Functionalities in eWater Source to address new challenges in hydrological modelling

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Abstract: Hydrological modelling is a vital component of the water management toolbox. To stay relevant, modelling tools must evolve to meet the changing needs of water managers; this is particularly evident in the changes needed to respond to the new challenges posed by climate change and its impacts. Australia has recognised this and responded through the development of eWater Source® and its adoption as the National Hydrological Modelling Platform.

Developed to manage the highly varying water resources in Australia, Source is a crucial tool for climate change adaption. Source helps the water managers and modellers to understand and inform policies regarding environment, codify them and make operational plans in an efficient way. Source is a constantly evolving tool, with more capabilities and functionalities added to its toolkit based on changing requirements and feedback from the user community. In this regard, eWater Group is playing a significant role in supporting the environmentally sustainable management of water resources in Australia and around the world.

This paper features two recent enhancements to Source that will support water managers to meet current and emerging challenges of a changing climate.

The uncertainties of climate change require modellers to consider a wide range of scenarios. Working with the Victorian Government, eWater has added new 'multi-replicate' or 'Replicate Analysis' functionality to Source. Based on functionality in REALM (Victoria University and Department of Environment and Primary Industries, 2013), the 'Replicate Analysis' functionality allows the users to run multiple instances of any Source model with any degree of complexity using the concept of input data recycling to allow modellers to extract each replicate result. This is a useful functionality particularly in understanding the risk of spill in reservoirs under varying climatic conditions. For example, users can test 'what if' scenarios such as the reservoir storage and spill conditions if a past rainfall pattern is repeated in a particular year.

The 'Replicate Analysis' option is now integrated into Source as one of the run configuration options. Users can define the number of replicates required and the increment of replication and select all or specific data sources to be cycled. For example, if a particular rainfall data is selected and cycled, the resulting multiple downstream flows could be used to analyse the effect of changes in rainfall patterns on the flows.

Farm dams play an important role in helping landowners to manage climate variability. But they can also impact catchment and river hydrology. Source modellers have been able to examine these impacts for several years using the Onstream Farm Dam plugin, this functionality has recently been incorporated into core Source, making it more readily accessible to all Source users. The new Farm Dams node models the reliability of water diversion from farm dams to agricultural land based on environmental engineering principles (Government of Western Australia 2012). The node uses inputs and parameters such as dam capacity, demand, rainfall, evaporation, seepage etc. to conduct water balance at every time step.

Adoption of the abovementioned functionalities and features help eWater Source to continuously evolve and adapt to new challenges in the realm of water resources management.

REFERENCES

Government of Western Australia, 2012. Installation and user guide for Farm Dam plugins to eWater Source.
Victoria University and Department of Environment and Primary Industries, 2013. REALM user manual (Edition for REALM Version 6.28).

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