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Tool for Regional scale assessment of groundwater storage improvement in adaptation to climate change

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COORDINATING BENEFICIARY:
- High Adriatic River Basin Authority

ASSOCIATED BENEFICIARY:
- European-Mediterranean Centre for Climate Change (CMCC);
- SGI Studio Galli Ingegneria S.p.A. (SGI)
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ISSUES

- Groundwater in the Upper Plain of these regions have been exploited for decades for agricultural and industrial uses.

- In recent years, aquifers, affected by growing water demand, showed a significant lowering of groundwater levels and artesian depressurisation.
Adaptation to Climate Change and Water Framework Directive

Art. 4 WFD 2000/60/CE:
“Member States shall protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status”
General OBJECTIVES

• Incorporate climate change scenarios in the river basin management in accordance with WFD 2000/60/CE

• Examine issues related to the development of water management strategies at river basin scale (WFD) in relation to the CC scenarios
Specific OBJECTIVES

• Develop a database that may characterize the groundwater (and the related water balance terms) to regional scale

• Assessing the possible negative impacts on aquifers of the Veneto-Friuli plain, associated with the climate change scenarios
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Tool for Regional-scale assessment of groundwater storage improvement in adaptation to climate change

TRUST - STUDY AREA

THE UPPER VENETO-FRIULI PLAIN
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>ACTION TITLE</th>
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</thead>
<tbody>
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<td>1</td>
<td>Set up of the stakeholders</td>
</tr>
<tr>
<td>2</td>
<td>Acquisition / evaluation of available data</td>
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<td>3</td>
<td>Remote sensing and GIS</td>
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<td>4</td>
<td>Climate change scenarios</td>
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<td>Impact of climate change</td>
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<td>6</td>
<td>Tools for large scale groundwater balance</td>
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<td>Objectives and measures definition</td>
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<td>Capacity building</td>
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<td>Project dissemination</td>
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<td>Project monitoring</td>
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**Tool for Regional – scale assessment of groundwater Storage improvement in adaptation to climate change**

**Coordinating beneficiary:**

**Partners:**
**ACTION 1: Set up of the stakeholders and conceptual framework**

**OUTCOMES:**

- TECHNICAL ADVISORY COMMITTEE
- AGREEMENT FOR EXCHANGE DATA

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*Coordinating beneficiary:*

*Partners:*

*CMCC Centro Euro-Mediterraneo per i Cambiamenti Climatici*
ACTION 2: Acquisition and evaluation of data and studies available

AIR-SOIL INTERFACE DATA
- Pedology map
- Land usage
- Irrigation system

METEOROLOGICAL DATA
- Rainfall
- Temperature area
- Humidity
- Solar radiation
- Wind speed
- Snow
- EVT

HYDROGEOLOGICAL DATA
Superficial water...
- Hydrometric levels
- Discharges

... and groundwater
- Piezometric levels
- Withdrawals
- Withdrawal depth
ACTION 3: Remote sensing and Gis (to quantify the irrigation water deficit)

Spectral signature

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Coordinating beneficiary: [Image]

Partners: [Image]
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ACTION 3: Remote sensing and GIS
(to quantify the irrigation water deficit)

LANDSAT Satellite images

Crops map
Crop water balance

ACTION 3: Remote sensing and GIS
(to quantify the irrigation water deficit)

\[ D_n = P_n - (ETp_n * Kc_n) + Ru_{(n-1)} - R - I_n \]
ACTION 3: Remote sensing and GIS (to quantify the irrigation water deficit)

Irrigation water deficit (summer 2006)

<table>
<thead>
<tr>
<th>mm</th>
<th>250 - 300</th>
<th>200 - 250</th>
<th>150 - 200</th>
<th>100 - 150</th>
<th>50 - 100</th>
<th>1 - 50</th>
<th>0</th>
</tr>
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Coordinating beneficiary:

Partners:
ACTION 5 - Impact of climate change

\[ j(x,t) \quad \text{geomorphoclimatic approach for determining hydrological response of river basins} \]

\[ j(x,t) \rightarrow Q(t) \]

TRUST STUDY AREA

Possible effects of future climate on the hydrological balance of the studied river basins