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Evaluation by component applied to the study of landscape visual quality. District of Fuentes del Narcea, Degaña and Ibias (Asturias, Spain)

The vast scientific, pedagogical and cultural heritage generated around the notion of landscape consecrated its meaning in a global way largely after the signing of the European Landscape Convention (CEP), where it was defined as “an area as perceived by people, whose character is the result of the action and interaction of nature and human factors.” This broad definition provides the basis for the understanding of the landscape as a visual and spatial expression of the territory, a meaning that deepens, among other aspects, the relationship between the components of the environment that can be observed by any subject / observer and the spatial-temporal composition that they present in the space. In this way, if the landscape has an obvious externalization of a visual nature, it seems coherent to consider in its analysis also the observer himself and the evocations or sensations of an aesthetic nature that he perceives.

Faced with the challenge of treating the landscape as another resource of the territory, man taking on the role of perceiver, the various fields of knowledge of the landscape have reacted with the emergence of multiple techniques and procedures for valuation and aesthetic and / or environmental objectification of the perceived landscape, that is, the visual landscape. Since the relationship between the landscape and its visual quality is very powerful, and is established to the extent that a landscape is able to contribute to the quality of life of its inhabitants and attract both new socio-economic activities and wealth to the territory through of its aesthetic, cultural or natural values, the procedure of visual assessment has been erected in recent decades as one of the systems of

analysis on the correspondence between the properties of the landscape and the effects of these on the most accepted and used observers. In this context, the visual quality of a landscape seeks to quantify, in a succinct way, the degree of excellence of the landscape, its merit so that its essence and its current structure are preserved.

The nature and multiplicity of data and analysis required in the understanding of a particular landscape has traditionally been approached from various analysis techniques, which has led to the research presented to the Multicriteria Assessment (MA), a set of techniques oriented to attend the decision-making processes in the most varied fields of science, investigating for the case that here a number of alternatives are presented in light of the multiple criteria and objectives that influence the evaluation of landscape value, as well as the environmental aspects of greater spatial relevance and the human activities that affect the global vision in one way or another.

In the specific case of this research work this fact is specified in the expert selection of the factors and criteria to be considered and the subsequent weighting and aggregation. The integration of all the alternatives and variables with geospatial attributes generated by the MA will be done within a GIS, considering that the coordinated employment of the MA and the GIS provides a framework capable of operating with different judgments on the identification of the elements, this is, the factors and criteria of the landscape, and offers the possibility of structuring them in a hierarchical arrangement.

Therefore, the main objective of this essay is to develop a methodology to determine, with an evalua-

tive method, the visual quality of the landscape of the Comarca de las Fuentes del Narcea, Degaña and Ibias through indirect observation of the territory. This procedure, in addition to describing the landscape characteristics from the weighted aggregation of its components, will evaluate it through predefined estimation criteria. In this work, and as a secondary objective of the research, we propose the development of a visual quality model of the landscape using Multicriteria Evaluation (ME) techniques, which integrated into a Geographic Information System (GIS) is capable of generating a cartographic base of the region of Fuentes del Narcea. This cartography must contain the different layers of information that allow the global assessment of the visual quality of its landscape. The second part of this secondary objective leads to conceive the experience obtained in this research as an exportable model, which with adaptations in the parameters and descriptors of each of the landscapes that need to be evaluated, can serve as a pattern for valuing the landscape in a hint.

The importance of assessing the landscape and its visual quality lies in the provision of appropriate forms for the establishment of certain uses and activities in a territory, as well as to ensure their conservation over time, especially when dealing with landscapes of great uniqueness. In this sense, the proposed methodology has evaluated the combined use of GIS and ME, which allows on the one hand to take advantage of the enormous potential of management, spatial analysis and modeling of data related to the landscape offered by GIS and, on the other hand, the implementation of efficient procedures aimed at the analysis of preferences and evaluations expressed by experts and other interested parties.

The methodology that has been implemented in this study goes through different stages: a first one of study and selection of the factors that are part of the visual quality of the landscape, a second one of weighting the factors by means of the Analytical Hierarchical Method (AHM), to finally obtain the visual quality map of the landscape of the three selected Councils. The selection of the criteria was carried out under three complementary procedures. First, a bibliographical review was carried out with the objective of, on the one hand, determining which aspects are the most valued and accepted by the scientific community in landscape studies and, on the other hand, which criteria had been used in previous similar experiences. In the second place, several debates were held within the Group of Research and Territorial Analysis (Gratet) of the Geography Department of the Rovira i Virgili University, from which a first extensive

list of criteria was made. In the third place, the initial proposal was validated from two meetings with the staff of the Technical Office of the Natural Park of Fuentes del Narcea, Degaña and Ibias. In order to organize the multiple factors that participate in the model, three main groups of criteria have been defined: A) intrinsic quality, B) anthropic elements of positive political incidence and C) anthropic elements of negative political incidence.

Regarding the standardization of the criteria and their assessment, each one of the considered elements has been treated independently.

The weighting of the criteria, defined as the weight or importance attributed to each of the factors used to calculate the visual quality of the landscape within the model designed for it, has been carried out using the Analytic Hierarchy Process (AHP) or Hierarchical Analytical Method. This method establishes the relative importance of the elements of each hierarchy from the matrix of comparison by pairs of Saaty (1980). This matrix is composed of as many columns and rows as the criteria make up the model, always introduced in the same order, which allows to compare each factor with the rest (Fig. 3). Each pair of variables is assigned a value of the scale between 1/9 (the first criterion is extremely important with respect to the second) to 9 (the first criterion is extremely important with respect to the second).

Once the factors have been standardized and the weights calculated, the integration of the layers is started from the application of a MA algorithm, more specifically with the exploitation of the so-called Linear Summation System. When weighting the final map of visual quality of the landscape, and therefore adding the layers of intrinsic, positive and negative values, resulted eight positive values that divided the visual quality of the Fuentes del Narcea landscape, based on a valuation scale that, according to the values and weights assigned to each of the factors already mentioned, assigned to each pixel of the visual quality map a positive assessment ranging from 3 to 10, with 10 being the maximum visual quality obtainable in a grid of the raster model and 3 the minimum. These eight categories, therefore, were reclassified and grouped into four levels of visual quality, giving rise to the Final Map of the Visual Quality of the Landscape of the Sources of Narcea.

The maximum visual quality assessment, corresponding to 31% of the Visual Quality Map of the Landscape, approximately 386 km², includes the highest relief intensities and the steepest areas, as well as walls with steep slopes and greater amount of natural vegetation among the which are mentioned as important forested areas of

perennials and deciduous trees. These zones are, in addition, coincident with the shaded areas in the more mountainous areas, which correspond to the zones with the least presence of anthropic elements owing to their marked character of natural redoubt and the complicated accesses they present.

The high visual quality assessment corresponds to 286 km² of the study area, that is, 23% of the Landscape Visual Quality Map. To this valuation correspond the main and most extensive forest and forested areas, which are mainly concentrated in the Valleys of Degaña, of Hermo, by the Sierra de Caniellas and the Acebo and the Sierra de Muniellos, in the part closest to the nucleus qualified as of the highest visual quality.

The third level, corresponding to the average visual quality, represents 27% of the study area, which is equivalent to 335 km² of the Comarca de las Fuentes del Narcea. Basically this group of visual quality has been assigned the highest concentrations of population and human activity, such as areas of cultivation or industrial activity or services of the region, such as the vicinity of the nucleus of Cangas del Narcea or San Antolín de Ibias. Also in these areas have been reflected areas of lower natural vegetation, as for example in the central and southeast Ibias Council.

The fourth level of quality, which represents the lowest visual quality levels of the landscape, occupies 19% of the study area corresponding to 236 km², which are closely linked to the most impacting activities from the environmental and visual point of view the study area, indoor and open-pit mining operations and all the activities derived from it, as well as urban points where presence of negative landscape incidence values has been detected, such as landfills, sewage treatment plants or high-voltage lines and communication repeaters or transport networks. These activities are concentrated in the south of the region, specifically in isolated areas of Degaña, in the areas of greater population density of Cangas del Narcea, and in the large mining centers of Ibias.

From the point of view of the application, it is shown once again that the studies of quality and visual fragility of the landscape are fundamental for a correct ordering of the territory, especially in natural spaces in which the policy of conservation of nature is a priority, and in those in which uses such as tourist-recreational activi-

ties or public use are compatible with the conservation of natural resources. Undoubtedly studies like this, linked to the perception of the landscape, provide information to reduce human pressure on certain sites of great ecological value where public use is traditionally concentrated, indicating alternative places with a high attraction. In this sense, the visual quality of the landscape, together with other resources, is frequently used as a criterion to indicate areas that must be preserved against actions that involve a certain environmental impact.

At present it is true that the vast majority of techniques for assessing the visual quality of the landscape are criticized for their subjectivity, for the limited and characteristic territorial or knowledge area to which they are applied. This research was already based on the premise that there is no correct landscape assessment technique that excludes others and that most of the works are based on subjective but systematic methods. The partiality with respect to the valuation of the landscape becomes even more evident if it is possible when variables of aesthetic and cultural type, related to human perception, become part of the equation of visual quality. The development of the indirect evaluation methodology presented here has a clear bias linked to the relevance and degree of participation of the parameters that constitute its model. This bias is indisputably associated with the direction and choice of the components of the landscape studied and the quality approaches provided. Only through the requirement of a greater and more accurate knowledge of the medium under study by the management team and a more comprehensive incorporation of landscape parameters and the relative importance given by means of the weights carried out will provide an effective solution capable of, in one hand, to offer a less biased alternative and, on the other, adjust more to the demands and peculiarities of the complex space analyzed.

The methodological proposal presented here was born as an aspiration to be a guideline that helps to determine the value of the landscape of a space as concrete as a region of the southwestern mountain of the Principality of Asturias, but at all times the investigation has considered necessary the elaboration of a complete valuation method with well-established ranges and criteria, which is one more tool in the field of perceptual assessment of the landscape from the point of view of geographical discipline.