



THE DINA-MAR PROJECT. AQUIFER RECHARGE MANAGEMENT WITHIN THE FRAMEWORK OF SUSTAINABLE DEVELOPMENT

This is a R&D&I project that is financed by the Grupo Tragsa, the aim of which is to establish which zones in Spain are liable to be used for artificial recharge operations (AR) and Artificial Aquifer Recharge or Managed Aquifer Recharge (MAR), within the framework of sustainable development and following standards involving minimum negative environmental impact.

- The area of land likely to store volumes in addition to the yields from natural recharge with forestry use, generally lying in the upper reaches of basins, is slightly lower than 9,000 km².
- The land that is associated with river beds or wetlands with the same conditions as in the preceding case amount to 10,500 km².



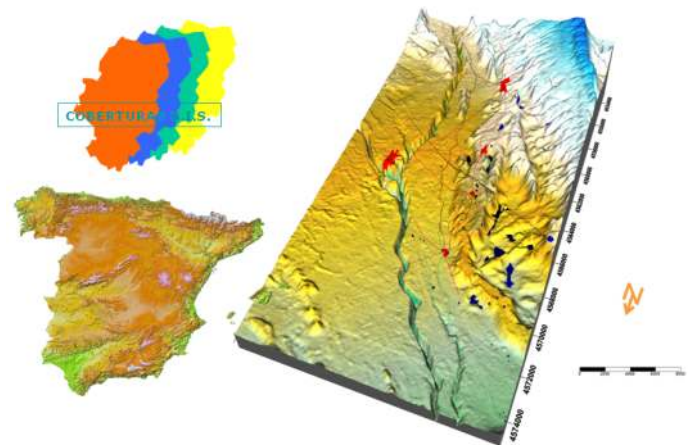
The project, which consists of five phases, began with an extensive study of the state of the art, especially on a national scale. Until the present time, the technique has hardly ever been put into practice. Mention must be made of the activities that have been promoted by the MAPA in the Arenales Aquifer (Segovia), the research into the subject undertaken by the Instituto Geológico y Minero de España and the experiences that have been obtained in Catalonia.

PHASE 1: Establishing the geological formations suitable for artificial recharge

The calculation process is based upon the GIS analysis used for this with more than 30 thematic covers tested using different deductive methods.

GIS Analysis. First results

- The total area calculated (Mainland Spain and the Balearic Isles) ranges from 27,000 to 43,000 km² in aquifer zones close to river beds of a reasonable size, most of which lie in irrigation zones where groundwater is used.



Nº	BASIN	Calculus 2 (km ²)	%	Calculus 3 (km ²)	%
1	NORTE II	1	0,01	1473	3,48
2	DUERO	2699	25,95	11113	26,23
3	TAJO	973	9,35	5515	13,02
4	GUADIANA I	881	8,47	2972	7,02
4	GUADIANA II	24	0,23	91	0,22
5	GUADALQUIVIR	1406	13,51	3500	8,26
6	SUR	468	4,50	1674	3,95
7	SEGURA	494	4,74	1633	3,85
8	JUCAR	1224	11,77	5884	13,89
9	EBRO	1822	17,51	6599	15,58
10	C.I. DE CATALUÑA	413	3,97	1910	4,51
TOTAL		10403	100,00	42364	100,00

GIS analysis. First results.

PHASE 2: Establishing and controlling in “Pilot zones”

Work has begun on taking ongoing data in the pilot zones, and it is planned to add to more in the near future. Studies are conducted in these to establish the way the infiltration rates evolve and to test the effectiveness of the prototypes of artificial aquifer recharge devices (AR).

PHASE 3: Studying and designing specific devices to achieve a high infiltration rate

This is based upon the analogical scenario technique. At present, tests are being carried out on different devices for the artificial recharging of aquifers in the pilot zones, with a view to establishing the most suitable technique to use in each one of the potential application zones.



PHASE 4: Environmental aspects

a) CONSERVING THE ECOLOGICAL FLOWS

A methodology is being developed for establishing what environmental flows must be conserved in the river beds concerned, on the basis of a variety of different hydrological and environmental criteria.

b) WATER REGENERATION. KEY ELEMENTS

Water regeneration of wetlands by means of AR is one of these key elements. This is the case with the experience



carried out by the JCL and the Grupo Tragsa in the Iglesia de Coca Lagoon (Segovia). Other further aspects are the recovery of springs, restoring dune systems, etc.

c) SUDS

The Sustainable Urban Drainage Systems (SUDS) are conducive to the infiltration of surface water in urban



areas, and are likely to be used as a tool in a suitable and



sustainable environmental management model.
D) ENVIRONMENTAL INDICATORS

At the same time as research is being conducted into the technique, a series of new environmental indicators are being prepared that will enable the users to obtain an approximation of the actual effect of the potential, implementation of the infrastructures for artificially recharging aquifers and environmental impact assessment criteria.

PHASE 5. Environmental Education and Dissemination

The project intends to disseminate the information generated in different fields, distinguished by action groups, as well as to disseminate environmental education premises. With a view to this, specific educational material is being prepared and communicated with respect to aquifer recharge management, and action strategies are being developed.



CONTACT

Further information:

Enrique Fernández Escalante
Tel. 913 226 106
dina-mar@tragsatec.es
www.dina-mar.es

