

Small reservoirs: a contribution to a sustainable water resources management

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Small reservoirs are widely used water storage, especially for irrigation purposes. During the last decades, many of these reservoirs became an untapped resource and the increase of drought periods suggests to evaluate a full and rational use of these resources.

Small reservoirs are generally widespread over the territory, but often there are no reliable data on their potential in terms of storage volume, hence of the available water. In the recent bibliography, there are studies that describe new approaches for estimating the storage volume, which are essentially based on new computational procedures combined with remote sensing techniques and GIS. On the other hand, since they are so widespread in the territory, it is often not easy to evaluate their contribution in water resources management policies as well as their environmental impact and the risk analysis in emergency conditions, such as flood and dam break.

The situation in Italy is portrayed in the Italian Environmental Data Yearbook (Edition 2016). In 1998, the number of small reservoirs (height of the dam lower or equal than to 15 m and storage volume up to 10^6 m³) has been assessed in 8288. In 2015 this result is updated to 6333, but this number is the result of a regional census and many regions have not provided reliable data. The Italian Committee for Large Dams, basing on data from a satellite census carried out in 1988 and the corresponding data obtained from a partial census conducted at regional level in 2010, estimates that small reservoirs have increased in number by 60% over the period. Extending this result to all the regions, the Committee hypothesizes a possible total number of small reservoirs in Italy between 12000 and 14000.

The present study deepens the knowledge about small reservoir in the Umbria region, on the basis of a regional database which has been analysed and geo-referenced on the map. This operation made it possible to verify the accuracy of remote sensing techniques in localizing small reservoir and in the estimation of lake surfaces. Correlation equations are then built to estimate storage volume from surface area of lakes and finally a simulation model compared available water volume with the corresponding data for the irrigation demand at the basin and sub-basin scale. The simulated scenarios evaluate the possible contribution of small reservoirs in the framework of water resources management policies in drought periods.

The first results of the study show the need to re-focus on these untapped resources for water resources management, environmental impact and risk analysis.

The geo-referenced database and the WebGIS system can surely facilitate this operation, however the need for further investigations is particularly evident, especially when the maintenance status of these small reservoirs is concerned.