A hydrometeorological flood forecast system for the Red River (China - Vietnam)

L. A. Ngo (1), S. Barontini (1), A. Buzzi (2), O. Drofa (2), L.T. Do (3), M. C. Vu (4),
T. T. Hoang (4), R. Ranzi (1)

(1) University of Brescia-DICATA, Brescia - Italy, (2) CNR-ISAC, Bologna - Italy, (3)
NCHMF, Hanoi - Vietnam, (4) Water Resources University, Hanoi - Vietnam

A flood forecasting system for the Red River basin ($169'000$ km^2), which was tested
in an operational framework, is presented. Here results mainly concerning the hydro-
logical component are presented. The key research objective was to extend the forecast
time of floods to medium term (5 to 7 days) in order to support reservoir management
during floods. In the basin large reservoirs were built, used mainly for hydropower
and irrigation, and capable also to mitigate floods downstream. The forecast system
is based on the use of the distributed hydrological model DIMOSHONG forced by
Quantitative Precipitation Forecasts by the BOLAM model, set up for the Red River
basin. Five heavy flood events occurred in 1971, 1996, 2000, 2002 and July 2007 were
investigated, showing the relatively quick response of the floods in the Lo, Thao and
Da sub basins, superimposed to a low frequency component resulting from the mon-
soon seasonal rainfall. From data analyses and simulated results, some indications on
the accuracy of flood forecast in the Red River basin are given. Verification of the
QPF versus observed rainfall at different scales showed a very good timing of the
precipitation and flood forecast but some overestimation of the precipitation forecast.
Resulting flood forecast up to 5 days in advance were, however, reasonably good in
view of reservoir operation. An intercomparison between a saturation excess and a
modfied Green-Ampt infiltration excess model was done and results discussed. There
are still several uncertainties affecting the accuracy of the hydrological model, as the
role of reservoirs in a real time framework, and the coarse information in the upper
part of the basin.