



TRUST - Tool for Regional scale assessment of groUndwater STorage improvement in adaptation to climate change

PROJECT DESCRIPTION

Climate change is the survey context of the 'TRUST' project as decisive factor within the surface waters and groundwaters management. In particular 'TRUST' was aimed at quantifying the possible consequences of climate change on aquifers and identifying adaptation measures through their artificial recharge to mitigate the impacts caused by drought and decreased availability of water resources resulting from climate change. The first project step was the hydrogeological characterization of the study-area. The filling of the aquifer was done by long-lasting irrigation of specific cultivated areas trough adapted irrigation infrastructure. Successively the amount of water infiltrated in the underground was measured so testing the contribution that this practice can provide in balancing the groundwater resources.

PROJECT PHASES

The survey area of 'TRUST' covered the North-East part of Italy, in particular the aquifer recharge area in the plains of Veneto and Friuli regions, where important rivers such as Isonzo, Tagliamento, Livenza, Piave, Brenta and Bacchiglione flow. The 'TRUST' project has been divided into 12 specific actions. The most significant were:

- Acquisition and evaluation of all data and studies available regarding the project area in order to determine the state of the aquifer. The collected information was then addressed in a WebGIS with a Geo-database;
- Remote Sensing and GIS development for the assessment of water deficit caused by climate change. During this activity the current land use and the types of crops in the project area were mapped. It was also set up a procedure for assessing the water requirement of the most widespread cultivation in the area study-area;
- Scenarios on future climate change. Simulations of climate change evolution in the Mediterranean region were made by the Euro-Mediterranean Centre on Climate Change and therefore represented the past scenarios of the twentieth century and the future scenarios of the twenty-first century;
- Impact of climate change on the future water demand and the aquifer recharge. In particular the consequences of an increase of drought on the river flow and the aquifer recharge, as well as the expected water demand on the basis of specific analysis and the groundwater deficit were evaluated. This action was supported by a Regional Risk Assessment (RRA) which supplemented the characterization of future scenarios of groundwater vulnerability with an economic assessment;
- Hydrogeological balance model. A software tool was developed to assess the impact of the climate change on the aquifer recharge and to make projections of the water demand by the various users;
- Objectives and aquifer recharge measures accompanied by cost-benefit analysis. As part of this action an assessment of the water reserve potential in the project area was also carried out.

A complex coordination work has been performed to reach the targets and it led to the activation of an operational network of stakeholders in order to make the project actions converge and make them consistent with the different needs expressed by the territory. A database has been created to collect all the acquired data to quantify water requirements by using remote

sensing techniques.

This allowed to identify different climate change scenarios and to assess their impact in order to define and calculate the risks for water resources. During this phase some very important data have been detected. In particular it was shown that in the course of the twentieth century the Earth's temperature may rise up to 5 ° C with a consequent precipitation reduction. A newly created complex balance model served as useful tool to manage the inputs from climate, hydrologic and hydraulic components. Practical actions for artificial aquifer recharge were implemented to check on the field the results of the infiltration models and to understand their effects in the different climate change scenarios.

PROJECT RESULTS

The experiments carried out within the TRUST project made it possible to verify on the field the sustainability of artificial aquifer recharge in line also with the European orientation, promoted as part of the topic “ecosystem services” of the National Biodiversity Strategy, which promotes “a unifying concept in the assessment of the relations among environmental resources, economic systems and governance actions”.

The solutions developed by the TRUST project for the integration of climate change into sustainable planning of groundwater resources can be replicated to great effect in Italy and Europe. The main results achieved were as follows:

- Design and development of a [Web GIS Database](#) to give the opportunity to all users to view, in a very simple and immediate manner, the main results obtained from the processing performed and from the models implemented within the project. The Web GIS had also the function to support all stakeholders in the water resources planning and management in the Veneto and Friuli regions;
- Organization of campaigns to measure the soil infiltration flow. These initiatives have allowed a cost-benefit analysis of the practices for protecting aquifers and they have provided useful instructions for the enhancement of the territory multi-functionality as well as for the generation of an excellent combination of resources and services. It was evaluated within the project that the application of Managed Aquifer Recharge (MAR) techniques on an area of 100 hectares could recharge the aquifer with approximately 50 million cubic meters of water and, simultaneously, provide 60.000 Euro from the sale of crops cultivated in the MAR sites;
- Application on the field of a risk assessment methodology aimed at identifying the components of the territory which could be most affected by climate change impacts on aquifers. In particular a [Regional Risk Assessment \(RRA\)](#) methodology, able to provide an estimate of the potential climate change risks for exposed areas and targets, was applied in the project area. The so elaborated method, together with the [Technical manual of the hydrogeological balance model](#), gave support to the territorial policy makers to define adaptation measures for the groundwater aquifers. As part of the book published at the conclusion of the project, “The TRUST project 2009-2011”, realized on the occasion of the celebrations for the twentieth anniversary of the LIFE Programme, an entire chapter was dedicated to the RRA and its on the filed experimentation.

The project was awarded Best of the Best LIFE Environment.

Acronym: TRUST

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Website: <http://www.lifetrust.it>

Keywords: [Artificial recharge](#), [Aquifer](#), [climate change](#), [Water](#), [Subsoil](#).

Call Year: 2007

Theme: [Clima](#)

Beneficiary Coordinator: Autorità di Bacino dei fiumi Isonzo, Tagliamento, Livenza, Piave, Brenta-Bacchiglione

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Project area Region: Veneto.

The project was realized in the Esino river basin area in Veneto region.

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