



## **ARPA LOMBARDIA river gauging network: a great daily effort**

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ARPA Lombardia is the Environmental Protection Agency of Lombardy, a wide region in northern Italy. ARPA is in charge of river monitoring either for Civil Protection or water balance purposes. Lombardy is characterized by a very complex territory; rivers start from the alpine areas and end in the Po river plain. Each mountain or plain area has specific hydrological features that has to be considered when planning a monitoring network. Moreover, human activities (such as lake regulation, agriculture diversions, hydropower plants with regulation structure etc) add anthropic interferences on the natural river system and can invalidate the collected data. In the last 10 years ARPA performed a major revision of the river gauging network. Each station was analysed using well defined criteria based on the required information (water balance or flood monitoring) and on the suitability of the gauging site (hydraulic characteristic or accessibility for spot measures). In the end more than 30% of the network was revised, many stations were closed and other installed. Particular attention was given to the discharge estimation. Many sites are characterized by backflow effect due to river confluences or to hydropower plants with water regulation structures. In these cases the classic rating curve approach can not be applied. Thus, for the first time in Italy, water velocity side looking doppler sensors were installed on natural rivers and the discharge is estimated with the index velocity method.

The Italian Civil Protection Agency requires high transmission standards. No data can be lost for transmission failures and data has to be available every 30 minutes. For these reasons ARPA implemented a double transmission system: the first is based on the existing GPRS network managed by private operators, the second is based on a radio network directly installed by ARPA and totally dedicated to data transmission. This double approach ensures a very robust transmission and it allows ARPA to collect and publish data every 10 minutes.

ARPA also decided to freely publish all hydrological data on its web site (<http://idro.arpalombardia.it>). Since 2010 either real time data or historical long series have been made available to everyone over a webgis platform.

Every day ARPA employs check if the network is working correctly and validate the data. The aim is to follow the whole process of data management from its collection on the field to its open publication; this requires a great daily effort from the people in charge of the network maintenance.