HERITAGE VALUES AS THE BASE FOR THE DEVELOPMENT OF A MONITORING SYSTEM, THE CASE OF CUENCA - ECUADOR

VALORES PATRIMONIALES COMO LA BASE PARA EL DESARROLLO DE UN SISTEMA DE MONITOREO, CASO DE CUENCA-ECUADOR

Verónica Heras-Barros
Facultad de Arquitectura y Urbanismo
Proyecto vlir*CPM* - Universidad de Cuenca (Ecuador)

Abstract:

Preservation of cultural heritage is linked to regular maintenance and a continuous monitoring; both activities define preventive conservation. This paper discusses the conceptual model for a value-based monitoring system as a support to preventive conservation practices in World Heritage Properties. The paper was illustrated for the city of Cuenca and gives an insight into requirements and potentials of a system that aims to support informed decision and management strategies.

Keywords: *Preventive conservation, monitoring system, data model, heritage data.*

Resumen:

Conservación del patrimonio cultural está vinculada a un mantenimiento regular y un monitoreo continuo; ambas actividades definen la conservación preventiva. Este artículo discute el modelo conceptual de un sistema de monitoreo basado en valor patrimoniales como soporte a las prácticas de conservación preventiva. Esta investigación fue realizada en la ciudad de Cuenca y da cuenta de las necesidades y potencialidades de un sistema monitoreo que tiene como objetivo apoyar las estrategias de toma de decisiones y de gestión patrimonial.

Palabras Clave: Conservación preventiva, sistema de monitoreo, modelo de datos, datos patrimoniales.

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1. Introduction

Preventive conservation in cultural heritage aims to avoid or mitigate the damages to a heritage property by understanding its risks and harmonizing the responsibility among actors and involved stakeholders. It also promotes maintenance as a conservation strategy based on continuous monitoring of the heritage site[1]. This concept it is not new, since the Athens Charter (ICOMOS 1931) and continuing with the Venice Charter (ICOMOS 1964), the World Heritage Convention (UNESCO 1972) and the Burra Charter (ICOMOS 1999); different maintenance and monitoring reflections have been taken place. But it is only until 1992 when different measures to strength the control, follow up the changes over time and establish successful management strategies have been included as practices of international organisms such as UNESCO, ICOMOS, ICROM, among others interested in heritage conservation[2]. In this regard, the World Heritage Committee (UNESCO) has been reviewing heritage management procedures which were translated into processes to report the state of conservation of heritage values.

In the last years in Latin America, different heritage sites included in the World Heritage List (WHL) worked the Periodic Reports processes, but from preliminary results it is clear that in spite of the importance of the writing of Periodic Reports, World Heritage Sites lack monitoring tools; which could allow them to trigger control measures to prevent, correct or mitigate current and future problems within their sites[3]. In relation to the heritage assets, the control of heritage values presents a particular challenge as heritage values must be considered as a dynamic process that can change from one generation to another depending on the special meanings that groups of people attach to heritage places[4]. In this context, this paper presents different methodologies to identify heritage values and the process to structure this data (values) into a monitoring system which can look at changes on different elements (site, building block, heritage building, elements, etc.) over a given period of time[5].

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[1] ICOMOS, "ICOMOS Charter - Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage". Ratified by the ICOMOS 14th General Assembly, in Vicoria Falls, Zimbabwe, October 2003. Available in: <http://www.international.icomos.org/charters/structures_e.htm> (Consulted on: 14th, 09, 2016).

[2] VAN BALEN, K., *Preventive Conservation in the International context of the PRECOM3OS network*, (Yifu Science Hall, Southeast University, from 28th to 31th of October), Nanjing - China, Southeast University Press, 2011, pp.1-13.

[3] HERAS, V., "Cuenca, quince años como patrimonio mundial: evaluación de los procesos de documentación y monitoreo", *ESTOA, Revista de la Facultad de Arquitectura y Urbanismo de la Universidad de Cuenca*, No. 6, 2015, pp.27-35.

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[5] WALTON, T., "Methods for monitoring the condition of historic places DEPARTMENT OF CONSERVATION TECHNICAL SERIES 27-2003". Available in: <http://www.doc.govt.nz/documents/science-and-technical/docts27.pdf> (Consulted on: 10th, 07, 2016).

2. Methodology

2.1 The Preventive Conservation Approach

As defined by the American Institute for Conservation of Historic and Artistic Works (AIC - 1996), preventive conservation aims to "mitigate deterioration and damage to cultural property through the formulation and implementation of policies and procedures"[6]. This concept is relevant to the long term protection of our heritage, but as it was mentioned before, it is not a new concept. However recently, different countries have been shifting from restoration towards a system of regular maintenance to protect their heritage asset, supporting this so-called proactive protection of cultural heritage. This is the case of Cuenca a southern city of Ecuador and a World Heritage Site (WHS) since 1999. The Municipality of Cuenca in collaboration with the Universidad de Cuenca and its Architecture and Urbanism Faculty is part of the PRECOM[3]OS network and a UNESCO Chair for preventive conservation, maintenance and monitoring of monuments and sites. The established methodology for the network is based on the application of preventive conservation to cultural heritage that aims to avoid the causes of damage, get an early detection of the symptoms of damage, and control over time the damage progress. As it is shown in figure 1, there are four steps for the preventive conservation processes namely: analysis, diagnosis, therapy and control. The analysis gives the description of the state of conservation of heritage values and specify the type of damages and external or internal factors threating those values. During the diagnosis stage the condition assessment is linked to the risk analysis towards the therapy, which proposes possible mitigation actions and later allowing the control of the efficiency of the actions or mitigations proposed.
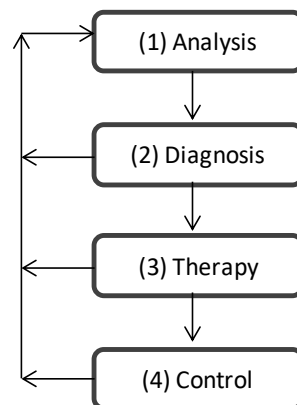
Figure 1: Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage (2003). Source: ICOMOS.

With this conceptual scheme the vlir***CPM*** project has developed different maintenance campaigns in Susudel, a small parish of Oña in Azuay Province and in San Roque, a traditional neighborhood of Cuenca[7]. Nowadays, both experiences constitute successful

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[6] AMERICAN INSTITUTE FOR CONSERVATION OF HISTORIC AND ARTISTIC WORKS, "Definitions of Conservation Terminology". Available in: <http://www.conservation-us.org/index.cfm?useaction=page.viewPage&PageID=620&E:\ColdFusion9\verity\Data\dummy.txt> (Consulted on: 20th, 03, 2016).

[7] CARDOSO, F.; MOSCOSO, M., *De la teoría a la acción: El Plan Piloto de Conservación Preventiva aplicado a las viviendas de Susudel*. III Encuentro PRECOM3OS: Desafíos de la Conservación

histories of the implementation of preventive conservation actions. The results also help to understand the process but also the basic information needed before the implementation of any plan under a preventive conservation perspective. Therefore this paper will take special attention in data related to heritage values which constitute the core of the proposed monitoring system.

2.2 Management of World Heritage properties and Monitoring System

Besides the previous describe experiences, management procedures related to the maintenance of the Outstanding Universal Value (OUV) of a property and its control over time has been also studied. The World Heritage Committee of the UNESCO has established the reactive monitoring and periodic reporting as part of these management mechanisms that enables to assess the state of conservation of the OUV. Therefore, this paper tackles on aspects of these tools that are basic requirements for heritage control and monitoring that could be included on the conceptual model for the monitoring system. The results of the analysis point out two aspects, the first is related to the type of data that is structured and required in both reports. Long text descriptions and some photographs are part of these documents, nevertheless for the monitoring tool this data cannot easily be monitored. The second aspect of both reports are the proposed monitoring indicators. Those indicators are: i) indicators of pressure (threats to the asset), ii) those of state (universal values, authenticity and integrity), iii) those of response (management and public asset), and iv) indicators for the state of conservation[8].

Once the maintenance experiences in Susudel and San Roque have been evaluated, as well as the management mechanism currently used for the World Heritage Committee, the data requirements for the monitoring system were identify. Consequently, in the following sections of the paper different methodologies for heritage value identification will be described.

2.2.1 Data requirements: heritage values

As it was mentioned in the introduction the identification and monitoring of heritage values represent a challenge for any site inscribed or not in the WHL as they are continuously changing in time. In addition, the Convention Concerning the Protection of the World Cultural and Natural Heritage[9] has defined ten criteria to the nomination and inclusion of a site in the WHL. Nevertheless, this criteria cannot ever accurately describe all the values of every heritage ensemble[10]. In this context, the research project started to study the criteria for the inscription of Cuenca in the WHL, but also a selection of different methodologies to identify other heritage values was established.

Preventiva. Seminario para estudiantes doctorales expertos y gestores de sitios patrimoniales. (Facultad de Arquitectura, from 5th to 9th of November), Universidad de Cuenca, 2012, pp.19-40.

[8] UNESCO, "Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972". Available in: <http://whc.unesco.org/archive/convention-en.pdf> (Consulted on: 05th, 05, 2016).

[9] *Ibid*.

[10] MEUL, V., "A guide to Assessing the Significance of Ensembles", Draft document, 2009, p.108.

2.2.2 Building consensus with stakeholders

For the proposed monitoring system heritage values are placed at the core of the main structure. Therefore, the process of the value assessment was one of the main tasks for the project. Formerly, those assessments were executed by one or a group of experts that could be familiar or not with the site or monument. However, the results were less reliable and sustainable. As it has been mentioned by Heras, et al.[11] stakeholder engagement increases considerably the chances of preserving the multiplicity -tangible and intangible- values of an ensemble. In line with this statement and from the vlir*CPM* experience, the recognition of more "soundless" stakeholders (citizens, owners and small social structures) are fundamental in any conservation process. Once key stakeholders were identified, different methodologies were study in order to communicate and engage them. The Delphi technique and Semi-structured questionnaires were used to gather heritage values and attributes.

2.2.3 Gathering heritage values: The Delphi technique and Semi-structured questionnaires

The Delphi technique has been characterized as a popular consensus building strategy among experts on an uncertain issue[12]. This technique can efficiently accomplish tasks about ill-defined and highly complex issues. Its application consists of three stages: i) identifying the important issues by asking qualified experts with a sufficient research background; ii) proving and opportunity to reconsider and modify their answers by re-circulating opinions a few times; and iii) proposing potential from the final consultation phase[13]. Under a preventive conservation approach, the Delphi technique was used to deriving mutual agreement through a feedback process within a multidisciplinary group. Kim Chang-Jun, states that "*the reliability of an evaluation group is essential for organizing persuasive categorizations*"; thus for the research the value definition was validated by a group of stakeholders composed by local authorities, governmental institutions, citizens, neighbors of San Roque and part of the team of vlir*CPM* project who represent the academic field. As seen in figure 2, the results of the different stages have been adjusted by three Delphi rounds. The results corroborate the values for which Cuenca is part of the WLH but also other interesting aspects in relation to social issues appear.

In the Semi-structured interviews some values resulting from the Delphi technique were questioned to a different group of stakeholders. In this case, some investors and citizens that could not deal with the rounds of the previous methodology were interviewed. It was fundamental to construct the whole picture of key stakeholders and gather all heritage values. The results of this methodology show up values in direct relation to the economic aspects. The tourism and use values (translated in monetary incomes) were stress by the stakeholders.

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[11] HERAS, V., et al., "A value based monitoring system to support heritage conservation planning", *Journal of Cultural Heritage Management and Sustainable Development*, Vol. 3, 2013, pp. 130-147.
[12] MEUL, V., "A guide to Assessing the Significance of Ensembles", Draft document, 2009, p.108.
[13] CHANG-JUN K., et al., "An experience curve-based decision support model for prioritizing restoration needs of cultural heritage", *Journal of Cultural Heritage*. Vol. 11(4), 2010, pp. 430-437.
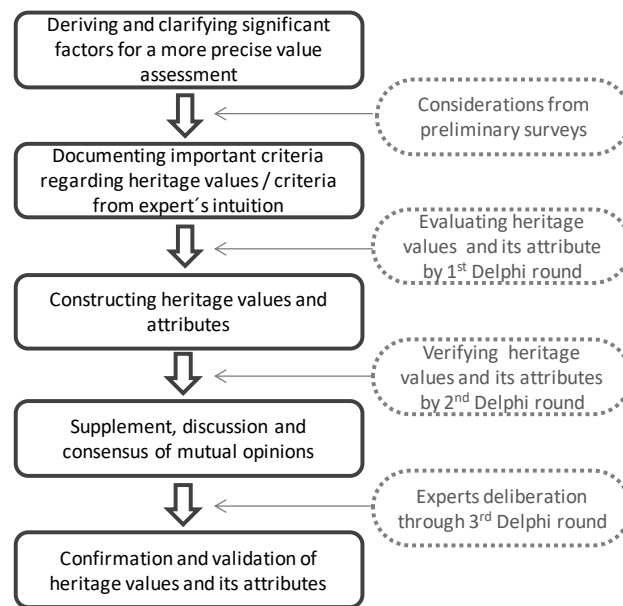
Figure 2: Value and attribute identification process by the Delphi technique. Source: own source.

2.2.4 Selection of factors to monitor values and attributes

Once the values and attributes were recognized, a summary table was developed in order to structure the gathered data. At this point the data in relation to "indicators of change" was important to establish in order to understand other invisible aspects that are causing change and need to be monitored. The table below (Table 1) was the proposed template to gather these indicators.

Table 1: Proposed template to gather monitoring indicators. Source: Own source.

Value(s)	Attributes	Agent(s) of deterioration	Change indicators	Response	Threshold(s)

- Value(s): in this field heritage values were defined based on official documents (nomination file, ICOMOS evaluation, retrospective inventory and the Nara Grid) and afterwards validated with the stakeholders.
- Attributes: key features (material characteristics on which significance resides).
- Agent(s) of deterioration: related with agents of deterioration[14].
- Change indicator: key features that evidence change.
- Response: any action that could "balance" the presence of disturbances or agents of deterioration.
- Thresholds (time-space): this field indicates the tolerable limits of change.

The following table 2 illustrates the use of the template with a particular heritage value of the city of Cuenca:

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[14] VAN BALEN, K., "Proposal for identification of the agents of deterioration for immovable heritage based on the concept of Waller (1993)". Available in:
<http://precomos.org/images/uploads/library_items/Preventive_Conservation_article_KVB_oct_2011.pdf > (Consulted on: 13th, 08, 2016).

Table 2: Determination of monitoring indicators at the building block level. Source: Own source.

Value(s)	Attributes	Agent(s) of deterioration	Change indicators	Response	Threshold(s)
The building blocks, shape the space perception in the historic city. It is expressed through its own scale. The urban and natural landscape is still clear and consistent, specialized and susceptible to interpretation.	-Max. height of the building block stretch. - Sky-line from the historic center to the surroundings.	-Dissociation -(In)Direct impact from human activities or development on the fabric.	-Heights of the buildings -Width of the streets. -Inscription boundaries -Buffer zone boundaries.	-Building block stretch survey (Total station, terrestrial photography). -Landscape survey: Annual report.	-Buildings not higher than 3 floors (approx. 9-10m.). No more than two buildings placed in a radio of 25m. -Width of streets no less than 6 meters. -Size of the WHS in hectares (max. - min.) -Size of the Buffer zone in hectares (max. - min.)

2.3 Heritage Monitoring System

As it has been explained before, the development of the monitoring system for Cuenca aims to become a management support tool for heritage conservation. With the system implementation, more informed decisions can be taking; however, it is important to establish that any system can replace a heritage manager. In this regard, people with a robust heritage educational background is needed in the institutions that works for heritage conservation. It is also important to mention that this system has been conceived as an open system; it means, that in a near future other type of data can be added to the system.

2.3.1 Data model

A data model is a set of constructs for describing and representing selected aspects of the real world in a computer. Difficult choices have to be made about what things are modeled in a geographic information system (GIS) and how they are represented. Because different types of people use GIS for different purposes, and the phenomena that these people study have different characteristics, there is no single type of all-encompassing GIS data model that is best for all circumstances. Therefore the decisions about the type of data model to be adopted are vital to the success of a GIS project[15].

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[15] LONGLEY, P., et al., *Geographic Information Systems and Science*, London, John Wiley & Sons, Ltd. 2010. Third edition. p.435.

In light to the previous mentioned, the heritage monitoring system proposed in Cuenca has been designed considering its particular requirements as a world heritage site but from a generic perspective that could embrace all kind of heritage spatial data and extendable to future requirements. The system will allow the possibility to query, maintain but fundamentally it will follow heritage values up and clearly determine changes that could threaten them. It means that the development of the conceptual model started by identifying heritage values, which were translated into attributes as the main elements that need to be monitored through time. In the development of the data model for the monitoring system, the principles of preventive conservation approach are reflected as conceptual data blocks and the main relationships between the data.

### 2.3.2 Structure of the data model

The development of the data model for the heritage monitoring system has three main, interconnected conceptual entities in the schema:

- In the heritage entities the scale of work is defined. It means, at this stage the heritage element (single building, element, unity or site) to be analyzed by system is determined. The studied entity will delineate data requirements, however, at this stage all aspects that give the "heritage status" to the studied element are also recorded.

- The legal entities contains information about the legal protection of what is considered as part of city´s heritage. This main class conveys a set of elements for all protected heritage places. In this sense, information about legal documents such as: The Dossier, Retrospective Inventories, Reactive Monitoring and Periodic Reports are included. The institution(s) responsible for the management, the scope of the legal protection (buffer zones), among other information[16]. It constitutes an elementary enumeration of legal and management elements that might be extended in time.

- The monitoring entities encloses a set of classes in relation to the preventive conservation approach. Therefore, the main data about the state of conservation, threats, economic, or political issues are structured at the analysis phase. In the diagnosis, the previously recorded data is analyzed in order to establish a good therapy. The implementation of different conservation measures need to be periodically controlled, this activity will give as an output new information that should be the input for the new preventive conservation analysis in different periods of time.

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[16] ASAMBLEA NACIONAL CONSTITUYENTE DEL ECUADOR, "El Código Orgánico de Organización Territorial, Autonomías y Descentralización (COOTAD)", Montecristi - Manabí, 2010, p.62.
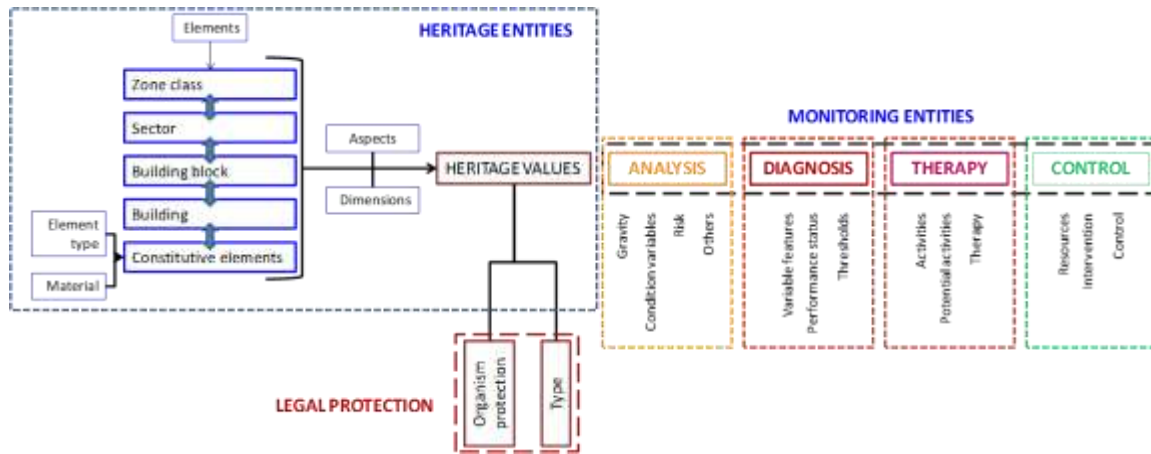
Figure 3: Cultural Heritage Monitoring Schema. Class Diagram for the proposed Monitoring System. Source: Own source.

3. Future research

As it was explained above different methodologies were used for heritage values identification, nevertheless the results of the Delphi technique can be widely discussed. In this context, other participatory methodologies should be explored.

In relation to the data model for the monitoring system, surely further work and small tests will lead to some adjustments to the diagrams, their behavior and the type of interaction between them. It is also important to indicate that as much as the system is used, more precise results can be obtained.

4. Conclusions

The preventive conservation approach applied in a monitoring system opens the possibility to perform relevant heritage analysis and consequently to a better management and monitoring of heritage values. The case study of the world heritage site of Cuenca, showed that the heritage data has a direct relation with monitoring procedures. As it was showed before, a conceptual model is based on heritage values and their attributes allow to support informed decisions and the implementation of tailor maid strategies for conservation of heritage values.

To conclude, the research would like to emphasize that it is vital for a heritage site to establish a monitoring process, which should start from the identification of elements that are valuable for the site and therefore need to be conserved over time. The type of analysis and the technical tool to be used are important but secondary aspects of the process. It means such a tool could only assist in making the process more efficient and systematic but the recognition of what is definitely important and needed to be preserved is a fundamental task for all stakeholders.

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