

# ARR Projects

## Project No. 6

### Loss models for catchment simulation

#### Context

Since its first publication in 1958, Australian Rainfall and Runoff (ARR) has remained one of the most influential and widely used guidelines published by Engineers Australia. One of the major responsibilities of the National Committee on Water Engineering of Engineers Australia is the periodic revision of ARR. A recent and significant development has been that the revision of ARR has been identified as a priority in the COAG endorsed National Adaptation Framework for Climate Change.

Funding for Stages 1 and 2 of the ARR revision projects has been provided by the Federal Department of Climate Change. Funding for Stages 2 and 3 of Project 1 (Development of intensity-frequency-duration information across Australia) has been provided by the Bureau of Meteorology. The update will be completed in three stages over four years. This will be the first major revision of ARR since 1987. There have been significant technological advances in many areas of rainfall runoff assessment since the 1987 update as such 21 revision projects will be undertaken with the aim of filling knowledge gaps. The outcomes of the projects will assist the ARR editorial team compiling and writing of the chapters of ARR. Steering and Technical Committees have been established to assist the ARR editorial team in guiding the projects to achieve desired outcomes. The 21 projects are to be undertaken over four years. The full list of projects is:

ARR Project No.	Project Title	Starting Stage
1	Development of intensity-frequency-duration information across Australia	1
2	Spatial patterns of rainfall	2
3	Temporal pattern of rainfall	2
4	Continuous rainfall sequences at a point	1
5	Regional flood methods	1
6	Loss models for catchment simulation	2
7	Baseflow for catchment simulation	1
8	Use of continuous simulation for design flow determination	2
9	Urban drainage system hydraulics	1
10	Appropriate safety criteria for people	1
11	Blockage of hydraulic structures	1
12	Selection of an approach	2
13	Rational Method developments	1
14	Large to extreme floods in urban areas	3
15	Two-dimensional (2D) modelling in urban areas.	1
16	Storm patterns for use in design events	2
17	Channel loss models	2
18	Interaction of coastal processes and severe weather events	1
19	Selection of climate change boundary conditions	3
20	Risk assessment and design life	2
21	IT Delivery and Communication Strategies	2

Visit [www.arr.org.au](http://www.arr.org.au) for information on the ARR update process, proposed books and chapters, revision projects or to subscribe for updates on the whole process or individual topic areas including proposed workshops.

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## Loss models for catchment simulation

### Background

There are two distinct and different components to this project which are the development of “*statistical loss models*” for catchment simulation and the development of “*deterministic loss models*” for catchment simulation.

For the first subproject, there is a need to develop further the statistical interpretation of loss models that was proposed originally by Walsh *et al.* (1991), ie a loss model that results in transformation of rainfall frequency into flood frequency. This model was developed further by Rahman *et al.* (2000). At present there is some information available for New South Wales and for Victoria (available from a CRC Catchment Hydrology project) and for southern Queensland (QUT project). However, this information is not consistent and the various studies used different approaches and assumptions in determining the information. Furthermore, values from some of these studies will be supplanted by new rainfall data and hence these previous studies will need replication, consolidation and expansion. As part of this subproject, there is a need also to define the influence of alternative process models and software implementations of these on statistical loss model parameters.

For the second subproject, there is a need to develop appropriate loss models when maintenance of frequency is not required as part of the catchment simulation. There is a need to correlate information about soil type and infiltration rates (see Tayfur, 2001) with available information on soil classifications and soil horizons as available from soil maps (note that many of these soil maps are available in a digital format). Additionally, there is a need to consider the utility (or otherwise) of the rainfall excess model and whether this form of loss model needs further development. As part of this second subproject, there is a need to develop measures of the parameter variability and the statistical distribution. This information will be needed for application with Monte Carlo approaches for estimation of flows with a given exceedence probability; see for example Blaikie and Ball (2005).

### Aim

Outcomes from this project can be categorised as:

- *Statistical loss model parameters* - these parameters will be those necessary to ensure that the assumption of frequency translation (i.e. rainfall to peak flow) is maintained. Included in this will be development of models to enable prediction of these parameter values at any location in Australia using the updated IFD information obtained from Project 1.
- *Deterministic loss model parameters* - those parameters are those needed for prediction of actual catchment response and where translation of rainfall frequency is not an inherent assumption. Models to enable prediction of these parameter values for application in ungauged catchments will be a fundamental component of this component of the project.

### Stage 2 Deliverable

The Stage 2 deliverables are:

- Discussion paper on achieving AEP neutrality
- A data base site that can be used for testing AEP neutrality

A Stage 2 report is due for release in late August 2009.

### For More Information

For more information on ARR Project 6 please contact [arr\\_admin@arr.org.au](mailto:arr_admin@arr.org.au) or visit [www.arr.org.au](http://www.arr.org.au) for information on the ARR update process, proposed books and chapters, revision projects or to subscribe for updates on the whole process or individual topic areas including proposed workshops.