



Thesis title

Multi-sector multi-actor adaptation to climate change in the Adda River basin

Short description

Climate change has become a significant global challenge, altering temperature and precipitation patterns worldwide. The resulting shifts have led to more frequent and intense extreme weather events, exacerbating tradeoffs between different sectors and posing unprecedented challenges to water resource management.

Future projections of meteorological variables are necessary to assess the impact of climate change and develop efficient management strategies. These projections work well in large regions, but not in relatively small basins, especially those with a complex horography such as the alpine region.

An example of this situation is the Lake Como water system. It drains an alpine hydrological basin with several artificial reservoirs used for hydropower production. Lake Como is then operated to provide water downstream to the agricultural sector, control floods on the lake shores, and contrast low water levels that would negatively impact navigation and aquatic ecosystems.

The candidate is expected to carry out the following activities:

1. Implementation of a two-step statistical downscaling framework to correct both the intensity and frequency of rainfall events in the Adda River basin
2. Estimation of the inflows into alpine hydropower reservoirs and Lake Como starting from the downscaled (unbiased) projections employing a physically-based hydrological model.
3. Identification of optimal planning and management strategies using the EMODPS approach
4. Assessment of the impact of new climatic regimes on different water sectors.

Relevant courses and knowledge: Natural Resources Management, Advanced Environmental Systems Analysis

Number of Students: 1

Requisites: The student should be comfortable with reservoir operation and climate change analysis (scenarios downscaling and impact assessment). Proficient coding skills (Matlab/Python/C++) are mandatory.