

GEOPORTAL PROPOSAL FOR THE INVENTORY OF CULTURAL HERITAGE IN NABÓN (ECUADOR)

J. L. Lerma^{1,*}, V. Heras², G. Mora-Navarro¹, P. Rodas³, F. Matute⁴

¹ Dept. of Cartographic Engineering, Geodesy and Photogrammetry, Photogrammetry and Laser Scanning Research Group (GIFLE),
Universitat Politècnica de València, 46022 Valencia, Spain – (jllerma, joamona)@cgf.upv.es

² Facultad de Diseño, Arquitectura y Arte, Universidad del Azuay, Ave 24 de Mayo 7-77, Cuenca Ecuador - vheras@uazuay.edu.ec

³ Instituto Nacional de Patrimonio INPC - paula.rodas@patrimoniocultural.gob.ec

⁴ GAD Municipal de Nabón- franklin.matute@nabon.gob.ec

Commission II, WG II/8

KEY WORDS: documentation, tangible and intangible heritage, landscapes, Sustainable Development Goals (SDGs), international cooperation

ABSTRACT:

Humanity is losing cultural heritage faster than it can be documented, preserved and disseminated. A combination of natural and human actions is heavily affecting heritage such as climate change, vandalism, looting and natural hazards such as floods, droughts, tsunamis and earthquakes. This paper presents a cooperation proposal for strengthening efforts to protect and safeguard the world's cultural and natural heritage through building a geoportal for the inventory of tangible and intangible cultural heritage in Cantón Nabón, province of Azuay, Ecuador. All the gathered information, historical records, old photographs, architectural and archaeological and geomorphological surveys, in combination with state-of-the-art photogrammetric documentation surveys, will integrate the new heritage geoportal. The initial implementation will be carried out by working together with local, regional and international experts, following the suggestions of the local inhabitants.

1. INTRODUCTION

Humanity is losing cultural heritage faster than it can be documented, preserved and disseminated. There is a huge concern about the preservation and safeguard of cultural heritage, but resources are limited. Many factors affect cultural heritage, not only human such as urban development, vandalism and looting, but also natural disasters, which represent a major threat, as reported by (Drdácký et al., 2007). Environmental fatigue, fires, floods, droughts, tsunamis and earthquakes, as well as long-term climate change, are typical effects that sometimes create irreversible damage, altogether with inadequate emergency interventions.

Inhabitants are not usually concerned with the great value of their movable and immovable heritage, despite a part of them participate in ceremonies, celebrations, rituals and festivals. Generally speaking, rural areas are not usually sensitive enough to identify, protect and preserve objects, monuments and sites, which might attract new resources to enhance development. Similarly, they are not used to add value to cultural heritage because further primitive needs are requested to contribute to supporting families. In addition, in these areas, fast or even internet connections do not exist. Putting all together, few heritage resources are identified and the lack of inventory and management of cultural heritage assets is missing.

The 2030 Agenda for Sustainable Development adopted by the United Nations in 2015 encourages peace and prosperity for people and the planet. (United Nations, 2015) acknowledges both the natural and cultural diversity of the world and

recognises that all cultures and civilizations can contribute to, sustainable development. Within this agenda, 17 Sustainable Development Goals (SDGs) have been set by all countries – developed and developing– in a global partnership. In particular, SDG 11.4 seeks to strengthen efforts to protect and safeguard the world's cultural and natural heritage. In this context, a small cooperation project was set in the rural context of Nabón in the Province of Azuay at the south of Ecuador. This study aims to contribute and to strengthening collaboration in documenting the cultural and natural heritage of Nabón through a web-based geoportal. However, what kind of heritage assets will integrate the geoportal and why those and not others depend on the local inhabitants advised by the heritage experts coming from the region. It will constitute a new geoportal in the country, complementing the endogenous resources information such as renewable resources, main crops, soil availability for agricultural production, installation of shrimp farms, the situation of soil quality for buildings available in the province of Manabí (Rodríguez Gamez, Vazquez Perez, Martínez Falcones, & Bravo Bazurto, 2019), and other governmental geoportals in Ecuador provided by the Instituto Geográfico Militar (Instituto Geográfico Militar, 2018), Fig. 1. The results of the study, are aligned with the National Ecuadorian Constitution (COOTAD, 2010), that in three articles mention the importance of the heritage identification, documentation and conservation for the country identity.

* Corresponding author

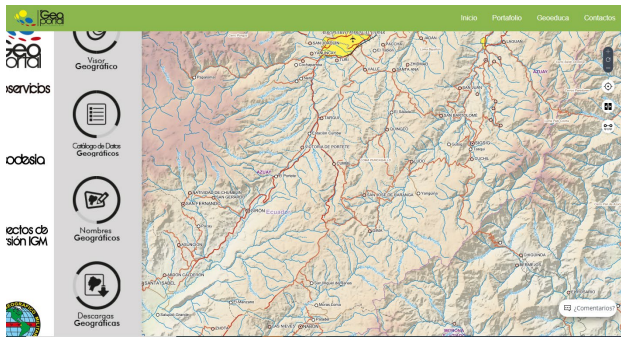


Figure 1. Part of the Azuay province in Ecuador, with the capital of Cuenca (in yellow) on top and Nabón in the bottom.

The efficient conservation and management of cultural heritage can be used to enhance the dynamism of modern societies, not only from a touristic but also economic and cultural viewpoints. These aspects are very important especially in the rural areas of Ecuador like Nabón where cultural heritage in the last years has been related with poverty conditions, has caused the mutilation of an important part of their local history, and last but not least, the removal and replacement of their landscape identity. In this scenario, the advent of digital technologies, efficient management tools have been developed all over the world. Many examples of management information systems for architectural or archaeological cultural heritage documentation can be found (Barker & Swart, 2020; Ronzino, Acconcia, & Falcone, 2018; Vacca, Fiorino, & Pili, 2018), although the previous generations had as origin either architectural/architectural/spatial information systems, linking geospatial data (point, lines and polygons) with alphanumeric database content through geographic information systems (GIS). In fact, (Petrescu, 2007) described the status of the use of GIS technology in cultural heritage in different countries. (Campanaro, Landeschi, Dell’Unto, & Leander Touati, 2016) reported about the improvement of the effectiveness of conservation and preservation strategies thanks to the combination of digital technologies such as laser scanning, photogrammetry and computer vision-based techniques and 3D geographic information systems (3D GIS), namely for ancient buildings. The foremost idea is to help experts, citizens and researchers in the cultural heritage field with tools and solutions that are able to translate the requirements for data acquisition, archiving, inventory, conservation, knowledge, exploitation, quantification, visualisation, and, last but not least, management of constantly changing cultural heritage assets.

(Barker & Swart, 2020) raised an important issue that might often happen in most of the organisations that deal with culture and heritage, the lack of digitally available content in number, coverage and size in private and public repositories; documents and photographs usually constitute the largest source of available digital information, but there is a substantial lack of asset drawings. The authors also alerted about the quality and accuracy of knowledge due to the curation of architectural information. The same issue can be extrapolated to other cultural heritage sectors dealing with both tangible and intangible heritage. In fact, the situation with intangible heritage is not as well developed as for immovable architectural and archaeological heritage.

This paper will present the workflow adopted by the international team to build up a new systematic inventory,

targeting the rich cultural and natural heritage of the Nabón region. All the gathered information, historical records, old photographs, architectural and archaeological, as well as geomorphological surveys, in combination with state-of-the-art photogrammetric documentation surveys, will integrate the new heritage geoportals. The initial implementation will be carried out by working together with local, regional and international experts, following the suggestions of the local inhabitants. The Arches heritage inventory and management system will be used for the implementation of the Nabón Geoportals.

2. STUDY AREA

The selected study area is Nabón in the province of Azuay, located in the southeast of Ecuador (Fig. 1). Cantón Nabón is one of the fourteen administrative parts in the Province of Azuay, with approximately 16000 inhabitants, representing 2.89% of the province featured by a rural landscape (Table 1).

Nabón	Features
Area	668.2 km ²
Urban area inhabitants	7.5%
Agriculture & farming active inhabitants	60%
Agriculture & farming active inhabitants	11%
Construction active inhabitants	8%

Table 1. Nabón features

Nabón was awarded as Ecuadorian national heritage in 2005 due to its natural and cultural features which are well preserved. Nevertheless, in the last years, different requests to “improve” buildings or to change landscapes arrived at the Municipality. Regrettably, this institution does not have the capacity to solve all these appeals. In this scenario, this project aims to support heritage management decisions by identifying, valuing and proposing general heritage management strategies for this canton.

Nabón has a rich historical background, coming back to the indigenous Inca period with the cañari inhabitants (Iturralde, 2004). The Spanish colonial period starts at the end of the 16th century, confronting a village with doctrine and religious services in 1685. Around the first quarter of the 19th century, starts the independence and republican period. Nabón is established as the capital of the new canton of the Province of Azuay on 7 August 1987.

The heritage within communities is shown with daylife facts and traditions, either parties or religious beliefs, and intangible heritage in an important part of heritage in Nabón (Iturralde, 2004). This technical report clearly specifies that the heritage in villages is not only the architecture of the city and the tangible or archaeological assets, but also the daylife facts. The set of buildings keep the historic, urban and architectural values, with one or typically two story buildings, with not many decorative features, except wooden balconies with flat-shaped balusters, windows and doors, as it is illustrated in Fig. 2. Nabón also has an important archaeological and natural heritage that holds and shows ancient traditional life and the relationship that exists between built heritage and the surrounding landscape (Fig. 3).



Figure 2. Heritage buildings of Nabón. Source: Municipality of Nabón (2019)



Figure 3: Part of an archaeological site in Nabón. Source: Municipality of Nabón (2019).

Fifteen years have passed without Nabón being able to count not only on digital platforms but on an updated inventory which should be part of the Information System of the Ecuadorian Cultural Heritage (SIPCE), official inventory platform established as mandatory use under current legal regulations. The SIPCE entered into force in 2010, while the heritage declaration of Nabón -and hence the inventory of real estate- is from 2005. Therefore, this cooperation projects pretends to reverse this situation involving local, regional and international partners.

3. GEOPORTAL FOR CULTURAL HERITAGE RESOURCES

Geoportals are used in a wide range of fields, since they are software systems able to provide access to diverse information resources to different users, granted with different attributes. (Yamashkin et al., 2019) reported a list of functional and qualitative requirements when designing geoportal solutions, ensuring the sustainable development of the global society: availability of cartographic layout, ensuring combined thematic mapping overlapping, the existence of right navigation tools for moving across the geospatial data, access to the spatial object attributes, and the chance to reach complementary information from other multimedia sources.

In relation to the mentioned above, the current research has been working on the baseline of the existing data. From this activity, it is important to mention that historical records,

photographies, and the last inventory executed by the Instituto Nacional de Patrimonio Cultural (INPC) in 2005 are not digitalised. Another important element to be reported is that this inventory only gathers information about the building architecture but not about the landscape, which is a challenge for the project, as in Ecuador the INPC has a national information system (SIPCE), but it does not include this data.

In this scenario, after exploring the existing heritage systems, the Arches heritage inventory and management system (Enriquez, Myers, & Dalgity, 2018; Myers, Dalgity, & Avramides, 2016) has been choosing as one the best existing system for the development of the cooperation project. The Arches is conveyed taking into account the foremost guidelines to be widespread all over the heritage world:

1. Economy: open source software (OOS) available at no cost, easy to maintain and enhance by institutions or organisations;
2. Customisation: the OOS can be customised to fulfil your requirements without interfering to the existing modules. The administrator can select which data fields are included in the implementation. Besides, a reference data manager (RDM) is specifically incorporated to manage cultural heritage terminology in different languages.
3. Standards: Incorporates standards and specifications of the Open Geospatial Consortium (OGC) on spatial data and web services such as the Web Map Service (WMS), as well as the International Committee for Documentation (CIDOC) conceptual reference model (CRM), the ISO 21127:2014 standard for the exchange of cultural heritage information, to model and integrate cultural heritage entities (CIDOC CRM, 2014).
4. Design: The geoportal is designed to be as user friendly as possible, requiring minimum adaptation, although it depends on your role and permissions, i.e. administrator, professional acquiring and editing data, or general user (no editing permissions).
5. Relationships: The web-based geoportal helps to define and view spatial source interrelations that are near or share common features, difficult to set with other systems through a fixed/free time framework.

Besides, Arches as an open-source, geospatially-enabled software platform for cultural heritage inventory and management, is continually updated and developed jointly by the Getty Conservation Institute and World Monuments Fund, altogether with third party companies (Arches, 2020).

The default version of Arches can record information for six different types of resources: heritage; heritage group; heritage activity; historical event; actor; and information resource (Arches, 2020). We foresee the need to upgrade and customise new resource types able to handle intangible heritage, such as foods, clothing and religious parties. Therefore, the inventory system will handle either tangible and intangible resources, as required by the local and regional authorities, through international cooperation development.

4. CONCLUSIONS

This paper has presented our idea to develop a comprehensive web-based geospatial platform able to handle all the cultural and natural heritage assets of Nabón. The use of arches inventory system will help users with different background to acquire data, edit and update data fields, to increase the

geospatial database, monitor resources, and carry out comprehensive analysis and management, visualising a wide range of data in different media. The purpose is to increase consciousness of their historic, cultural and natural legacy, add value to heritage resources, increase self-confidence and boost local sustainable development.

This project will be our contribution to support international cooperation among parties, enhancing invaluable cultural heritage. Besides, the team is expecting to gather the data through crowdsourcing campaigns, assisting the local communities in capacity building.

ACKNOWLEDGEMENTS (OPTIONAL)

The authors acknowledge the support by the Centro de Cooperación al Desarrollo, Universitat Politècnica de València (Research Programme ADSIDEO-COOPERACIÓN 2019).



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

ÀREA DE COOPERACIÓ AL
DESENVOLUPAMENT

REFERENCES

Arches, 2020. An open source data management platform for the heritage field. Retrieved May 3, 2020, from J. Paul Getty Trust and World Monuments Fund website: <https://www.archesproject.org/>

Barker, A., & Swart, J., 2020. Platforms of knowledge: architectural heritage practice and the information age in South Africa. *Virtual Archaeology Review*, 11(22), 56–73. doi.org/10.4995/var.2020.12234

Campanaro, D. M., Landeschi, G., Dell'Unto, N., & Leander Touati, A. M., 2016. 3D GIS for cultural heritage restoration: a “white box” workflow. *Journal of Cultural Heritage*, 18, 321–332. doi.org/10.1016/j.culher.2015.09.006

CIDOC CRM, 2014. CIDOC Conceptual Reference Model. Retrieved May 3, 2020, from <http://www.cidoc-crm.org/>

COOTAD, 2010. Código orgánico de organización territorial, autonomía y descentralización. Registro Oficial Suplemento 303 de 19 octubre de 2010.

Drdácký, M., Binda, L., Herle, I., Lanza, L. G., Maxwell, I., & Pospíšil, S., 2007. Protecting the cultural heritage from natural disasters. In *Directorate General Internal Policies of the Union. European Parliament*. Retrieved from [http://www.europarl.europa.eu/RegData/etudes/etudes/join/2007/369029/IPOL-CULT_ET\(2007\)369029_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2007/369029/IPOL-CULT_ET(2007)369029_EN.pdf)

Enriquez, A. L., Myers, D., & Dalgity, A., 2018. The Arches heritage inventory and management system for the protection of cultural resources. *Forum Journal*, 32(1), 30–38.

Instituto Geográfico Militar, 2018. Geoportal Ecuador – Infraestructura de Datos Espaciales. Retrieved May 2, 2020, from IGM website: <http://www.geoportaligm.gob.ec/portal/>

Iturralde, E., 2004. *Informe técnico: Reseña histórica y memoria urbano arquitectónica de “NABON.”* Cuenca: Instituto Nacional de Patrimonio Cultural Ecuador.

Myers, D., Dalgity, A., & Avramides, I., 2016. The Arches heritage inventory and management system: a platform for the heritage field. *Journal of Cultural Heritage Management and Sustainable Development*, 6(2), 213–224. doi.org/10.1108/JCHMSD-02-2016-0010

Petrescu, F., 2007. The use of GIS technology in cultural heritage. *XXI International CIPA Symposium*, 6. Retrieved from <http://www.isprs.org/proceedings/XXXVI/5-C53/papers/FP114.pdf>

Rodriguez Gamez, M., Vazquez Perez, A., Martinez Falcones, V. A., & Bravo Bazarro, J. J., 2019. The geoportal as strategy for sustainable development. *International Journal of Physical Sciences and Engineering*, 3(1), 10–21. doi.org/10.29332/ijpse.v3n1.239

Ronzino, P., Acconcia, V., & Falcone, A., 2018. Towards the integration of spatial data through the Italian Geoportal for Archaeological Resources. *2018 3rd Digital Heritage International Congress (DigitalHERITAGE) Held Jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018)*, 1–5. doi.org/10.1109/DigitalHeritage.2018.8810132

United Nations, 2015. Transforming our world: The 2030 Agenda for Sustainable Development. *A/RES/70/1*, pp. 1–41. Retrieved from sustainabledevelopment.un.org

Vacca, G., Fiorino, D. R., & Pili, D., 2018. A spatial information system (SIS) for the architectural and cultural heritage of Sardinia (Italy). *ISPRS International Journal of Geo-Information*, 7(2), 49. doi.org/10.3390/ijgi7020049

Yamashkin, S. A., Radovanović, M. M., Yamashkin, A. A., Barmin, A. N., Zanozin, V. V., & Petrović, M. D., 2019. Problems of designing geoportal interfaces. *GeoJournal of Tourism and Geosites*, 24(1), 88–101. doi.org/10.30892/gtg.24108-345