Cultural Landscape's Spatial Management: Concept, Model and Advanced Mapping Tools

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Abstract. The semantic expansion that heritage concept has experienced during last decades has brought about a progressive inclusion of landscape notion in heritage sphere and a great effort for heritage's contextualization and integration in other sectoral policies. In order to make progress in this new panorama, this text presents the theoretical basis and the structure of a territory-based spatial management model for Cultural Landscapes oriented to promote their sustainable use. The increasing commitment in heritage scenario to strategies that make it work as an active resource for society results in the need to reformulate the traditional mechanisms of heritage management. To this effect, the proposed model promotes the connection of heritage with spatial planning and large scaled intervention projects from a management framework, overtaking the traditional static condition of the procedures conducted in heritage sphere. The model, which is applied to the archaeological site of Italica (Seville, Spain) and its landscape area, particularly studies the possibilities of relating heritage management processes to the landscape architecture project. For that purpose, the model is supported by the use of Geographical Information Systems. The application of geospatial technologies in this context allows to explore the potential of this type of resources that go beyond data visualization and rely on advanced data processing for architecture field.

Keywords: GIS · Advanced mapping tools · Heritage management · Cultural Landscape · Italica

1 Introduction

Heritage is a constantly evolving concept. Since the beginning of the 20th century, through the ground-breaking Athens Charter for the Restoration of Historic Monuments [1], built heritage has overtaken a decontextualized object-based approach, in many cases strictly material, and progress has been made towards its appreciation as part of a physical, social and economic environment. The extension of the formal boundaries of heritage has resulted in the incorporation of Cultural Landscape as a category of Assets of Cultural Interest in heritage policies. Along with this spatial expansion, quite appreciable advance has been made in recent years towards its interpretation as a development paradigm, a sustainable way of generating growth from the use of territory's inherent resources. The first conferences concerning these issues

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were carried out by international organizations such as UNESCO, ICOMOS, IUCN and the Council of Europe: from pioneering events such as the World Conference on Cultural Policies held in Mexico City [2], the first conference explicitly aimed at exploring the links between culture and development, or the Intergovernmental Conference on Cultural Policies for Development [3], to more recent experiences such as the Faro Convention [4], the Hangzhou Declaration [5], the Habitat III Conference held in Quito in 2016, which approved the New Urban Agenda, where cultural heritage is recognized as a crucial factor for the sustainable development of cities [6] or the 2030 Agenda for Sustainable Development, which identifies cultural heritage as an essential development driver [7].

T. Loulanski defines the contemporary view of heritage as a transition from objects to functions and consequently from conservation to sustainable use and development [8]. In other words, an evolution from a static-restrictive perception of heritage towards a dynamic-evolutionary one [9]. This attitude towards heritage leads to its interpretation, rather than as an unchanging set of elements with a premeditated meaning, as a flexible phenomenon whose value extends beyond the historical-artistic relevance the conservation scenario has been traditionally focused on, in order to open the doors to a citizenship value [10]. In essence, the importance given to heritage nowadays goes further strictly material qualities and considers values linked to the changing needs and demands of society. Heritage today represents a complex set of values [11–13] where the socioeconomic dimension plays a main role [14–16].

One of the lines of thinking about the heritage-development pairing is directly linked to the mentioned spatial expansion process, which has confirmed the need to address it from a broad and integrated territorial approach [17–19]. As J.M. Feria affirms, "the important thing is to understand heritage resources under a broad approach, going beyond their exceptionality or uniqueness, focusing instead on the traditional and historical use of territorial systems, which arose from the confluence between the physical-natural environment and the human action, which, by its permanence during generations, has demonstrated a heritage value and a long term balance and sustainability" [20]. Besides provoking stronger links with local dynamics and with the particular socio-cultural conditions of an area, the territorial approach enhances heritage's valuation and promotion. M.A. Troitiño and L. Troitiño state "heritage has to be read under a territorial approach since it's not possible to explain or value it properly without understanding the logic of the social development of the territory, a process with temporal sequences, crosses and ruptures" [21]. Referring specifically to the landscape, M. Antrop asserts that "coherence between small composing elements in a broader spatial context is important for the legibility of the landscape and that the ability to tell the (his)story of a place strongly enhances the identity and the overall value" [22].

The research presented in this paper is framed within these arguments. Its aim is to deepen the links between Cultural Landscape's management processes and development strategies through the definition of a territory-based management model grounded in an integral and active logic. The integral approach is built upon an overall assessment of the different dimensions of landscape-physical-natural, historical-cultural, touristic-recreational and scenic- following the line of national planning tools such as Landscape Catalogues or Italy's Regional Landscape Plans. The active logic pursues

the use of management tools as supporting instruments for decision-making processes by a double strategy: on the one hand, by giving assessment capacity to the model by means of spatial analysis tools and, on the other hand, by flourishing its communicative potential through mapping and visualization techniques. The management model will be developed by Geographic Information Systems (henceforth, GIS), a working environment from where we will analyze the relevance of advanced mapping tools for achieving two relevant goals. Firstly, for strengthening the link between documentation processes, a work with long tradition and experience in the heritage field [23], and the roll-out of large scaled territory projects carried out by architects, overcoming the traditional static view of these heritage procedures. Secondly, for enriching the design phase itself by use of geospatial data, pointing towards an "informed landscape design". These strategies have been applied specifically to the cultural landscape of The Archaeological Site of Italica (Seville, Spain), a first-level heritage area [24]. By studying the site from a landscape approach (Fig. 1) we can establish a dialogue with the territory which avoids a fragmented view of the archaeological area [25, 26].

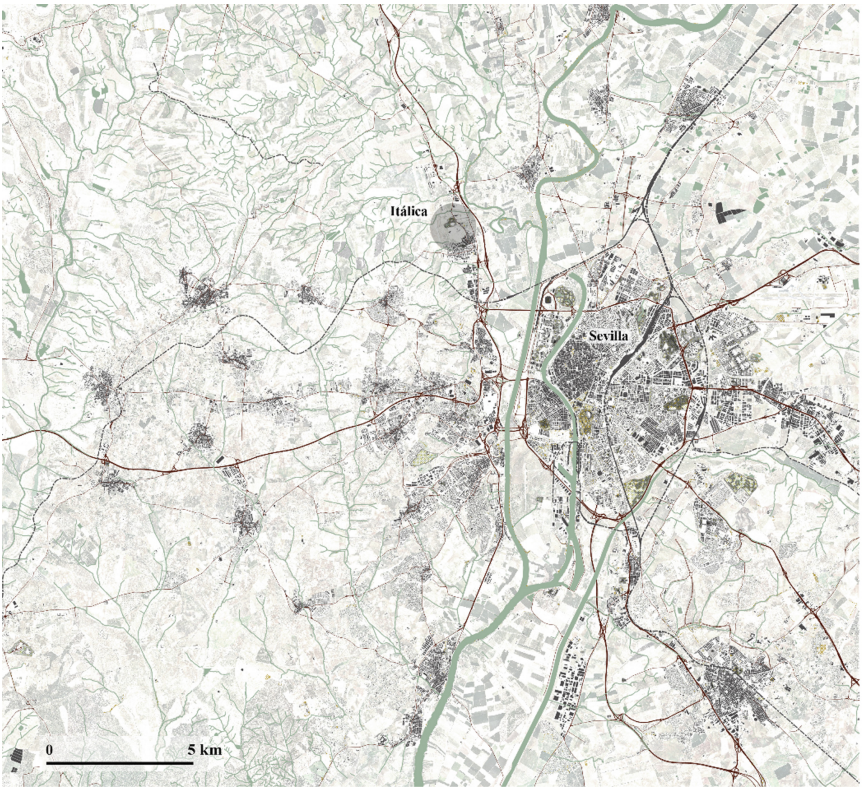

Fig. 1. Archaeological Site of Italica and its landscape area. Source: Author's creation by the use of GIS tools

2 Discussion

2.1 Advanced Mapping Tools

Nowadays, strengthening the links between heritage and development represents a world-class challenge for public research and innovation strategies at different scales. In this scenario, stablishing synergies with new technologies stands as a fundamental development line. The digital potential of cultural heritage is mentioned as a priority in the 2030 UN Agenda or in the European Union Framework Programme for Research and Innovation for the period 2014–2020, known as Horizon 2020.

Zooming in the framework of this study, the use of GIS for landscape-related procedures responds very well to its contemporary understanding as a heterogeneous and multidimensional reality-as a fusion of natural, historical, cultural, symbolic, social, scenic and productive values- which definitely highlighted the European Landscape Convention. The relevance of this technology for landscape characterization is based on its ability to accumulate and cross data of different nature. As McHarg already anticipated, by overlapping different type of information through layers of data, the connections that exist between them can be detected and thus deepen the obstacles and opportunities they offer [27]. S. Bertazzon and F. Lando point out that "the object of study of GIS is *not*, nor can it be, the *landscape* itself, but the different *elements* that compose it, processed and considered as *separable*, but not independent, elements" [28].

In addition to the analysis of spatial relationships of different layers from overlapping maps, what distinguishes GIS from other mapping software is its ability for geo-tagged data processing [29]. This enables us to discuss about GIS as an advanced mapping tool. The national Landscape Catalogues and Italian's Regional Landscape Plans are valuable examples of the development of methodologies related to advanced mapping for planning goals (for a deeper knowledge of their methodological mechanisms from a general approach, consulting [30, 31] is suggested). These instruments are created for landscape identification, representation and analysis and they directly respond to the requirements of the European Landscape Convention. They are great examples of innovative methodologies for mapping intangible landscape features such as their social, symbolic or aesthetic value, but additionally these instruments are relevant for using GIS analytical capabilities under the goal of improving landscape assessment and landscape quality objectives' setting. For example, the Galician Landscape Catalogue [32] runs a GIS density analysis aimed at detecting areas of greater concentration of landscape values. The results are the basis for locating "areas of special landscape interest". The Landscape Plan of the Italian region of Friuli Venezia Giulia [33], for its part, rasterizes its geo-tagged points of natural, cultural and landscape resources and overlays them in a final map of "landscape enjoyment gradient", where each minimum region of the map, each cell, has an enjoyment value obtained by a sum of scores which depend on if the cell is inside an ecological valued area, the sphere of influence of a cultural heritage item or the area of a remarkable landscape component. By overlaying this map with the current slow mobility network, the Plan builds its strategic goals.

Furthermore, researchers like R.S. Wurman, C. Alexander, N. Negroponte, W. Maas, founding partner of the firm MRVDV, or N. Amoroso [34] have worked on the development of GIS tools also in the field of architecture and landscape design. New horizons are looking to spatial design improvements at a territorial scale through the use of these digital techniques by understanding them as an extension of the traditional observation and analysis cycle performed by architects [35]. The possibilities for data visualization and for the development of landscape digital models, together with its analytical capacity, make GIS a potential tool for revealing new information within the process of information and knowledge and the subsequent design exercise of the architect.

GIS presents therefore great aptitude for the different processes related to landscape-characterization, assessment, planning and design-intervention- which makes it a transdisciplinary software and, therefore, a favorable scenario for encouraging closer ties between the different landscape-based actions. This potential makes it a reference tool in the path towards the definition of effective protocols for an integral and active Cultural Landscape's management.

2.2 Cultural Landscape's Management Model

The application of advanced mapping tools within the framework of an integral and active Cultural Landscape's management requires the definition of a data set which could effectively assume the requirements of an assessment procedure which is going to be linked with decision-making processes. The structure of the proposed management model, which arises from a holistic strategy for addressing landscape as a heritage reality, considers characterization (structure), assessment (diversity of values) and also diagnosis in order to study its potential as a resource for the present society (service).

The characterization phase defines a data set which is based on a structured system. The instruments that we have taken as references, the national Landscape Catalogues and the Italian Regional Landscape Plans, both structure the data in series of thematic catalogues and each one is represented by a specific map. In our case, in accordance with the Italian Regional Landscape Plans, we organized the information in "structures" rather than "values", in order to emphasize the distinction between an objective characterization phase and the subsequent of assessment and diagnosis. The system is organized in nine structures (Fig. 2). The first one consists on a collection of orthophotos and maps, both historical and present-day ones, which works as the basis of the system. It is perfectly possible to carry out data query on them. The following structure collects information related to land cover and use. Next structures consist on networks which define the accessibility and connectivity of the different landscape components: these are the layers of morphological structure, river courses, urban settlements and mobility network. The last four structures represent sets of territorial features, with their own logic in each case. They define the identity and the character of the analyzed landscape. In this sense, 2^{nd}–5^{th} structures are network layers which define elements whose value in the territory relies on their structuring capacity, while the 6^{th}–9^{th} layers are thematic structures that reflect the particular features that define the

studied landscape, which means that they show its distinguishing specific qualities. It is important to point out that elements which are part of the network layers may be also part of the thematic ones. For example, a river is an undoubtedly structuring element of the territory. However, it can also be part of the touristic-recreational structure in its swimming areas, of the physical-natural structure as an ecological corridor, of the historical-cultural structure as an identity element for the local community or for its role in the historical construction of the territory, and of the scenic structure as a landmark.

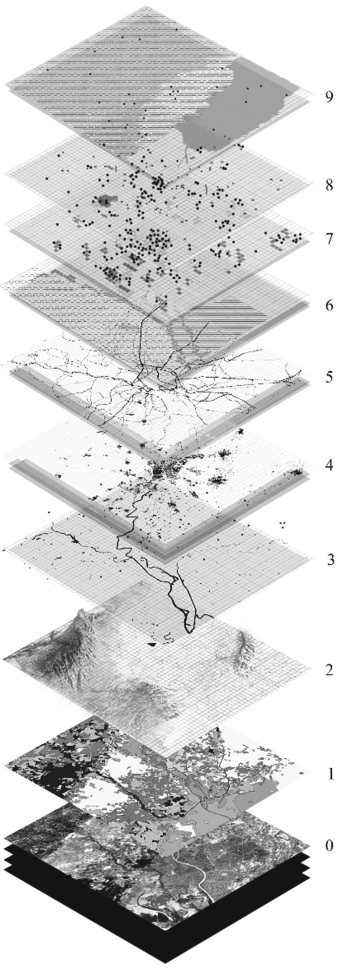

Fig. 2. Structures' scheme for an active management model. Source: Author's creation. 0: Orthophotos; 1: Land cover and use; 2: Morphological structure; 3: River courses; 4: Urban settlements; 5: Mobility network; 6: Physical-natural structure; 7: Historical-cultural structure; 8: Touristic-recreational structure; 9: Scenic structure.

From the thematic layers it is possible to visualize the landscape according to: its physical-natural features (Fig. 3), where the landscape is defined by topographic, hydrographic and geomorphological characteristics and its ecosystem, climate, flora and fauna; historical-cultural characteristics (Fig. 4), where built heritage resources, intangible heritage and other territorial traces of the historical construction of the landscape such as settlements, roads and historical land divisions are registered; its touristic-recreational infrastructure (Fig. 5), which records a set of attractions (trails, itineraries, recreational areas, cultural spaces and viewpoints) and services (visitor centers, tourist offices and information points, tourism business, accommodation, restaurants and events); Finally, its scenic features (Fig. 6), such as intervisibility, viewsheds, landmarks, scenic backgrounds, etc.

Fig. 3. Topography and land cover. Physical-Natural Map of the landscape area of Italica. Source: Cartografía de la estructura físico-natural del ámbito paisajístico de Itálica. Source: Author's creation by the use of GIS tools and geo-tagged data from the Instituto de Estadística y Cartografía de Andalucía.

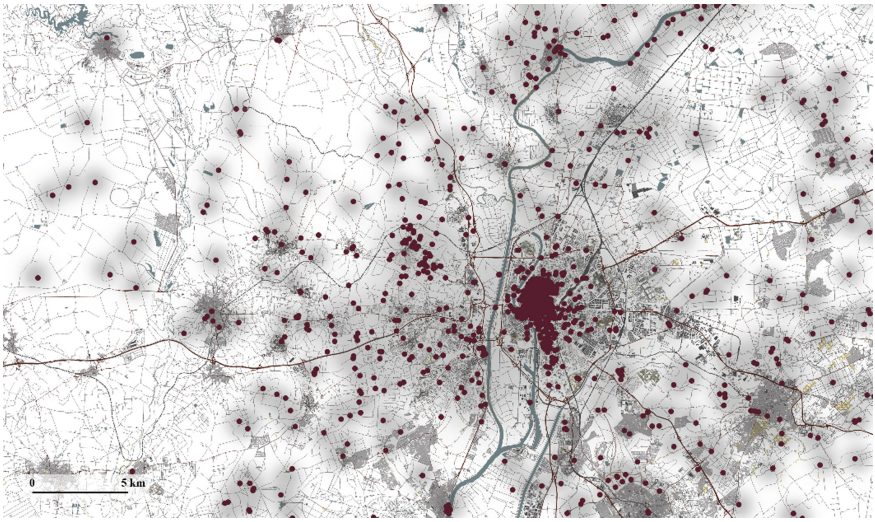

Fig. 4. Built Heritage. Historical-Cultural Map of the landscape area of Italica. Source: Cartografía de la estructura físico-natural del ámbito paisajístico de Itálica. Source: Author's creation by the use of GIS tools and geo-tagged data from the Instituto Andaluz de Patrimonio Histórico.

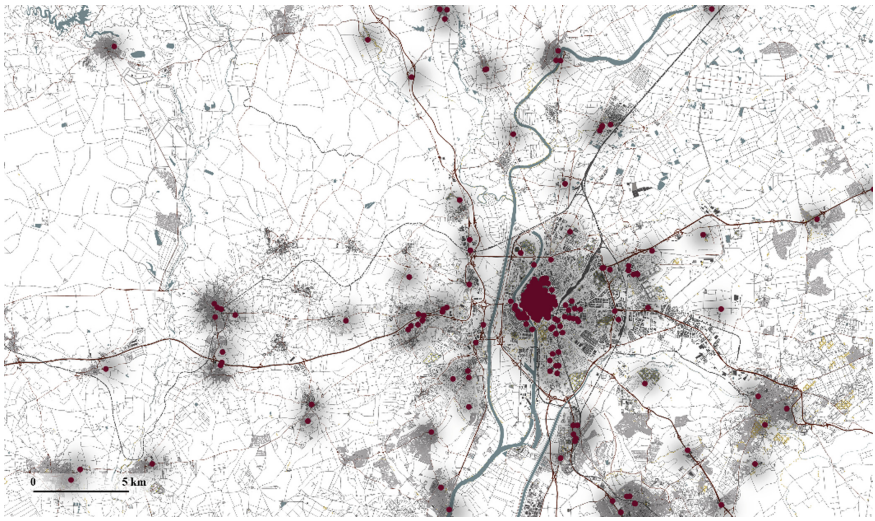

Fig. 5. Touristic Accommodation. Touristic-recreational Map of the landscape area of Italica. Source: Cartografía de la estructura físico-natural del ámbito paisajístico de Itálica. Source: Author's creation by the use of GIS tools and geo-tagged data from the Instituto de Estadística y Cartografía de Andalucía.

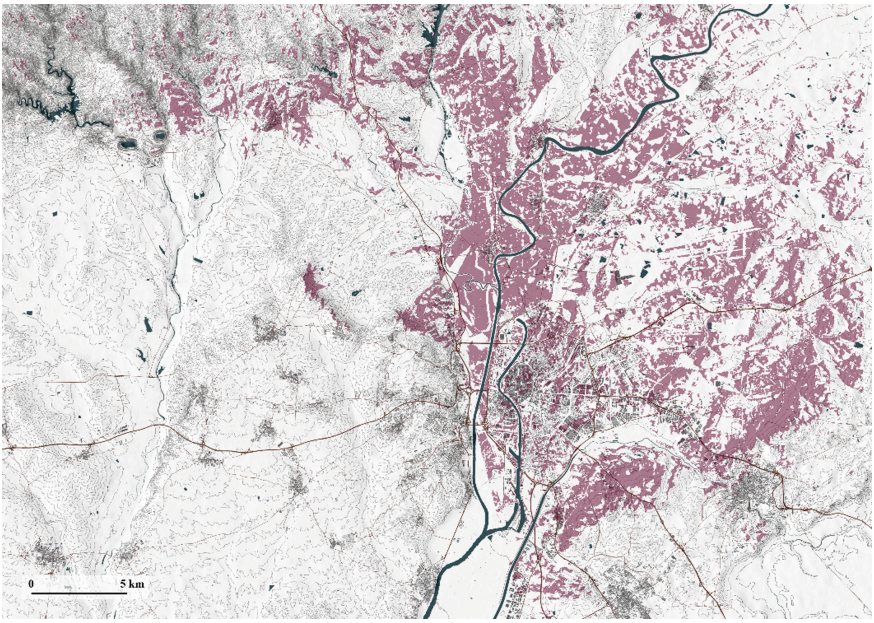

Fig. 6. Viewsheds from Italica's maximum visibility viewpoint. Scenic Map of the landscape area of Italica. Source: Author's creation by the use of GIS tools and Digital Terrain Model (10 × 10 m) obtained from the Red de Información Ambiental de Andalucía.

Once the characterization is completed, the assessment phase aims at defining a value gradient for each of the thematic structures. Density maps are generated, from which it's possible to look at the "hot spots" of each structure. These four maps are used for a GIS weighted overlay analysis whose final result is a gradient map which represents the total value. This map allows us to detect "target zones", which are areas of the territory where there is a higher concentration of landscape values from a multidimensional approach.

The last part, related to the diagnosis of the results obtained in the assessment phase, deals with the analysis of the connectivity and accessibility of the target zones from a double approach:

- Internal connections between the landscape components that are within a specific area.
- External connections. In this case, two different types are studied: those that occur between the different areas, and those that occur between the areas and the poles, understood as the spaces where the population is concentrated, the urban settlements.

The connectivity level is studied from a double approach as well:

- Visibility, by calculating the visual exposure of the points of interest in order to locate viewpoints from where to look at them. Intervisibility relationships between landscape components will be also analyzed.

– Accessibility, where it is studied, through distance and network analysis, the possible spatial connections between the different landscape components, as well as the accessibility of the points of interests, especially from the poles.

In this phase, the previously defined network layers are used, which are already part of the management model. While the thematic layers refer to an intermediate scope, morphological structure, river courses (Fig. 7), urban settlements and mobility network (Fig. 8) are analyzed from a larger approximation scale that addresses a wider land area (>1,000 km^2). The reason is that the intermediate area, which is the space of the cultural landscape, where an integral analysis of landscape values is produced, can be influenced by the presence of other nearby elements out the area itself. For example, an urban settlement outside the landscape area of the archaeological site of Italica may be too far for being considered an influential point for the historical narrative of the space or, if we are speaking about a heritage resource, for taking part in the touristic-recreational dynamics of the archaeological site. However, the urban settlement could be considered as a point of origin for potential visitors of the Cultural Landscape of Italica, making therefore an influence in the dynamics of the Cultural Landscape.

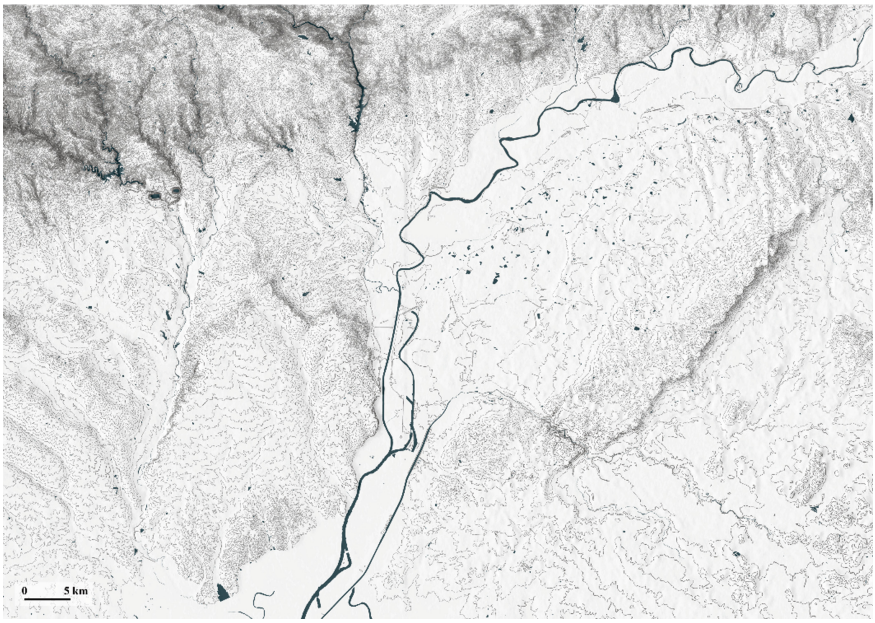

Fig. 7. Morphological structure and river courses Map. Source: Author's creation by the use of GIS tools and geo-tagged data from the Instituto de Estadística y Cartografía de Andalucía.

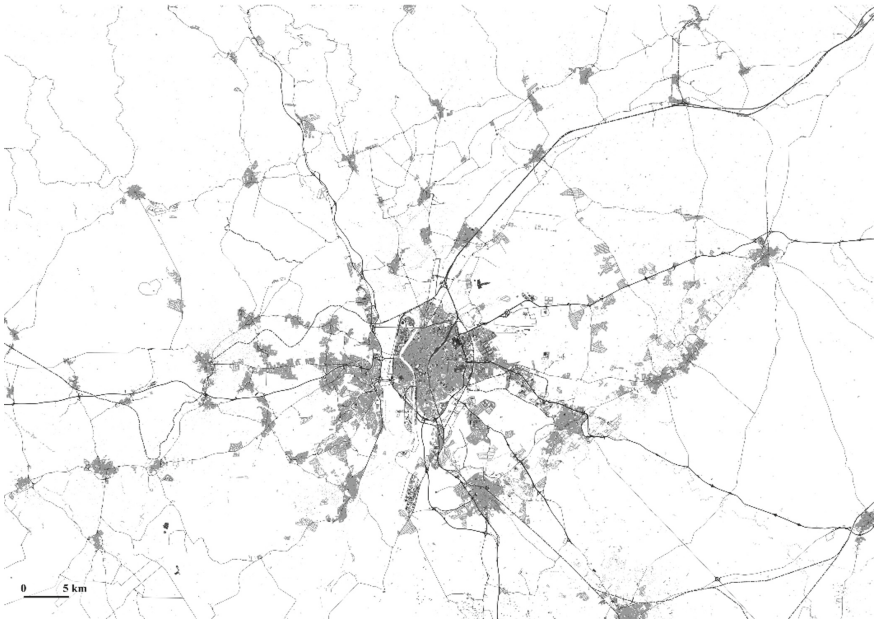

Fig. 8. Urban settlements and mobility network Map. Source: Author's creation by the use of GIS tools and geo-tagged data from the Instituto de Estadística y Cartografía de Andalucía

The goal of the diagnosis phase is to stablish a multidimensional landscape network from the target zones. This network sets up connections between landscape components, and between them and the poles, in a coherent and structured way. In this sense, the model inspires planning procedures from a management environment, laying the foundations for a subsequent intervention project aimed at designing the network through the definition of new routes or viewpoints, opting for a design process which is based on the analytical capabilities of Geographic Information Systems.

3 Conclusion

This text presents a methodological proposal for the definition of design strategies that promote a vision of heritage as an active society's resource from the operational framework of landscape management. The conceptual basis of the design strategy relies on the definition of a multidimensional landscape network that promotes landscape's storytelling capacity, allowing a better understanding, interpretation and promotion of the landscape. The architectural project becomes a relevant way for the materialization of this goal, and the proposed system also enhances it by framing it in a landscape-based multidimensional scenario and by useful techniques such as visibility, distance or density analysis. A research line addressing the advanced landscape design project is emerging, where GIS is effectively becoming a decisive tool [36–38].

GIS is a reference tool for establishing continuity between different landscape actions as it provides an environment that works as a common framework for all of them. Its mapping capacity is essential, since it makes it work as a tool from where to visualize, overlay and contrast information. Its analytical potential, the one that makes us refer to GIS as an advanced mapping tool, overtakes the static representation of information through the performing of data analysis that allows us to detect patterns, meanings and territorial conditions invisible until now. Due to its capacity for data processing, GIS is becoming nowadays a tangible methodological way from which to move forward to a broad and integrative heritage understanding that fully addresses its role as a development resource from a framework of active cooperation between processes, agents and disciplines involved in heritage management, incorporating the role of architecture in these dynamics.

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References

1. ICOMOS: The Athens Charter for the Restoration of Historic Monuments (1931). https://www.icomos.org/en/167-the-athens-charter-for-the-restoration-of-historic-monuments. Accessed 03 Sept 2019
2. UNESCO: World Conference on Cultural Policies (1982). https://unesdoc.unesco.org/ark:/48223/pf0000052505. Accessed 05 Sept 2019
3. UNESCO: Intergovernmental Conference on Cultural Policies for Development: final report (1998). https://unesdoc.unesco.org/ark:/48223/pf0000113935. Accessed 05 Sept 2019
4. Council of Europe: Convention on the Value of Cultural Heritage for Society (2005). https://rm.coe.int/1680083746. Accessed 05 Sept 2019
5. UNESCO: The Hangzhou Declaration. Placing Culture at the Heart of Sustainable Development Policies (2013). http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/images/FinalHangzhouDeclaration20130517.pdf. Accessed 05 Sept 2019
6. United Nations: New Urban Agenda (2017). http://habitat3.org/wp-content/uploads/NUA-English.pdf. Accessed 05 Sept 2019
7. UNESCO: Culture for the 2030 Agenda. UNESCO, Paris (2018)
8. Loulanski, T.: Revising the concept for cultural heritage: the argument for a functional approach. Int. J. Cult. Property **13**, 207–233 (2006)
9. Mrak, I.: A methodological framework based on the dynamic-evolutionary view of heritage. Sustainability **5**, 3992–4023 (2013)
10. Avrami, E., Mason, R., de la Torre, M. (eds.): Values and Heritage Conservation. Research Report. The Getty Conservation Institute, Los Angeles (2000)
11. de la Torre, M. (ed.): Assessing the Values of Cultural Heritage. Research Report. The Getty Conservation Institute, Los Angeles (2002)
12. English Heritage: Sustaining the Historic Environment: New Perspectives on the Future. English Heritage, London (1997)

13. ICOMOS: The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance. ICOMOS, Paris (2013)
14. Allison, G., Ball, S., Cheshire, P., Evans, A. Stabler, M.: The Value of Conservation? A Literature Review of the Economic and Social Value of the Cultural Built Environment. English Heritage, London (1999)
15. Greffe, X.: Heritage conservation as a driving force for development. In: Council of Europe (ed.) Heritage and Beyond, pp. 101–112. Council of Europe Publishing, Strasbourg (2009)
16. Towse, R. (ed.): A Handbook of Cultural Economics. Edward Elgar, Cheltenham (2003)
17. Castillo, J.: La dimensión territorial del Patrimonio Histórico. In: Castillo, J., Cejudo, E., Ortega, A. (eds.) Patrimonio histórico y desarrollo territorial, pp. 22–48. Universidad Internacional de Andalucía, Sevilla (2009)
18. Feria Toribio, J.M. (ed.): Territorial Heritage and Development. CRC Press, London (2012)
19. Manero Miguel, F., García Cuesta, J.L.: Territorial heritage & Spatial Planning. A Geographical Perspective. Thomson Reuters Aranzadi, Cizur Menor (2017)
20. Feria Toribio, J.M.: El patrimonio territorial. Algunas aportaciones para su entendimiento y puesta en valor. E-rph **12**, 200–224 (2013)
21. Troitiño, M.A., Troitiño, L.: Visión territorial del patrimonio y sostenibilidad del turismo. Boletín de la Asociación de Geógrafos Españoles **78**, 212–244 (2018)
22. Antrop, M.: Why landscapes of the past are important for the future. Landscape Urban Plann. **70**(1–2), 21–34 (2005)
23. Muñoz Cruz, V., Fernández Cacho, S., Arenillas Torrejón, J.A. (coords.): Introducción a la documentación del patrimonio cultural. Consejería de Cultura, Junta de Andalucía, Sevilla (2017)
24. Zoido Naranjo, F. (dir.): El Paisaje en el Conjunto Arqueológico de Itálica. Centro de Estudios Paisaje y Territorio. Consejería de Educación, Cultura y Deporte, Junta de Andalucía, Sevilla (2013
25. Bustamante, L.P., Ponce, C.P.: Paisajes culturales: el parque patrimonial como instrumento de revalorización y revitalización del territorio. Theoria **13**, 9–24 (2004)
26. Verdugo Santos, J.: El territorio como fundamento de una nueva retórica de los bienes culturales. PH Boletín del Instituto Andaluz de Patrimonio Histórico **53**, 94–105 (2005)
27. Mcharg, I.L.: Design with Nature. New York Natural History Press, New York (1969)
28. Bertazzon, S., Lando, F.: GIS e paesaggio: dalla scomposizione dei paesaggi reali alla creazione di paesaggi virtuali. In: Gazerro, M., Bertazzon, S. (eds.) Itinerari Multimediali nel Paesaggio Italiano, pp. 117–135. Università degli Studi di Padova, Dipartimento di Geografia, Padova (2000)
29. Maguire, D.J.: An overview and definition of GIS. In: Maguire, D.J., Goodchild, M.F., Rhind, D.W. (eds.) Geographical Information Systems: Principles and Applications, vol. 1, pp. 9–20. Wiley, Hoboken (1991)
30. Nogué, J., Sala, P., Grau, J.: Los catálogos de paisaje de Cataluña. Metodología. Observatorio del Paisaje de Cataluña, Olot (2016)
31. Cassatella, C., Paludi, G. (eds.): Il Piano paesaggistico del Piemonte. Atti e Rassegna Tecnica della Societa degli Ingenieri e degli Architetti in Torino LXXII-3, Torino (2018)
32. Instituto de Estudios do Territorio: Catálogo das paisaxes de Galicia. Galicia: Xunta de Galicia (2016). https://cmatv.xunta.gal/seccion-organizacion/c/CMAOT_Instituo_Estudos_Territorio?content=Direccion_Xeral_Sostibilidade_Paisaxe/Catalogo_paisaxe_galicia/seccion.html&std=Descarga.html. Accessed 05 Sept 2019
33. PPR-FVG: E3-Scheda della rete della mobilità lenta. Piano Paesaggistico Regionale. Friuli Venezia Giulia. Parte Strategica (2018). https://www.regione.fvg.it/rafvg/cms/RAFVG/ambiente-territorio/pianificazione-gestione-territorio/FOGLIA21/. Accessed 10 Sept 2019
34. Amoroso, N.: Representing Landscapes: Digital. Routledge, London (2015)

35. Nijhuis, S.: Applications of GIS in landscape design research. In: Nijhuis, S. et al. (eds.) Geo-Design. Advances in Bridging Geo-Information Technology, Urban Planning and Landscape Architecture. Research in Urbanism Series, Delft University of Technology, Faculty of Architecture and the Built Environment, Delft, vol. 4, pp. 43–56 (2016)
36. Batty, M.: Defining geodesign (= GIS + Design?). Environ. Plann. B: Plann. Des. **40**, 1–2 (2013)
37. Castro, E., et al.: Critical Territories. From Academia to Praxis. List-Laboratorio Editoriale, Rovereto (2013)
38. Goodchild, M.F.: Towards geodesign: repurposing cartography and GIS? Cartograph. Perspect. **66**, 7–22 (2010)