

DESIGN OF A GIS FOR PHYSICAL LANDUSE PLANNING: A CASE STUDY IN THE BASQUE COUNTRY

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RESUMEN: En este trabajo se presenta un procedimiento para evaluar la aptitud de uso de un territorio basado en el reconocimiento de las pautas de covariación espacial de los valores ambientales de un conjunto de variables territoriales.

Palabras Clave: GIS, Sistema de Información geográfico, uso del suelo, planeamiento, geografía física.

LABURPENA: Lan honek lurren erabilera baloratzeko metodo bat aurkezten du. Metodo horrek ingurugiroko parametroak nola elkar-aldatzen diren eta aldaketa horren errekonozimenduan oin-harritua dago. Ingurugiroko parametroak eta bariabileak estadistika erabiliaz nola tratatu behar diren erakusten saiatzen da lan hau.

'ABSTRACT: DESIGN OF A GIS FOR PHYSICAL LANDUSE PLANNING A CASE STUDY IN THE BASQUE COUNTRY

In this research, a procedure to evaluate the suitability of use of a territory is presented. It is based upon the identification of the lines of spatial covariation of the environmental values of a unit of territorial variables.

Key Words: Geographical Information System, Gis, Basque Country, Physical Landuse.

INTRODUCTION

The main aim of territorial planning studies is to evaluate the suitability of use that the territory offers. This suitability is determined by the possibilities of exploitation of the resorts that it possesses, and by the degree of vulnerability or fragility of these as opposed to different human activities (development actions).

The suitability of the territory can be weighed up as the change of its environmental grade when an activity is implanted on it. This grade does not depend on an only variable or element of the territory but on the interactions which take place among a large amount of them. For instance, interactions among soil, vegetation, relief and water. Being this so, it is necessary the integrated evaluation of these interactions. Given the spatial variability of the elements of the territory, the interactions which take place among them will be also different depending on the geographical sectors.

The use of G.I.S. allows to handle easily the spatial variation of a large amount of variables of environmental interest, making easy its use in planning problems.

Nevertheless, this ease of handling does not guarantee that the necessary integration of the data contained in the G.I.S. can be obtained. In many cases, the cartography of the united spatial variation of these variables is reduced to the simple superposition of their thematic maps. In this way, the system of interactions that takes place among the different spots of the territory for the whole of variables cannot be known.

In this research, a procedure to evaluate the suitability of use of a territory is presented. It is based upon the identification of the lines of spatial covariation of the environmental values of a unit of territorial variables.

MATERIAL AND METHODS

The environmental grade of a spot in the territory can be considered as a vector whose elements are the partial environmental values considered for the different constituents of that territory. These partial or thematic values are easier to evaluate than the overall grade, although, it is difficult to integrate them within an only value of environmental grade.

This integration can be achieved by comparing the vectors of partial grades of a group of numerous spots of the territory. The study of the spatial cooccurrence of all the subjects registered on the points of that group allows to establish a criterion to determine the environmental grade of each point in an integrated way and without the inconveniences of map superposition.

The methodological development has been as follows:

1) Environmental valuation of the thematic cartography in existence. The suitability of the following variables has been valued: altitude, incline, exposure, human uses, drainage, lithology, soils, density of the regolith, geotecnic, morphodynamics, vegetation, landscape and visibility.

2) Regular sampling of the variable values. In order to do it, the territory was divided into 1527 squares of 250 x 250 m. In 714 of them, the value of the above mentioned variables was registered. Each of these last squares is characterized by the grade values of the variables that appeared in them.

3) The lines of spatial covariation of the partial values of graderegistered in the 714 squares of the sampling are studied by means of an automatic multivariant classification. The use of this sort of analysis allows to identify areas of the territory in which the grade of all the subjects is similar, and areas with the same overall grade can be defined. These areas are the result of the spatial covariation of the thematic grades and their characteristics depend on the such covariation. Thanks to the use of multivariant analysis, the relative importance of each subject regarding to the determination of the total environmental grade is determined by the structure of the spatial covariation of the thematic grades and not by judgements, more or less subjective, made by the experts who attain the evaluation.

RESULTS

The phenogram which results of the clasification allows to identify a first division of the territory regarding the variables related to the eurrent uses of the soil (roads, towns, paths, existence of railway, electric layings). They correspond to areas where the physieal features (altitude, incline, soil, geotecnic, and availability of water) offer a favourable suitability of use (groups of comments 1, 2, 3 and 4).

The rest of the territory is characterized by a high naturalistic component determined by greater limitations of use regarding the relief and they coincide with high values of environmental grade.

The image of the phenogram reflects that the territory is organized in the form of environmental gradient which embraces from the lowest areas, valley grounds and areas of scarce relief (right side of the phenogram) to the high areas, with scarce soil and rough relief (left side of the phenogram, at the considered level of similitude).

The transition between these two areas is realized in an abrupt way, as it is shown by the few comments (group 5 and 6) in which the conditions of substratum and relief still offer a certain suitability of the territory to develop activities with certain limitations. An instance of them could be the forests with control of extraction of wood.

The rest of the territory presents scant suitable conditions for an intensive human use, because of the relief and erosion conditions, low capacity of hidric retention and surface soils of scarce density. These areas require a strict control of their use and, probably, the development Or protection measures. These measures should safeguard the high values of the landscape and of vegetation in these areas. Uses designed to preserve and maintain wild life are advisable, by controlling the exploitations of natural forests.

CONCLUSION

This procedure allows to define areas of homogeneous environmental grade which are the result of the spatial covariation of the partial grade of the different subjects considered. These areas of homogeneous grade are determined objectively, being clearly explicit the steps taken for their definition.

The procedure presents a very favourable relation effort/results, allowing to embody in the planning the spatial relations among numerous variables in a quick and integrated way.

