



PRODAM

Reservoir management system

The system

The regulation of a reservoir is generally carried out in order to pursue different targets: agricultural, hydroelectric, ecological, recreational, protection from floods, etc. All these objectives are often in conflict and their requirements in terms of water accumulation and release does not coincide neither in terms of time neither in terms of quantity. It is though necessary to find a compromise for reservoir management that on one side can minimize losses due to water deficits and on the other can reduce the entity and the number of the possible damages caused by floods.

PRODAM is a reservoir management software that faces the problem of multi-purposes reservoir optimal management. It uses the method of Stochastic Dynamic Programming and it helps the user defining the management plan of the water system considering the appraisal of the economic, ecological, environmental and social impact that it involves.

The calculation module is based on Stochastic Dynamic Programming, a mathematical procedure that can solve in optimal way the problems of resources allocation, in the cases in which it is possible to separate between the various objectives to be optimized, giving them a homogenous economic quantification.



Main functionalities

PRODAM allows to plan long term management optimization of reservoirs on the base of the forecasted water inflow to the reservoir computed using historical data.

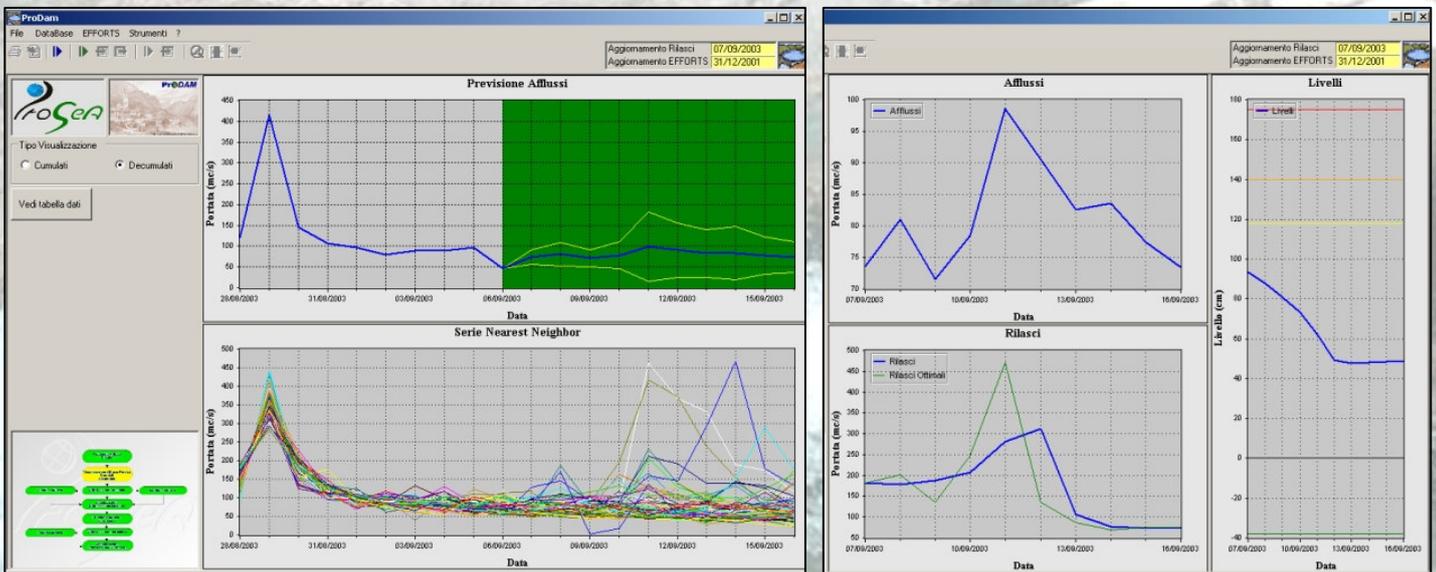
The research of the best long term operational management rule usually proceeds using 10 days periods (different periods can be set by the user): the problem is broken up in under problems with a limited temporal horizon (i.e. 10 days) and a recursive procedure is used.

Every 10 days PRODAM estimates the amount of water to be released from the reservoir that optimizes the total behavior of the system. The optimization algorithm only uses data about water release of the previous 10 days interval: in this way the user does not have to care about management decisions taken in the past (Optimality principle).

Long term reservoir regulation is usually obtained for one solar year to be repeated cyclical.

In order to deal with those management situations that do not belong to the long term management, for example a flood event, PRODAM allows real-time changes to long term release rule. In general terms and for limited temporal horizons, emergencies are faced increasing the importance of the contingent problem regarding the requirements to respect politics for the long period. A nearest Neighbors technique is used to derive daily forecast of water inflow to the reservoir, while a real-time flood forecasting system is used to forecast inflow at shorter (hourly) time steps.

PRODAM can be connected to Progea's real-time flood forecasting system EFFORTS.



Example of PRODAM visualizations. The panels show forecasted inflow (on the left) and data from the reservoir (on the right): measured inflow, outflow and water level.



PROGEA srl - Via Galliera 93, I-40121 Bologna (Italy)
Tel: +39 051 6389099 - Email: segreteria@progea.net
www.progea.net