

Bibliometric Analysis of the Scientific Production on Soil Erosion in Andalusia (1964-2008)

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Key words: soil water erosion, bibliographic database, scientific production, bibliometric indicators, Andalusia.

1. INTRODUCTION

Andalusia is the autonomous region most affected by soil erosion by water in the Spanish Mediterranean region. Water erosion is the main cause of soil degradation in Andalusia. In Andalusia, soil erosion rates are high due to climatic conditions, soil characteristics and the nature of tillage systems employed, mainly, in many olive groves. Soil erosion has both on-site and off-site environmental impacts. The primary aim of this paper is to analyze the scientific literature of soil water erosion research in Andalusia by means of bibliometric indicators. The period under consideration runs from 1964 to 2008, representing a total of 433 works published in international (135 references) and national (99) journals, national (83) and international (21) conferences proceedings, book chapters (54), books (18), doctoral thesis (16) and other documents (7).

Bibliographic information was collected from Bib-Eron, a bibliographic database on soil erosion. The analysis was based on the scientific documents encoded in the database. The database is collected and maintained by the land use planning department (Centro de Investigaciones sobre Desertificación –CIDE). The Desertification Research Centre (CIDE) is a research joint centre (The Spanish National Research Centre, University of Valencia and Valencian Government). The aim of Bib-eron is to classify the large number of scientific and technical publications on water erosion in Spain and aims a useful tool for researchers through its availability on the Web in the near future. The database use twenty six classification descriptors to facilitate evaluation and retrieving bibliographic references.



Several bibliometric indicators have been employed in order to establish the number of documents published by year of publication, distribution of documents by research topics, characteristics of contributions published in national and international journals, geographical distribution of scientific production, institutional affiliation of authors, institutional productivity and interinstitutional collaboration.

2. RESULTS AND DISCUSSION

Between the mid-sixties and the late 1980s the study of erosion in Andalusia is not relevant if we consider that such a long period only contributes 42 scientific documents. As of 1990, the number of publications analysing water erosion increases considerably. Of the total of bibliographic references considered in this analysis, 42 were published between 1964 and 1989 (10% of the total), 138 in the nineties (32%) and 253 between 2000 and 2008 (58%).

The most important erosion research lines developed in Andalusia are the following: soil infiltration and runoff production (55 references), predicting soil erosion with models (53 references), effects of agricultural management on soil properties and soil-water losses (51 references), hydrological and erosion response of badland system (41 references), qualitative assessment of erosion risk (24 references), methodologies to study erosion processes (23 references), erosion control policies and restauration strategies (21 references) and effects of vegetation on water erosion control (20 references). The documents classified by these eight descriptors represent 66% of the bibliographic references encoded in the database.

The 234 articles incorporated in the database have been published in 48 international journals (27 with an article) and 31 national journals of which 21 only have one or two articles. This situation reflects the dispersion of scientific production. The international journals with more articles are *Catena/Catena Supplement* (31 references), *Geomorphology* (11 references), *Earth Surface Processes and Landforms* (8 references), *Journal of Hydrology* (6 references), *Soil Use and Management* (6 references) and with 5 references each one, *Agriculture, Ecosystems and Environment* and *Soil and Tillage Research*. These 7 magazines concentrate half of international publications, the rest is distributed in 68 different journals. National journals with more erosion related articles are *Edafología. Revista de la Sociedad Española de la Ciencia del Suelo* (17 references); *Baética. Estudios de Arte, Geografía e Historia de la Universidad de Málaga* (15 references); *Cuadernos Geográficos de la Universidad de Granada* (10 references), *Cuadernos de la Sociedad Española de Ciencias Forestales* (8 references), *Agricultura de Conservación* (5 references) and *Ingeniería del Agua* (5 references). As of 1998, the papers are directed, preferably, towards journals included in the journal Citation Reports.



The spatial distribution shows that five autonomous regions (Comunidad Valenciana, Andalucía, Región de Murcia, Cataluña and Aragón) account for 75% of the scientific documents published in Spain. In Andalusia the interprovincial distribution is very uneven. This distribution is conditioned by the location of the most productive research centres and the location of the experimental stations financed by the RESEL Network. Almeria (95 bibliographic references), Granada (77 bibliographic references), Málaga (54 bibliographic references) and Córdoba (44 bibliographic references) provide 85% of the publications encoded in the database. The scientific production is distributed among 40 departments of 20 Spanish universities, 60 research units or departments of foreign universities, 8 CSIC research institutes, 3 joint research centres between the CSIC and Spanish universities and more than 10 organisms of public administration. Spanish universities constitute the most potent source of scientific production. CSIC research institutes form the second institutional group in quantitative importance. About 60% of the publications are written by authors from the same institution. The most productive institutions are the following: Departamento de Geografía de la Universidad de Málaga, Departamento de Agronomía de la Universidad de Córdoba, Departamento de Edafología y Química Agrícola de la Universidad de Almería, Estación Experimental de Zonas Áridas (CSIC) and Centro de Investigación y Desarrollo Agrario (Junta de Andalucía).

