WATER AND NATURAL HAZARDS MANAGEMENT

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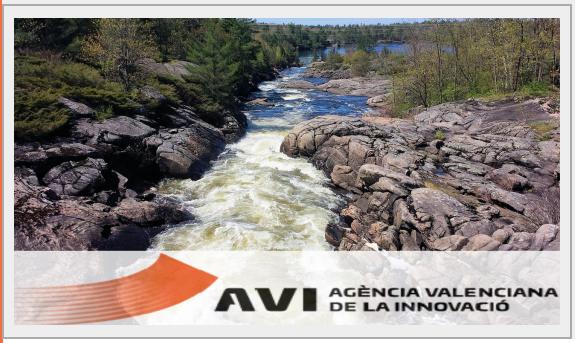
ABSTRACT

The Interuniversity Institute of Geography (IIG), at its headquarters at the University of Alicante, has extensive experience in the design of territorial management and development projects.

Currently, its work on water management and natural hazards is particularly noteworthy. Therefore, the Institute is looking for companies or institutions interested in developing projects to solve their needs or problems within these fields of research.



INTRODUCTION

The current Inter-University Institute of Geography (IIG) is the result of the union of the University Institute of Geography of the University of Alicante (created in 1982) and the Climate Laboratory of the Universitat Jaume I of Castellón. Thus, in 2009, they joined forces, resources and personnel into one, with the aim of strengthening and expanding their lines of research.

Thus, the IIG has branches in both organisations; the Alicante branch is made up of 25 members with multidisciplinary training who deal with the most complex problems.

Figura 1: logo del IIG

TECHNICAL DESCRIPTION

The group conducts its research and has in-depth experience and know-how in the following areas:

1. Water and Territory

Water is a scarce good that acquires strategic value in regions where its availability is insufficient to meet the different demands, thus conditioning the alternatives for territorial development. The following works are included:

- Diagnosis of water management efficiency in urban, tourist and industrial areas.
- Management systems in irrigation communities and agricultural areas.
- Characterisation and use of conventional and non-conventional water resources.
    - o State of surface resources
    - o Aquifer systems
    - o Drainage and wastewater treatment systems
    - o Wastewater reuse and desalinated water production

2. Climate and Spatial Planning

This area studies the relationship between climatology and spatial planning/organisation, with works such as:

- Synoptic analysis of atmospheric situations
- Climate hazard studies
- Cartography of natural risks
- Floodability studies (PATRICOVA)
- Climatic analysis for spatial planning documents (PGOU, Environmental Impact Studies)
- Historical climatology studies, based on the analysis of documentary information (rogations, written press, proxy-data).
- Wind studies in coastal and mountain areas

ADVANTAGES AND INNOVATIVE ASPECTS

MAIN ADVANTAGES OF THE TECHNOLOGY

The Institute has two laboratories from which it obtains all kinds of data necessary to provide knowledge and thus address any need or problem with maximum guarantees:

- *Climatology Laboratory:* it carries out research, teaching and scientific dissemination work for the knowledge of weather and climates in our country and, especially, in the lands of Alicante. It has facilities where different climatic variables are monitored by means of daily observation using a variety of traditional and automatic meteorological equipment.
- *Geomatics Laboratory:* it specialises in the development of thematic cartography and geographic information systems in areas such as water resources, climatic risks, land use, landscape, as well as cadastral cartography for the management of real estate assets. The Laboratory staff always uses free software tools for each of its projects.
  It is worth mentioning the creation of the Geographic Information System of the University of Alicante (SIGUA) more than 20 years ago. A tool that has obtained great international recognition and that is adding new functionalities adapted to the new needs of the University.

INNOVATIVE ASPECTS

Researchers incorporate all the information obtained in each project into a Geographical Information System (GIS), designed and developed for territorial management. For example, in the case of projects on water resources, the GIS provides the following advantages:

- The possibility of homogenising data on supply sources, consumption, areas of use, infrastructures.
- The continuous updating of the generated databases, as well as the obtained spatial representations.
- The identification of management scenarios for aquifers, surface water, water transfers and non-conventional sources.
- Monitoring and control of the exploitation of all supply sources.
- Monitoring and control of agricultural, urban, tourist and industrial use areas by means of exploitation plans.
- Modelling of the operation and supply regimes of supply sources.

- Modelling of the operation of high- and low-level distribution, sanitation and purification infrastructures.
- Consultation, in real time, of existing operations and even the design of models to identify future trends.

CURRENT STATE OF DEVELOPMENT

Since 1983 the Institute has published a scientific journal for the dissemination of geographical knowledge under the name of **Investigaciones Geográficas** (ISSN 0213-4691). The journal, of great national prestige, currently published only online, accepts articles and bibliographic reviews, in Spanish or English, necessarily original and unpublished, which include scientific contributions of a geographical nature, in any of its areas of knowledge.

The journal, which is published every six months and offers open and immediate access to all its contents, has an Editorial Board and an Advisory Board, made up of prestigious researchers, who guarantee the rigour of the contributions published.

In addition, the Institute is responsible for the organisation and annual delivery of the **Official Master's Degree in "Planning and Management of Natural Hazards"**, the first specific Master's Degree in Spain on natural hazards. Its creation is a consequence of the growing concern, in society and public administrations, about the serious effects of nature in vulnerable areas, most of the time due to bad decisions and actions of human beings.

MARKET APPLICATIONS

The most interested sectors may be the Public Administrations (national, regional, provincial, county or local) responsible for urban planning and environmental competences, as well as those concessionary companies in charge of the collection, potabilisation, distribution, purification and reuse of water in a specific territory.

Recent national and European regulations oblige administrations to incorporate hydrological variables in land-use planning and development. These policies, under a global perspective based on the integral water cycle, must have an objective system of environmental and hydrological indicators to assess the costs and benefits derived from the introduction of new demands and the changes in use introduced by expanding productive activities such as tourism and second homes.

Some of the most recent research projects are worth highlighting, for example:

- Assessment of water poverty in urban environments on the Mediterranean coast. Case study (Alicante, Murcia and the metropolitan area of Barcelona). Funded by the Ministry of Science, Innovation and Universities and due to finish in 2023.
- The Lower Segura as a geostrategic enclave of the European Union: historical-normative study of water law as a basis for the future Territorial Action Plan. Vice-rectorate for Research and Knowledge Transfer of the University of Alicante, to be completed in 2022.
- Simulating tourism water consumption with stakeholders (SIMTWIST). European project funded by the Joint Programming Initiative (JPI)-WATER and with completion in 2022.
- Climate change and water: non-conventional resources as an adaptive strategy to increase the resilience of agricultural and urban-tourist uses on the Alicante coast. Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital (Regional Ministry of Innovation, Universities, Science and Digital Society) and ending in 2021.

COLLABORATION SOUGHT

- Type of client sought: companies, universities and public or private institutions.
- The research group is interested in the application of its know-how in specific projects.

INTELLECTUAL PROPERTY RIGHTS

The technology is protected under the Research Institute's ***know-how*** accumulated over the years and with the result of hundreds of publications: books, book chapters, articles in specialised Spanish, European and Latin American journals, conference minutes; likewise, a large number of degree theses, Master's theses and doctoral dissertations have been defended.

In addition, several monographs have been published which constitute bibliographical works of reference on water use in Spain:

- *"Alteración de los regímenes fluviales peninsulares"*, a book published by the Caja Murcia Foundation, which analyses the substantial modification of the regimes of Iberian rivers during the 20th century, particularly in the second half of the century. This monograph specifies the causes and quantifies this process, with essential reference to flows, runoff coefficients, low water levels and floods, agricultural and urban demands, ecological flows and environmental alterations.

- *"Aridez, salinización y agricultura en el Sureste Ibérico"* a book published by the Ramón Areces Foundation and the Euro-Mediterranean Institute of Hydrotechnology, is a novel contribution on the use and management of water resources in cutting-edge agriculture. This work makes an exhaustive diagnosis of the advantages, dependencies, uncertainties and risks of cutting-edge agriculture in relation to the use of water, highlighting such important aspects as the overexploitation and contamination of inland waters, the technification of irrigation systems, the uncertainties involved in the irruption into international markets of products from other continents, competition for the use of land and water with urban-tourist functions, etc.

MARKET APPLICATION (4)

Pollution and Environmental Impact
Regional Planning
Water Resources
Tourism