Long term continuous simulation: lessons learned from real-life applications

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Aim:
To demonstrate the advantages of long term continuous simulation (LTCS) for the planning and management of flooding and drainage assets in all catchments from the scale of small urban drainage systems to large river systems. LCTS comprises unified approach that offers valuable information on the interaction of the factors of flooding on a whole of catchment scale.

Method:
Reference will be made to several projects that have been undertaken by **pitt&sherry** (consulting engineers) for local governments in Australia.

Results:
The methodology for long term continuous simulation is practical and transferrable, and can be implemented through several free and licensed programs.

Conclusion:
Event-based modelling yields models of events. Long Term Continuous Simulation (LTCS) yields models of catchments.

Event-based modelling, which includes the recent movement towards Monte-Carlo ensembles, depends on AEP Neutrality (the probability that the probability of a flood follows the probability of the coincident rainfall event). However, this assertion far too limiting in most practical applications because it cannot address complex interactions (e.g. preceding catchment saturation, downstream river or sea levels, capacity of storages) and can only yield results at a single point within the catchment.

LTCS addresses these issues by extrapolating from the known into the unknown. It combines water balance modelling with advanced hydrology and hydraulics. An essential component is a scalable model that adequately represents the flooding behaviour of the entire catchment over the entire period of available records. For example, by using the SILO gridded climate data, models can be run from 1889 to the present day (about 130 years), and calibrated to all the gauge readings and flood marks available in that period. A well-conditioned, calibrated model will naturally combine the combinations of flooding mechanisms to yield probability distributions, confidence limits and flow and flood level duration curves.