat on the surrounding rock. The cave is located between 10 and 20 meters depth, in a zone in which the slope is positive in September 1981 and negative in 1999. Figure 10 shows these two thermal configurations as they are taken into account in the Simulator.



9. Temperature as a function of depth for the two thermal configurations studied.

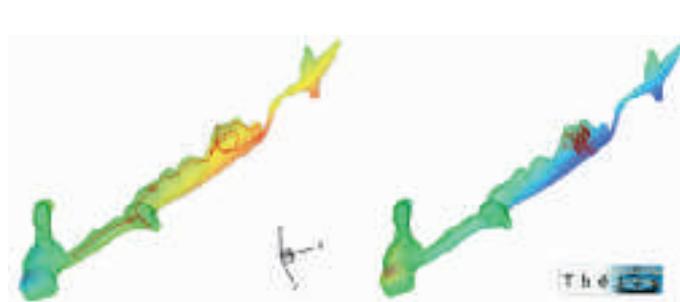


8. Evolution of temperature in the ground as a function of depth from May 1999 to December 2000.



10. Thermal configurations – September 1981 (left) and December 1999 (right).

Figures 11 and 12 outline the trajectory of a virtual particle dropped at the same place for two simulations corresponding to the two thermal configurations. In figure 11 the particle is dropped at the end of the Main Gallery, and in figure 12 it is dropped at the end of the Painted Gallery. For the two cases, in September the particle tends to go to the entrance of the cave,



11. Trajectory of a virtual particle dropped at the end of the Main Gallery for the two thermal configurations – September 1981 (left) and December 1999 (right).

whereas in December 1999 it tends to stay at the end of the right gallery.

An airflow is created by natural convection due to the difference of temperature between the vaults and the ground inside the cave. In September 1981, in the right gallery of the cave the air flow went naturally from the deep places (Main Gallery) to the less deep ones (Lateral Passage) whereas in December 1999 it went from the Lateral Passage to the Main gallery.

Regarding the evacuation of virtual particles the flow in the cave is favourable in the thermal configuration of September 1981, and unfavourable in the thermal configuration of December 1999.

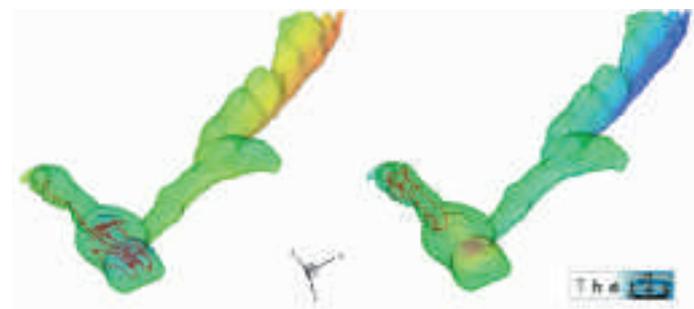
This analysis is coherent with the observations made at these periods in the cavity [3,4].

The validation made here allows to add parameters and to lead scenarios with the Simulator.

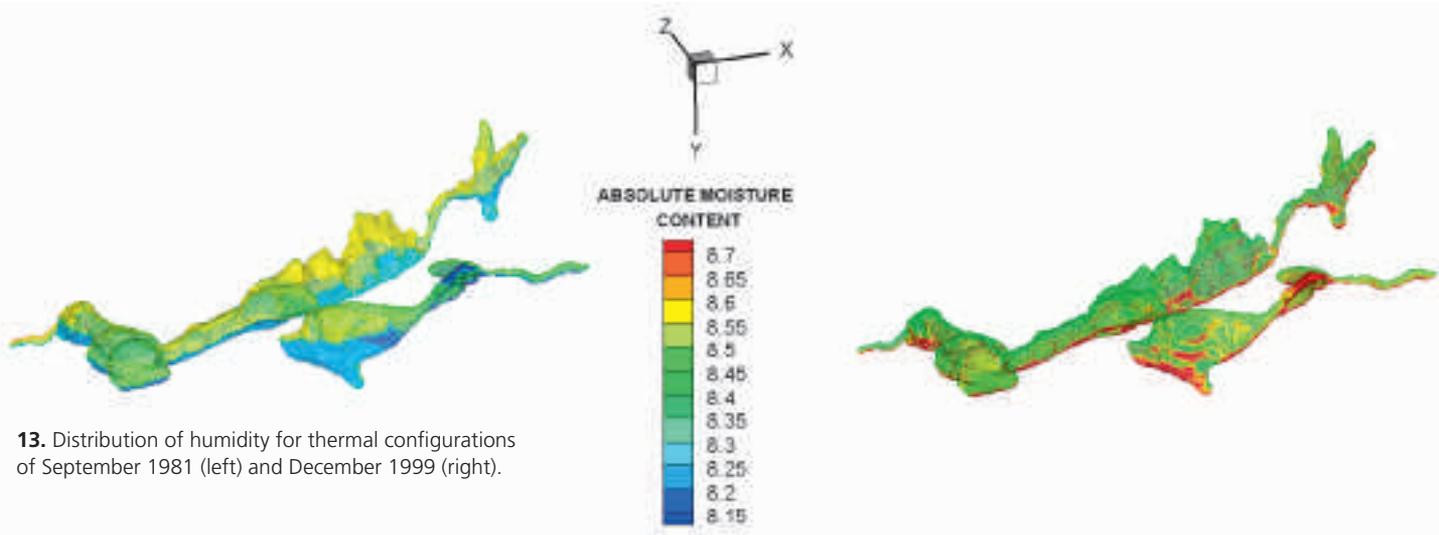
The aim of the simulation is to give information about the precise location of the condensation risk zones. The case presented here corresponds to the configuration without anthropogenic effects. It is meant to serve as a basis for further studies, as the introduction of machinery, human presence, and hot and cold points. Figure 13 shows the

distribution of the absolute moisture content for the two thermal configurations of September 1981 and December 1999. Regarding the moisture content at the walls of the cavity, it is globally higher in December 1999, due to the global warming of temperature in the cave. Besides, it is concentrated in the vaults in September 1981 and on the ground in December 1999.

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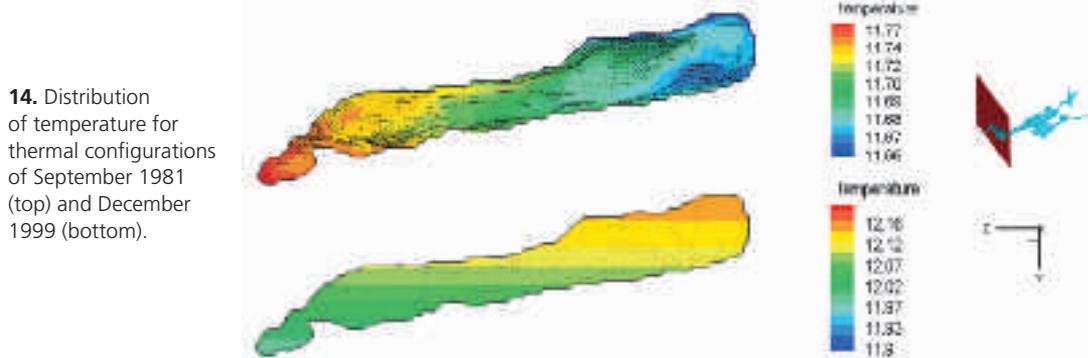


12. Trajectory of a virtual particle dropped at the end of the Painted Gallery for the two thermal configurations – September 1981 (left) and December 1999 (right).

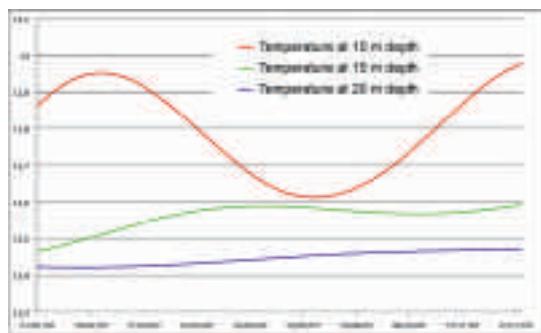


13. Distribution of humidity for thermal configurations of September 1981 (left) and December 1999 (right).

In the slices of figure 14, we can observe the inversion of temperature between the two periods. In September 1981, the vaults are colder than the ground on the cave and convection currents are established with a mean velocity of an average  $\text{cm}\cdot\text{s}^{-1}$ . In December 1999, the ground is colder than the vaults, there is almost no convection currents, the air is stratified and the velocity of an average  $\text{mm}\cdot\text{s}^{-1}$ . The comparison gives an interesting information: velocities in December 1999 were 10 times lower than the velocities in September 1981, due to the inversion of temperatures in the surrounding hill.



14. Distribution of temperature for thermal configurations of September 1981 (top) and December 1999 (bottom).



15. Evolution of temperatures at different depths in the cave during the year 2007.

### Example of the interest of the simulation

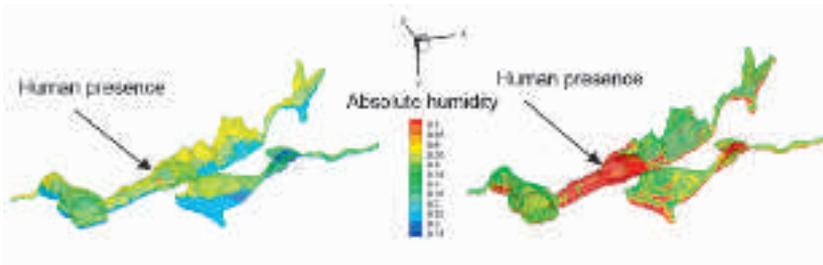
Simulator allowed until today to try scenarios to answer the questions of the international scientific committee of the Lascaux Cave. In order to give an outline of the work achieved with the Lascaux simulator, an event occurred in 2006-2007 is described and the interest of the simulation is shown at each stage. The appearance in 2006 of black stains in the cavity, and particularly in the right-hand side, encouraged the committee to wonder about their origin and the conditions of their appearance. They called for the simulation on the one hand to

visualise the thermal configuration at this time and on the other hand to virtually test fittings. At this time and in the concerned zone, the air velocities when the cave has no disturbance are very low. Indeed the temperature distribution prevents the formation of convections (see figure 15).

The temperature curves generally cross with the seasonal variations. Year 2007 is an exception. The more you go down the cave the more the temperatures are low, whatever the period of the year is. The human activity has been considerable in this area in the months before their appearance. The scientific committee hence wondered about the link between the lack of convection and the appearance of the black stains, and we tried to find a way to recreate them.

Simulations have shown that human presence in this area in which velocities are very low was producing a contribution of humidity and heat the cavity had difficulties to evacuate compared with other periods, as the early 80s when the same amount of humidity and heat was naturally eliminated faster. Figure 16 illustrates this fact, 3 people and 2 neons have stayed in the Lateral Passage during 7 hours. Then this disturbance is removed from the cave and humidity distribution is observed. In the early 80s thermal configuration, the disturbance does not appear, the humidity is homogeneous in the cave, because the velocities are high enough to eliminate the disturbances as they appear. On the contrary, in the late 90s the same disturbance generates an accumulation of heat and humidity in the area, which is not naturally eliminated during the exposure, owing to the low velocities caused by the almost absence of natural convection.

16. Distribution of humidity (g/kg dry air) following a human disturbance in the thermal configuration of September 1981 (left) and December 1999 (right).

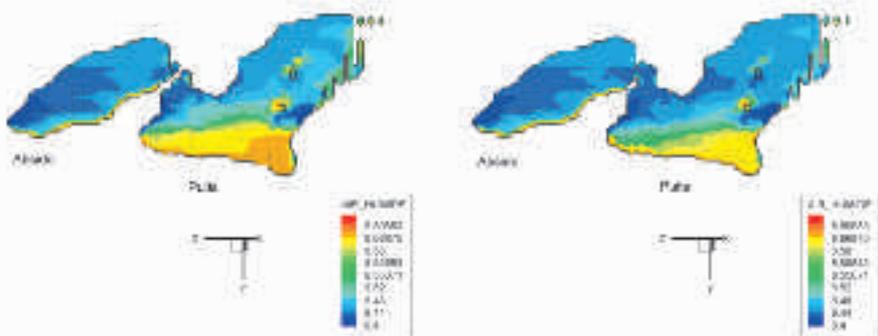


The committee hence wondered about the opportunity of opening the nearby door of the Shaft of the Dead Man to generate an airflow in the concerned area. Simulations have shown that the opening of the Shaft was creating a transfer of the humidity and heat from the area towards the Shaft, protected so far and free from black stains, without improving the airflow significantly in the Chamber of Engravings (see figure 17).

The Lascaux Simulator is an important tool to understand the observed phenomena in the cave. It allows checking the adequacy between measurements, hypothesis and observations. Moreover, it has a key role in the preventive conservation of the cave.

This project lies on the interdisciplinarity. The simulation needs the measurements given by metrology, data of the cave given by surveying, geology and hydrogeology, and analysis of the results by conservation, archaeology, and prehistory experts. It is located at the interface of these fields and constitutes a way to make them all work together.

Concerning the prospects, one of them is a major project of instrumentation and validation, which began in 2009. Poles are located in four places of the cavity, two of them in the Great Hall of the Bulls, one in the Lateral Passage and one in the Chamber of Engravings. Sensors of temperature and air velocity are laid out along the poles to give a description of the airflow and its distribution on a vertical line, which constitutes new information to analyse the air flows much more accurately. Besides these sensors allow the validation of the simulator, comparing measured and simulated parameters, based on the same configuration. The comparison between the measurements and the numerical results improve the measurement technique (choice of the best location to put the poles, search of the disturbances such as interference sources of heat) and refine the numerical models (taking into account the atmospheric pressure for example).



17. Distribution of absolute humidity (g/kg dry air) for the thermal configuration of December 1999 for an open Shaft (left) and a closed one (right).

It has been recommended not to open the door at this time and for this particular issue in order to avoid to contaminate which was not.

Another solution has been virtually tested to find a way to cut out heat and humidity brought by human presence in this area. As velocities are generated by natural convection created by a thermal gradient, several sources of cold are virtually set up in the cave and their effect on the convections is rated.

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### The laboratory cave

Experiments are very difficult to lead in natural sites as caves or rupestrian sites containing mural paintings or engravings. Nevertheless studies have to be headed to understand better these places and improve their conservation. Concerning the simulation in particular, the validation of the models, initial data and boundary conditions request comparisons with experiments. This issue encouraged a team of researchers of the university of Bordeaux to pick a natural, non-decorated cave to lead experiments in it. It is located in the Vézère valley in the south-west of France, a place where many sites have been discovered and studied since the middle of the 20<sup>th</sup> century, and recognized by Unesco as World Heritage. The works surrounding the laboratory cave is part of a larger study concerning the caves of the watershed of the Vézère valley.

The laboratories involved in the project are the TREFLE (*Transferts, Ecoulements, Fluides, Energétique* meaning Transfer, Flows, Fluids, Energetics), PACEA (*de la Préhistoire à l'Actuel : Culture, Environnement et Anthropologie* meaning from Prehistory to recent times: Cultural Heritage, Environment and Anthropology), CNP (*Centre National de la Préhistoire – Ministère de la Culture et de la Communication*, France meaning National Center for Prehistory – Ministry of Culture, France), GHYMAC (*Géosciences, Hydrosociences, Matériaux, Constructions* meaning Geoscience, Hydrosocience, Materials, Constructions) all from the University of Bordeaux.

The major aim is the study of the air/wall interface and the correlation with the internal climate of the cave in a purpose of conservation. The cave has been chosen to fit to every member of the team and its goal.

# Cave of Forgotten Dreams: Filming Secrets

## Interview with Nicolas Zunino, Producer, le cinquième rêve, France

Discovered in 1994 in the south of France and closed off almost immediately by the French government because of its fragility, the Chauvet Cave contains the oldest paintings known to exist (35,000 years old). Today, inside the cave, a very strict protocol of preservation is observed and only scientists are allowed to enter at some conditions. Moreover, the cave is under permanent climatological and biochemical surveillance.

However, the German film director Werner Herzog gained special permission from the French Ministry of Culture and Communication to make a documentary film on the cave, called *Cave of Forgotten Dreams*, to be released during 2011. Making the invisible visible and the inaccessible accessible... Read this interview to know more about these exceptional filming conditions.

### Interview with Nicolas Zunino, French coproducer of the film.

*IPN:* When did Werner Herzog's team get in touch with your film production company, le cinquième rêve, and what for?

*NZ:* I was contacted on January 2010 during filming preparation by the producer Adrienne Ciuffo who asked me to be in charge of on-site coordination and logistics. Then, to organize filming in line with the Cave paintings preservation, I met Dominique Baffier, the Chauvet Cave curator, staff from the French Ministry of Culture and Communication, some scientists and land surveyors from Guy Perazio firm (which made topographic readings of the cave used by the research team). Shooting took one month in all, divided in two steps: the first part was filmed on March during research campaign in order to film the scientific team headed by Jean-Michel Geneste<sup>1</sup> during fieldwork. The second part was filmed on April and focused on the cave paintings.

*IPN:* Which were the conditions for filming?

*NZ:* Once the authorisation delivered by the Ministry of Culture and Communication, filming conditions were established by Dominique Baffier. Only four persons were allowed to enter the cave for two hours maximum each day. Before each entry, the team was required to wear a special suit and shoes that have not been in contact with the exterior to avoid biological exchanges with the cavity as much as possible.

Inside the cave, the team had to film from a narrow metal walkway from which it was not allowed to step out, with battery-powered panel lights that emit no heat to avoid damaging the walls. Because of these very strict rules, cameras had to be re-adjusted after each shooting to obtain the best rendering.

Another preservation constraint was the material size: the 3D cameras had to be highly portable and miniaturized since the

access to the cave is reduced to a narrow opening in which stairs have been installed. That is why it was very difficult to get down the material, all the more so as filming in 3D implies to have two cameras assembled on a rig.

*IPN:* Guy Perazio's land surveyor firm made a 3D recording of the cave for research purposes: were these images used in the documentary?

*NZ:* First, it is important to note the difference between Herzog's documentary 3D images, which are real images filmed in three dimensions, from Guy Perazio's computer generated imagery recreating virtually the cave. The film director chose to include in his documentary a sequence from one of their video: a virtual walk inside the cave through 3D point cloud model, in order to illustrate what topographic readings are. Of course, 3D modelling can give a much better and highly realistic rendering than showed in the film.



Werner Herzog during filming in the Chauvet Cave.  
© Marc Valesella

**Conclusions:** Indeed, the 3D modelling of heritage sites or objects is a really interesting application in the conservation field since it provides lots of information that can be analysed without damage and allows "virtual operations" such as virtual restoration or digital simulations, particularly regarding climatology (See the paper "The Lascaux Simulator, a numerical tool for preventive conservation", p. 30).

*Cave of Forgotten Dreams. A Creative Differences production, in participation with the French Ministry of Culture and Communication, in co-production with Arte France, in association with More 4. Produced by Erik Nelson, Adrienne Ciuffo. Executive producers, Dave Harding, Julian P. Hobbs, David McKillop, Molly Thompson. Co-producers, Amy Briamonte, Phil Fairclough, Judith Thurman, Nicolas Zunino. Directed, written by Werner Herzog.*

### For more information:

- Chauvet cave website: <http://www.culture.gouv.fr/fr/arcnat/chaudet/fr/index.html>
- Guy Perazio website: <http://www.perazio.com/>

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[http://www.persee.fr/web/revues/home/prescript/article/bspf\\_0249-7638\\_2005\\_num\\_102\\_1\\_13351](http://www.persee.fr/web/revues/home/prescript/article/bspf_0249-7638_2005_num_102_1_13351)

1. Jean-Michel Geneste is Director of the *Centre national de la Préhistoire*, curator of the Lascaux Cave and head of the Chauvet Cave scientific team.

# Chronicles of Preservation

## Traditional Papermaking in Bhutan: Raw materials, Techniques and Use

by Luis Crespo Arcá, Senior Book and Paper Conservator, Restoration Laboratory, National Library of Spain

### Cultural and Historical background

Bhutan is a small kingdom, isolated in the eastern Himalayas between India and China (Tibet area in fact) as big as Switzerland but with a lesser extent population. It is a charm country with breathless landscapes, mountings, forests, imposing architecture and superb art. It has been said many times that Bhutan may be considered as a sort of Shangri-la for the occasional visitor. At the present moment 80 percent of the population is engaged in agriculture or raising livestock so Bhutan remains a rural country nearly devoid of industry except in the South. The foreigner gets out of breath with the multitude of Bhutan's religion symbols: impressive monasteries (well, it should be much more proper describing them as fortress, looking like the well-known Potala Palace at Lhasa, Tibet), plenty of fluttering prayer flags, huge prayer wheels on river flows ringing as water runs under them, humble *Chortens* (community commemorative monuments) on the rice fields and so on.

The Bhutanese are proud-hearted of their cultural and religious heritage, as well as they are proud of their traditions. They had never been colonized. This is an important fact in order to understand their point of view about foreign ideas: using common sense (the most uncommon of senses, in author's humble opinion) they accept only those ideas and concepts that may help them to improve their way of life and to develop the country within the framework of their own traditions. Because of this, they continue to follow customs that many other countries would criticize as archaic. Some years ago, former King Jigme Singye Wangchuck, said that he was worried about "the gross of national happiness". This thought expresses an absolutely different point of view on life opposed to that adopted as normal in most of the developed countries.

Because of that sense of connection with their unique old traditions, they keep teaching and working on them. In Bhutan there are thirteen traditional arts known as *zorig chusum* (*zo* = the ability to make, *rig* = science or craft, *chusum* = thirteen). These practices or traditional crafts have been gradually developed through the centuries, often passed down through families with long-standing relations to a particular craft, representing hundreds of years of knowledge and ability. The great 15<sup>th</sup> century treasure finder, Pema Lingpa, is traditionally credited with introducing the arts into Bhutan. In 1680 a major Bhutanese character, Shabdrung Ngawang Namgyal, ordered the establishment of the school for instruction in the 13 traditional arts. Although the skills existed much earlier, it is believed that the *zorig chusum* was first formally categorized during XVII century. The thirteen traditional arts are: Woodworking, Carving, Stone carving, Painting, Clay arts, Metal casting, Woodturning, Blacksmithing, Gold and silver works, Basketry, Needlework, Weaving and Paper-making.

At the present moment there are two state-sponsored schools devoted to the Thirteen Traditional Arts and Crafts. The school's instructors are passing down time-honored cultural skills to their students who will further perpetuate these traditions in Bhutan.

### The art of De Zo: Raw materials and Manufacture techniques

The art of paper making is called *De Zo* or *Desho* in Bhutanese. Handmade papermaking production has been traditionally confined to villages that need to undertake alternative income generating activities. Villagers collected and peeled the bark from the trees, after those raw materials are tied up in bundles and carried home for subsequent papermaking or sale to other paper manufacturers. At the present moment there are several manufacturers throughout the country like Jungshi Hand-made Paper Factory and Kabijisa (both in Thimphu – capital and main city of Bhutan), and other papers factories like Chorten Kora, Raptay (both in Trashiyangtse), Chazam, Shingkar Lauri, Radhi or Thramgom - Khaling.

Bhutan has five species of *Daphne* and one of *Edgeworthia*. All six are found throughout the country, but their distribution and frequency varies. In traditional paper making two are the main kinds of barks in use: *Dhenap* (*Daphne*) and *Dhekap* (*Edgeworthia*). The demand for *Daphne* in order to produce local paper is very high, thus, more businessmen are applying for licenses to establish local paper factories. The volume of raw materials required for an individual unit varies, depending on its size and the number of workers available. Some owners prefer to operate a small unit for a few years to produce only a few hundred sheets of local paper for a specific purpose. Others intend to operate large enterprises on a continuing basis. The method of paper processing, therefore, varies from one paper "mill" to another.

In Bhutanese traditional papermaking the inner bark of plants is peeled from the stalk of the shrub by women (fig.1), the bark is then soaked in water to wash off the outer layer and the residue of dirt and then let to dry in the sun. Once it is dried, the outer hard layer of the bark is peeled off pulling apart impurities from barks, leaving only the soft inner tissue of the bark that is again soaked in water, subsequent processes are boiling cortexes mixed with ashes through a long cooking process (braising) for two days, rinsing, pestling, airing and finally, beaten to a fiber. Years ago this process was done by hand but at the present moment a Hollander beater seems to be of common use in most important Bhutanese factories. While some may think that the best paper comes from the vats containing only pulped fiber and water, there are many beneficial chemical



1. Women peeling the bark of wet raw plants. Depending on the quality of the original fiber and the beaten process, at least two different grades of paper are obtained. Jungshi Hand-made Paper Factory, Thimphu. Bhutan.

additives which are used in hand papermaking. These materials are added to the pulp either during the mixing stage or in the vat itself before sheet forming.

In Bhutan, like in some other countries, papermakers add a kind of glue or mucilage to the fibers dispersion. It primarily changes the viscosity of the water, but it does not allow the fibers to stick together. It is an essential component obtained from the roots or barks of various plants being used as a formation aid. The main plants to obtain this mucilage are *Kazura japonica*, *Firmiana platanifolia* and *Hibiscus esculentus* (okra). These products work like the well known Japanese natural mucilage called *Neri* (obtained from *Tororo Aoi* roots). *Neri* is the general Japanese term for the clear, thick, slippery, viscous formation aid which is used to slow drainage through the screen of the mould. It is an indispensable component in fiber dispersion in making *washi* paper using the *nagashizuki* method. It increases the viscosity of water thus slowing the drainage rate. It also coats the beaten fibers and the exposed fibrils thus creating a hydrated layer that prevents direct contact between the fibers. Because natural *neri* is heat sensitive and loses its viscosity as temperatures rise, these days there is also in use a synthetic or chemical *neri* called *kagaku neri*. Chinese and Korean papermakers used some other natural sources of formation; also some Western papermakers use okra and similar substitutes to meet the crucial high quality of the handmade papers so produced.

There are a variety of moulds used for papermaking. They can be summarized into three basic categories: cloth screens affixed to a wooden frame, flexible screens which are removable from a wooden structure, and metal screens affixed to a wooden frame with a removable wooden deckle. The first of these categories is the type generally believed to be the earliest process

used for papermaking manufacture. Its use continues today in Asia, particularly in China, the Himalayas, and Southeast Asia. This type of mould is floated in a vat or open body of water, the pulp is poured onto the partially submerged screen and distributed across the surface water – the mould is not dipped into the fibrous water with the fibers dispersion - then the mould is pulled from the water and set out to dry. The screen and the pulp are then left to dry, which takes half a sunny day, the fiber becomes a thin sheet of translucent paper that is peeled off and is ready for use. As paper dries directly on the cloth, a certain number of moulds of this type are required for any volume of paper to be made. These moulds can be used multiple times in a given day depending on climatic conditions and the thickness of the paper. In Bhutan the paper so produced is called *Resho* (cotton paper).

In Bhutan, the second method is also in use: flexible screens are removable from a wooden structure, a significant improving method to obtain thinner papers. In this the craftsman stirs the pulp in a vat of water, dipping the mould into the vat. The mould consists of a rigid frame with a fine flexible screen made with a bamboo mat on top. The sheet is couched and the bamboo mat peeled off the wet sheet. The principle at work is that the screen, which can be rolled in one direction, can be removed from the frame once the sheet is formed, and curved to transfer the paper from the screen to another surface (Fig. 2). After the transfer, the screen can be returned to the frame and reused, over and over again. This method of papermaking is defined as a 'flowing' or 'discharge' method of making paper. It



2. Workers placing the sheets of paper freshly made on the stacks of paper using flexible screens made of bamboo. Jungshi Hand-made Paper Factory, Thimphu. Bhutan.

lends itself to the production of strong, translucent thin sheets of paper as well as papers with a wide variety of thicknesses and characteristics. The flexible screen also aids in the transfer of these sometimes delicate papers to a stack or “post” of newly formed sheets. The papers stacks are later pressed and brushed onto zinc heated sheets to dry. This kind of paper is called *Tsasho* (bamboo paper) in Bhutan. This process has been adopted by other highly specialized papermakers at other different countries. As far as the author knows this second method seems to be unique from Bhutan at the Himalayas Area, being directly linked with the Japanese *nagashizuki* method for the production of the fine Japanese papers called *washi*.

Regardless of the manufacture process chosen, Bhutanese paper is of excellent quality and impervious to insects’ attacks, besides none of these papers are sized because their fibers are naturally non-absorbent. This fact makes these papers ideal for pen & ink and a range of printmaking techniques. In the following chapter details are given about the traditional uses of these papers as well as some other present purposes.

### Use

*De Zo* was confined for monastic function in the past. Most paper was used to write on them the teachings of Lord Buddha. Transmission and preservation of the Buddhist scriptures in those countries of Buddhism influence played a major role in developing media to preserve, especially in the historical books. Manuscripts on birch bark and palm leaf prevailed in India for over a thousand years before the introduction of paper in the thirteenth century. Thereby Buddhist scriptures books perpetuate the horizontal format and other features of Indian books, though the paper was in general use.

Bhutanese culture shares many aspects of Tibetan culture because of their proximity and historical connection due to innumerable attempts from Tibet of invasion and annexation of Bhutan by past centuries. Result of this common history is also sharing many cultural and religious aspects. Some are rapidly noticeable, for example in the architecture of monasteries or, in a matter of our interest such as the formats of the books: both Tibetan religious books as those from Bhutan mimic the general shape of much older books on palm leaf and birch bark, remaining almost identical in format as well as in “writing” techniques, whether in the form of manuscripts or printed texts using wood block-printing techniques.

The term “book” should be used carefully when describing these traditional structures because they do not have any similarity with western bookbinding. As has been stated above, this Sanskrit binding format has its origins in Indian palm leaf Sutras being adopted by other countries at the Himalayas. Because of its structure, these sorts of book are named as “long-striped books” at these countries. They are made up of many pieces of long-striped paper cut in the same size, generally issued as unbound stacks of long, narrow paper leaves with two loose boards as covers. These wood covers may have some fine and impressive carvings. Typical leaf dimensions are roughly 8 x 40 centimeters but there are some other volumes significantly bigger (Fig. 3). The long edge of the leaves corresponds to the



3. The author with a collection of sacred books over two hundred years old from a small monastery in a remote village nearby Wangdi Phodrang. All books are wrapped in special fabric and tied in a way characteristic. Note the thickness of the book and the perfect state of preservation of its papers.



4. Sacred books wrapped and placed on wooden shelves richly decorated with paintings and Buddhist religious symbols. Note the second wrapping system over the thick wood covers of books. They help protecting the already wrapped block of sheets keeping them tightly tied. National Library, Thimpu. Bhutan.

western “spine”, so that the resulting bound volume is essentially shaped like a brick, and functions like one too. Books are wrapped and protected with different colors clothes made of fine silks (Fig. 4).



5. Inside the National Library in which one can observe an altar containing several sacred images. On both sides of the altar are the shelves that house the holy books with the Buddhist teachings which are deeply revered by the people of Bhutan. National Library, Thimphu. Bhutan.

A great collection of religious books with a diversity of formats may be seen at Bhutan National Library. This institution houses a collection of traditional texts and was consecrated as a *Lhakhang* or temple in order to provide a spiritually appropriate environment for these religious books which form the bulk of the collection. It is not uncommon to see people circumambulating the National Library building and chanting mantas. This is because the building houses these holy books (Fig. 5).

In addition to books, Bhutan paper has been traditionally used in relief printing, wood block and silk-screen methods as well as as a support to write prayers and mantras. Both kinds of papers, *Resho* and *Tsasho*, are highly durable and permanent so at the present moment they are opening to new purposes like bookbinding, stationery, gift wrapping, greeting cards and artist books. Some western and Indian companies are introducing it for conservation and restoration purposes. Both *Resho* and *Tsasho* newly made papers have a creamy color, containing small pieces of solid pulp with dark impurities. *Resho* paper finishing is more coarse and therefore of inferior quality. *Tsasho* papers are thinner and of noticeably higher quality than *Resho* but still contain clusters of pulp fibers. Comparing Bhutanese papers with the high quality of other Asian papers as those from Japan or China - widely used in Book and Paper Conservation Laboratories -, it is worth mentioning that these papers are not useful for Western paper conservation purposes.

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### Appointment of Deborah Novotny to the post of Head of Collection Care at the British Library



Deborah Novotny has been appointed to the post of Head of Collection Care at the British Library. She takes up the post at the beginning of August 2010. She is a new member of the IFLA-PAC Advisory Board.

Deborah will play a significant role at a key moment in the history of the library and will shape, co-ordinate and oversee the implementation of the BL's strategic programme of preserving the physical and digital collections, taking into account the needs of users now and in the future. This strategic role will steer the provision of care of the British Library's collection, through the leadership of the Library's Conservation team, the newly created Strategy and Compliance team, the Conservation and Preservation Research team and the Preservation Advisory Centre.

Deborah has over thirty years of experience working both privately and publicly within the conservation and preservation field. She started her career in 1976 at Camberwell School of Arts & Crafts and was one of the first women to hold a union card allowing her to work in the trade as a forwarder. Deborah ran her own business for many years before joining the British Library in 1989 where she initially managed the Printed Books Conservation studio before becoming the Head of Preservation in 2002. Deborah has lectured widely on preservation related topics both nationally and internationally and brings a wealth of experience to the role. Deborah has said "The role of Collection Care is fundamental to the changing needs of the BL and is currently undergoing a major internal transformation mainly as a consequence of the expanding digital agenda. I see my role as creating and steering the new policies needed to maintain and safeguard our ever-growing collections as well as making sure that we develop new expertise and have the right mix of skills in place to be able to address these emerging issues whilst also ensuring that more traditional skills are not overlooked."



### Conservación preventiva y Plan de Gestión de Desastres en archivos y bibliotecas

El Instituto del Patrimonio Cultural de España publicó recientemente un documento electrónico sobre *Conservación preventiva y Plan de Gestión de Desastres en archivos y bibliotecas* que se puede consultar en este enlace: <http://www.calameo.com/read/00007533559904d38d748>

### New issue of *Restaurator*: Proceedings of "Water Impact on Library, Archival and Museum Materials", 2<sup>nd</sup> IFLA-PAC Conference on Preservation and the Four Elements, 29-31 October, Prague, Czech Republic

The December 2010 issue of *Restaurator* has just been released: it publishes the proceedings of the 2009 conference on "Water Impact on Library, Archival and Museum Materials", organized by the National Library and the National Archives of the Czech Republic in Prague. It was the second conference of the cycle initiated by the IFLA-PAC programme studying the impact of the four elements on cultural heritage. The first one, held in Paris in March 2009, was dedicated to Air. Earth and Fire will be dealt with in a unique conference which will be announced soon.

*Restaurator*. Volume 31, Issue 3-4, December 2010  
ISSN (Online): 1865-8431  
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To order a copy: <http://www.reference-global.com/toc/rest/31/3-4>

### Announcements

#### International Conference on Digital Libraries and Knowledge Organization (ICDK 2011), 14-16 February 2011, Gurgaon, India

##### Organizers

Management Development Institute (MDI), Indian Association of Special Libraries and Information Centres (IASLIC), INDEST-AICTE Consortium, Indian Institute of Technology (IIT), Delhi

##### Associates

UNESCO  
Goethe-Institut, Max Mueller Bhavan

##### Themes

- Digital Libraries Development
- Tools and Techniques for Managing Digital Repositories
- Digital Resource Management Strategies
- Evaluation of Digital Libraries
- Content Development: Tools and Techniques
- Digital Library Consortia
- Cultural Issues of Online Services
- Technology Issues in Online Services
- Standards and Specifications for Digital Objects
- Metadata Standards, Interoperability and Crosswalks
- Case Studies of Digital Libraries and Institutional Repositories
- Multilingual Digital Libraries
- **Digital Preservation Strategies**
- Web Retrieval Tools and Strategies
- Information Retrieval in Indian Languages
- E-learning
- User Interface and Patron Interactions Tools
- Open Source Software Tools for Digital Library Development
- Open Access Initiatives, Open Access Repositories
- Open Access for Scholarly Contents
- Information Management Using Web 2.0/3.0 Technologies
- Social Networking Tools for Information Services
- Knowledge Organization Techniques
- Knowledge Representation Models
- Knowledge Management
- Emergent Techniques for Search Algorithms and Context Sensitive Indexing
- Semantic Web Technologies for Knowledge Representation and Management
- Ontologies and Approaches to Building Ontologies

Contact:  
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More information at: <http://www.mdi.ac.in/ICDK/Home.html> for more details on registration, etc.

**"Impact: redefining the measurement of collection care", Preservation Advisory Centre Conference, 15 February 2011, British Library Conference Centre, London, UK**

Digitisation, digital collecting, rising energy costs and the changed economic climate have prompted many organisations to rethink their approach to collection care. This one-day conference questions what we seek to achieve from collection care activities now and in the future, how we communicate our goals, and whether we have the evidence and metrics to effectively support the arguments we make. We invite you to shape the debate. Following presentations on the context for collection care, the role of evidence and examples of methodologies in practice, the afternoon features round table discussion sessions on the themes 'Changing times: changing strategies' and 'Challenging collection care'.

More information on the programme and fees at:  
<http://www.bl.uk/blpac/impact.html>

More information on the events organized by the Preservation Advisory Centre Conference at:  
<http://www.bl.uk/blpac/events.html>

**IFLA Newspaper Conference, "Newspaper in Multiple Scripts and Multiple Languages: Issues and Challenges for National Heritage", 25-27 April 2011, Kuala Lumpur, Malaysia**

The Conference is co-organized by the National Library of Malaysia, Librarians Association of Malaysia and IFLA Newspaper Section.

Libraries the world over are facing the dual challenges of preserving the printed newspapers as part of the culture of countries, and responding to the changes that new technologies bring on to managing both printed and online (born digital) newspa-

pers. Rapid advancements of digital technologies affect the various aspects relating to newspapers in libraries and archives such as acquisition, collection development, access, storage, preservation of newspapers and their contents, and interlibrary lending.

The purpose of this conference aims not only at the sharing of collective knowledge about how libraries can tackle these challenges but also to open up opportunities for libraries, librarians and associated industry players to interact with one another and work out suitable partnerships that will help to improve the provision of newspaper services at libraries.

At this dedicated arena for professionals in the industry, delegates will gain valuable insights, exchange ideas, explore opportunities and build new networks and strategic alliances.

Conference fees:  
Delegates: US\$200

More information at:  
[www.pnm.gov.my](http://www.pnm.gov.my)

**European Research Centre for Book and Paper Conservation-Restoration Conference, "New Approaches to Book and Paper Conservation-Restoration", 9-11 May 2011, Horn, Austria**

From 9<sup>th</sup> to 11<sup>th</sup> May 2011, there will be a start-up conference "New Approaches in Book and Paper Conservation-Restoration in Europe" in Horn, Austria.

The conference in Horn aims to bring together conservators, librarians and archivists, collection managers and many more professionals in the field of book and paper conservation-restoration who fight for the safeguarding and maintenance of our cultural book and paper-heritage from all over Europe and even further countries. There will be over 50 speakers from 28 different countries. During the entire conference experts on funding programmes will also be present. The conference language will be English.

The main question the conference puts forward is: what is needed to preserve our heritage? From the papers handed in, one can already see the variety of problems ranging from conservation theories, to the use of materials which are still not available but are on the wish list, and to further education.

Registration  
Conference fee: 180.00 EUR  
Registration on line at: <http://www.european-research-centre.buchstadt.at/>

Contact:  
European Research Centre for Book and Paper Conservation-Restoration  
Wienerstraße 2  
3580 Horn  
Austria  
Tel: 0043(0)6505871877 I  
0043(0)2982 200 30 31  
e-mail: [ercbookpaper\(at\)gmail.com](mailto:ercbookpaper(at)gmail.com)

To consult the conference programme and for more information:  
<http://www.european-research-centre.buchstadt.at/>

**39<sup>th</sup> AIC Annual Meeting on "Ethos, Logos, Pathos: ethical principles and critical thinking in conservation", 31 May – 3 June 2011, Philadelphia, USA**

The theme for the 39<sup>th</sup> Annual Meeting of the American Institute for Conservation of Historic and Artistic Works (AIC) is "Ethos, Logos, Pathos: ethical principles and critical thinking in conservation".

The goal of this year's meeting is to examine how ethics, logic, and perception guide conservation decisions. Assumptions long held in the practice of conservation are being challenged by the modern world. How are the issues of: environmental sustainability, economic drivers, art as entertainment, the use of cultural heritage, and public access concerns changing the practice of conservation? Do the core values of conservation still hold? We will examine existing assumptions about the way conservation decisions are made and the changing environment in which these decisions are taken today. For example, do the core values of conservation still guide conservators presented with the challenges of preserving new media? Does the increasing trend in collecting institutions towards outsourcing conservation services affect the long term preservation of cultural heritage? What is the impact of these changes on conservation education today?

Registration fees  
Members: \$299

More information at:  
[www.conservation-us.org](http://www.conservation-us.org)

## LIBER 40<sup>th</sup> Annual General Conference, "Getting Europe ready for 2020: the library's role in research, education and society", 29 June - 2 July 2011, Universitat Politècnica de Catalunya, Barcelona, Spain

The LIBER 40<sup>th</sup> Annual Conference will take place from 29 June to 2 July 2011 at the Universitat Politècnica de Catalunya (UPC) in Barcelona. There will be a varied conference programme organized under the main theme of "Getting Europe ready for 2020: the library's role in research, education and society".

The conference will focus on the following topics:

- Opening up access to content through (mass) digitisation
- Innovative business models for dissemination of scientific data
- Measuring the impact of scholarly communication
- User behaviour and the users' demand for services
- Enhancing the resource discovery experience
- Advancing information literacy and skills
- Digital preservation
- Mobile devices and applications
- New roles and partnerships
- Marketing research libraries

Important dates:

Conference registration: 15 February 2011

Final registration deadline: 1 June 2011

Registration:

LIBER member: 190 €

Non-member: 380 €

Contact:

For organization: [info.liber2011@upc.edu](mailto:info.liber2011@upc.edu)

For registration or accommodation: [liber2011@activacongresos.com](mailto:liber2011@activacongresos.com)

More information at: <http://bibliotecnica.upc.edu/LIBER2011/>

## Reports

### Report on the Asian Seminar on "Preservation and the Four Elements: Air, Water, Earth and Fire", 21-24 June 2010, Beijing, China by Noriko Nakamura

Asian Seminar on "Preservation and the Four Elements: Air, Water, Earth and Fire" was held from the 21<sup>st</sup> to the 24<sup>th</sup> of June in Beijing by the National Library of China. It was a conference in the framework of the cycle "Preservation and the Four Elements"



The opening ceremony: (from left to right) the interpreter (National Library of China), Park So Yeon (PAC Korea Centre), Zhang Zhiqing (Director of PAC China Centre), Noriko Nakamura (Director of PAC Asia Centre), Chen Hongyan (Deputy Director of PAC China Centre).

organized by IFLA/PAC. The seminar had about sixty participants, from IFLA/PAC Regional Centre for Asia, IFLA/PAC Korea Centre, and libraries, archives and museums of China, Hong Kong, Macao, and Taiwan. At the opening, Mr. Zhang Zhiqing, director of IFLA/PAC China Centre, Ms. Noriko Nakamura, director of IFLA/PAC Regional Centre for Asia, and Ms. Park So Yeon, representative of IFLA/PAC Korea Centre director, delivered addresses.

This was followed by each centre reporting on its activity. The Director of IFLA/PAC Regional Centre for Asia gave a report on preservation environment control based on IPM and its management, the formulation of principles to protect materials from disaster and preservation training and other programs. The representative of the Director of IFLA/PAC Korea Centre made a communication on the establishment of IFLA/PAC Korea Centre in 2008, the construction of the Conservation Centre and the preservation training program. Ms. CHEN Hongyan, Deputy Director of the PAC China Centre, reported mainly on the Chinese Ancient Books Preservation Project.

Under the theme "Preservation and the Four Elements: Air, Water, Earth and Fire", five reports mainly on the preservation environment and four reports mainly on disaster were given.

First of all, Mr. Zhang Xin, Deputy Chief of the Sichuan Provincial Archives, gave a report on the rescue of the Beichuan Archives damaged by the Wenchuan Earthquake in 2008. Showing pictures of great damage to the Beichuan Archives, he reported that the rescue of the damaged materials was conducted under the leadership of his organization.

Ms. Satoko Muramoto (National Diet Library) gave a report on the countermeasures against pest and mold damage based on IPM (Integrated Pest Management) which were taken by the NDL for the control of the preservation environment. She stressed that management role such as communication in the library to control the preservation environment by IPM was really important.

Dr. Nobuyuki Kamba (Tokyo National Museum) reported that the TNM had made a systematic investigation of the atmospheric contaminants in storages and exhibition rooms for five years. Based on the result of the investigation, the TNM plans to establish a guideline on the allowable concentration of indoor atmospheric contaminants, for sustainable environment control.

Ms. Lee Sung Eun (National Museum of

Korea) reported on the preservation environment and the control of the exhibition hall and storage in the new facility built in 2005. Ms. Park So Yeon (National Library of Korea) made a communication on Inergen gas fire extinguishing system, the electromagnetic wave interception system, and the energy-saving and high efficiency preservation environment system in the digital library storage which was opened in 2009 as one of the NLK facilities. She added that continued research on the preservation environment was necessary.

Ms. Liu Jiazhen (Wuhan University) gave an outline of the status of paper materials preservation in China. A most interesting observation was that in temples there were a lot of paper materials damaged by insects because of a religious taboo on killing living things.

Mr. Tao Qin (Institute of Science and Technology of the State Archives) made a report mainly on the specific procedure to restore paper materials water-logged by flood and the like, based on laboratory experiments and case studies.

Mr. Du Weisheng (National Library of China) presented a paper on the method to dry out water-logged materials, based on their experiences.

Mr. Lin Ming (Deputy Director of the Sun Yat-Sen University Library) reported the results of a questionnaire on disaster preparedness conducted in big libraries in Mainland China. The result of this questionnaire showed that their preparedness for disaster was not enough and that they had not drawn up disaster plans yet.

The Chinese reports above showed that Chinese libraries and archives were very interested in disaster management.

As one part of this seminar, we visited "The Special Exhibition of National Precious Ancient Books" held in the Exhibition Hall of the NLC and the Library of Ancient Books, a branch library of the NLC, which had the Wen Jin Engraving Printing Museum and the Laboratory of Ancient Books Protection which is equipped with numerous up-to-date analytical instruments.

The Participants from China, Japan and Korea, who had been conducting preservation activities in a similar climate under Global Climate Change, shared the issues on preservation environment, disaster and disaster preparedness with each other and discussed them. It was a really meaningful interchange. In addition, this seminar made us think about preservation issues from a variety of perspectives because the participants were not only from libraries but also archives and museums. We hope Asian libraries, archives and museums will share more information on preservation and continue these preservation activities in the future.

The minutes of this seminar will be published very soon.

The NLC website:

[http://www.nlc.gov.cn/en/services/iflapac\\_chinacenter](http://www.nlc.gov.cn/en/services/iflapac_chinacenter)

[http://www.nlc.gov.cn/en/2010/0629/article\\_165.htm](http://www.nlc.gov.cn/en/2010/0629/article_165.htm)

# PAC CORE ACTIVITY

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