

RIVER BRENTA DEFENCE BY CONTROLLED FLOODING

Michele Ferri¹ and Fabio Giuriato²

ABSTRACT

The way to tackle the even more frequent and harmful flood events, is to adopt efficient forecasting and risk prevention methods. This can be obtained only through a deep understanding of causes and dynamics involved in such events.

The local Water Authority of North Eastern Italy, which is in charge of the planning and coordination of flood defence, water use and protection of water resources, has developed an accurate and robust hydrologic response model. The model, of the geomorphologic – MonteCarlo type, reproduces stochastic and real hydrographs and thereby the return period of peak flows and of any other feature of engineering interest, including shapes and volumes.

The salient geomorphic features of the basin is recovered by digital elevation model while the land cover analysis is based on data from remote sensing. The model captures the essential physics of the relevant processes, rather than merely reproducing a correspondence between inputs and outputs within a finite set of observations. So predictive capabilities and robustness of the model are showed.

The main forecasting measures adopted in the regarding Plan for Brenta river hydraulic defence are presented: identification of the maximally effective gate operations for flood mitigation using the storage capacity Corlo reservoir, development of the hydro-meteorological networks, real time interconnection of the hydro-meteorological control system and definition of the alerting procedures based not only on the notification of adverse weather conditions, but also on the knowledge of the land vulnerability according to established rainfall scenarios.

The operation rules of the Corlo reservoir were optimized to meet the different requirements of use. From the operative point of view, a meaningful improvement in flood defence has been observed when a new gate geometry in association with a suitable meteorological prediction is introduced: if the bottom outflow capacity is increased from 150 to 550 m³/s, all dam gates can be closed after inflow discharge is more than such value; as a consequence the Cismon peak's time is anticipated regarding that one of the Brenta river and the new different phase of the tributaries flood peak reduces to 1350 m³/s the maximum discharge expected at the following draft.

The new gates configuration and a robust meteorological forecast allows a not imposed low constant water level (240 m.s.l.m) in the period 1 september -30 november; contrarily the dam manager could operate a fast drawdown level in the case of predicted critical rainfall.

1 Autorità di Bacino dell'Alto Adriatico, Venezia (Tel.: +39-041-714444; Fax: +39-041714313; email: michele.ferri@idra.unipd.it)

2 Autorità di Bacino dell'Alto Adriatico, Venezia (Tel.: +39-041-714444; Fax: +39-041714313; email: at.ingegneria@adbve.it)