

# Italian case study areas



Water2Adapt

Resilience enhancement  
and water demand management  
for climate change adaptation

## River Basin Po

The Po is the longest river in Italy, with a length of 652 km from its source in Cottian Alps (at Pian del Re) to its mouth in the Adriatic Sea, in the north of Ravenna. It is also the largest river with an average discharge of 1540 m<sup>3</sup>/s. The river basin area extends on about 71.000 km<sup>2</sup> and includes a large part of the Padan Plain, and is fed by a main reticulum of more than major 140 water courses (more than 20km of length) and an almost ten time larger secondary reticulum of natural and artificial water bodies, irrigation and reclamation channels. In the Alpine area, 174 water reservoirs manage 2.803 billion m<sup>3</sup> a year, of which 143 artificial reservoirs for hydropower production, controlling 1.513 billion m<sup>3</sup> and another 1.290 billion m<sup>3</sup> controlled by natural lakes; furthermore the basin comprises circa 600k m<sup>2</sup> of glacier areas.

Climate conditions in the Po area are changing in a sensitive way: from 1960 to present an increase of the annual mean temperature of about 2 °C has been observed, with a relevant increase of the linear trend which leads to forecasting an increase of the annual mean temperature close to 3-4 °C at the end of the century. The decrease of precipitation is not so

evident, nevertheless, an increase in the intensity of the single rainfall events, but an overall decrease in the total number of the rainfall events can be observed, resulting in a decrease of the annual mean precipitation of about 20% observed during the last thirty years. The decrease is more evident during spring and summer seasons (when a maximum decrease of about 50% can be noticed) whereas the inter-annual variability increases. Furthermore, due to the strong negative correlation between the decreasing snow coverage and the increasing air temperature, a constant retreatment of the alpine glaciers is expected.

The Po Valley covers the economically most important area of Italy, and a population of more than 16 million which produces 40% of the national Gross Domestic Product. Water uses within the Po valley come from the electricity sector (about 890 hydro-electric power plants power producing 48% of the national hydroelectric production, and 400 thermo-electric plants (31% of the national thermo-electric production), from inland navigation (although heavily reduced in the recent years due to low-flow conditions) and for an irrigation based agriculture.

The river is subject to high flow variation, frequent floods and periods of low flows. Total water abstractions account to more than 20.5 billion m<sup>3</sup> per annum, most part of which (16.5 billion m<sup>3</sup>) is used in agriculture/irrigation, 2.5 billion m<sup>3</sup> for drinking water and 1.5 billion m<sup>3</sup> for industrial uses. Abstractions account for 14.5 billion m<sup>3</sup> for surface waters and for 6 billion m<sup>3</sup> for groundwater. The extreme low precipitations in 2006/2007 left a water deficit of about 380 m<sup>3</sup> of water, which exceeded the 2003 and 2006 drought years.



## Emilia-Romagna region

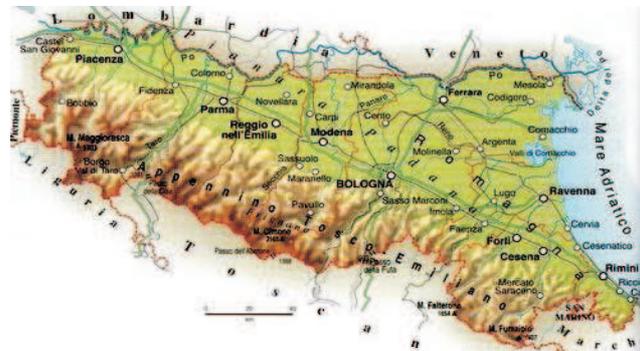
Emilia-Romagna is a North-Western Italian County that was officially established in 1970, with Bologna as the County capital. To the East it reaches the Adriatic Sea, to the North Veneto and Lombardia, to the West with Piemonte and Liguria, to the South with Toscana, Marche, and the Republic of S. Marino. The County comprises two historically separated regions: Emilia (Provinces of Piacenza, Parma, Reggio Emilia, Modena, Ferrara, and part of Bologna's) and Romagna (Rimini, Ravenna, Forlì-Cesena and the remaining of Bologna's).

The county climate is prevalently sub-continental, except along the coast, where it is Mediterranean. Hence, the area is characterised by

very hot and humid summers and cold, long, and foggy winters, with average temperatures remaining around 0°C.

Precipitations range between 650-800mm/yr in the plains, but increase in the Apennines where they exceed 1500mm/yr, with occasional snowfall –that sometimes reaches the plains too - between November and March.

The plains often suffer drought in summer, a phenomenon that has been increasing – albeit not permanent – since the turn of the century: in the last 5 years, winter temperature raised by 2°C and precipitations fell by 30%. For instance, in 2010, a particularly rainy year, July precipitations remained below average. The total of the local population adds to 3,906,448 inhabitants, whilst immigrants account for 460,000 units.



## City of Parma

Located in the North of Italy, in the western side of Emilia, between the Apennines and the Padana plain, the city is crossed by the homonymous stream Parma, an affluent of the river Po. The weather is continental: hot and humid summers with day-temperature set at around 30-35 °C; rigid winters with an average temperature below 0°C. A typically autumn phenomenon is fog, particularly to the North of the Via Emilia and towards the Po River. The rainiest month is October (average 110.2 mm) whilst the driest one is July (average 37.6mm) Population growth in the Parma Municipality, after several decades of negligible growth, began to rise again after the turn of the Millennium. In 2010 to a total number of inhabitants reached 184,467.

