

TOWARDS CRITERIA FOR FLOOD RELEASE OPERATIONS ON THE INTER-STATE MAPUTO RIVER SYSTEM

B Mwaka, C Arendse, R Cai; G van der Meulen, and P Sinha

*Department of Water Affairs and Forestry (DWAF); Private Bag X313, Pretoria 0001, South Africa;
(Email: qda@dwaf.gov.za)*

ABSTRACT:

The Maputo-Pongola River floodplain - of which the main rivers are Maputo in Mozambique, Pongola in South Africa and Usuthu in Swaziland - forms part of an extensive inter-state coastal plain that is situated between Lebombo mountains and the Indian Ocean in Southern Africa. The reach of the floodplain, stretching about 200 km, is endowed with many off-channel pans (lakes) with the associated ecological systems that owe their existence to periodic flooding and inundation by the rivers.

Prior to the construction of the Pongolapoort dam, the floodplain was frequently inundated naturally, and in the process recharged the lakes. But construction of the dam in the 1970s resulted in changes to the hydrological regime with a significant reduction in the flooding frequency. In order to compensate for these effects, the dam is operated to release artificial water flow series for downstream developmental requirements, including floods for inundating the floodplain.

Presently, therefore, the developmental water requirements and the general health of ecosystems on the floodplain are very closely dependent on the operation of the Pongolapoort dam. The operations aim to control floods and other vital hydrological processes that in turn support the environmental and social-economic activities, such as agriculture, reeds and medicinal plants harvesting, malaria control, fishing and tourism, among others.

However, due to the ever-increasing population on the plain, pressure and competition for the riverine resources has also been rising. So much so that latitude for planning flood release schedules that can conform to the needs of all of the various stakeholders has been severely compromised.

Divergence among the stakeholders is mainly between environmental and developmental requirements, particularly about the time when the flood releases should be scheduled. For example, whereas farmers would prefer flood releases in late winter to suit their planting season in summer, environmentalists would prefer floods in late summer in order to have warm water that suits the resurgence of riverine ecosystems. Mozambique, since suffering from the 2000 floods, has imposed a limit to the peak flood discharge that can be accepted to flow from South Africa, which should not be more than what can be contained by their dykes and other river engineering works. Users upstream of the dam, on the other hand, are significantly harmed when the reservoir level is made to suddenly fall beyond certain levels.

The Department of Water Affairs and Forestry (DWAF) of South Africa, as the regulatory authority of the Pongolapoort dam has realised that the answer to these challenges lie not only with the development of correct technical solutions, but in addition sharing the understanding of integrated water resources development and co-operative management approaches with all concerned stakeholders across the borders. Hence, DWAF has established an inclusive stakeholders' structure that creates opportunities for a more participative and equitable dispensation by all people affected by the flood release operations. In their forums, the stakeholders are encouraged to understand, appreciate and work in partnership while sharing the riverine resources, rather than be left to compete with each other for the same resources.

On its technical solution, an appropriate mathematical model was identified and applied for flood routing simulation. The simulations aimed to derive a flood big enough to burst the river banks and recharge the off-channel lakes on SA floodplain and yet by the time of crossing into Mozambique the flood does not exceed the imposed limit of 250 m³/s. The exercise was pursued for several possible alternative initial hydrological conditions of the river system. The simulation results formed the basis upon which optimal flood release schedules were negotiated at the stakeholders' forums. Through forums it is possible to negotiate and narrow down to a more acceptable flood release schedule that supports the communities' livelihoods while at the same time enabling new development projects that enhances rather than harm existing livelihoods.

The July 2002 flood release operation, which was undertaken as a contingency measure, was based on the above arrangement. Within practical limits it was a success. Details of the successes, like minimised inconveniences and claims, among others, are shared in the final full paper.