# River system modelling to inform Murrumbidgee and NSW Murray regional water strategies

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**Abstract:** The NSW Department of Planning and Environment has been developing regional water strategies (RWSs) across NSW to enhance the sustainable management of water resources. The strategies aim to understand the water needs in each NSW region over the next 20-40 years and identify the challenges to meeting these needs, plus a set of actions to improve the resilience of water dependent outcomes for towns and communities, the environment and industry. A risk-based approach was applied to assess hydrologic, economic, and ecological outcomes for a range of potential water supply and demand options. This approach is aimed at defining risks to essential water supply and the regional economy from climate variability and drought under current levels of water supply infrastructure and potential for mitigation of this risk via augmentation of the water supply infrastructure and/or operational changes in a river valley.

Hydrologic and river system modelling have been undertaken in more than 20 regulated and unregulated river systems to support the development of RWSs for 12 regions across NSW. In every region, river system modelling has been implemented in three stages: (1) base case modelling to inform the draft strategies, (2) base case modelling to support the development of economic and ecological outcomes and (3) options modelling to inform cost-benefit analysis and environmental benefit and impacts of various options for the final strategies. Three sets of climate data were used in each stage of modelling that included 130 years of daily instrumental data and 10,000 years of daily paleo-stochastic climate data without and with climate projections (Figure 1a).

The NSW section of the Southern Connected System (SCS) includes the Murrumbidgee and NSW Murray regions. The SCS is a complex system with multiple inter-connected river systems and requires integrated modelling of the Snowy Mountains Hydro-Electric Scheme, the Murrumbidgee river system, and the Murray-Lower Darling river system as well as flow and allocation contributions from several other upstream river system models (Figure 1b). These include the NSW Barwon-Darling model and Victoria's Kiewa, Ovens, and Goulburn-Broken-Campaspe-Coliban-Loddon models. The Barwon-Darling model receives contributions from ten upstream river system models, including contributions from five Queensland river system models. The integrated modelling has been undertaken in collaboration with interstate agencies including Snowy Hydro Limited, the Murray–Darling Basin Authority, DELWP, Victoria, the ACT Government and DES, Queensland.

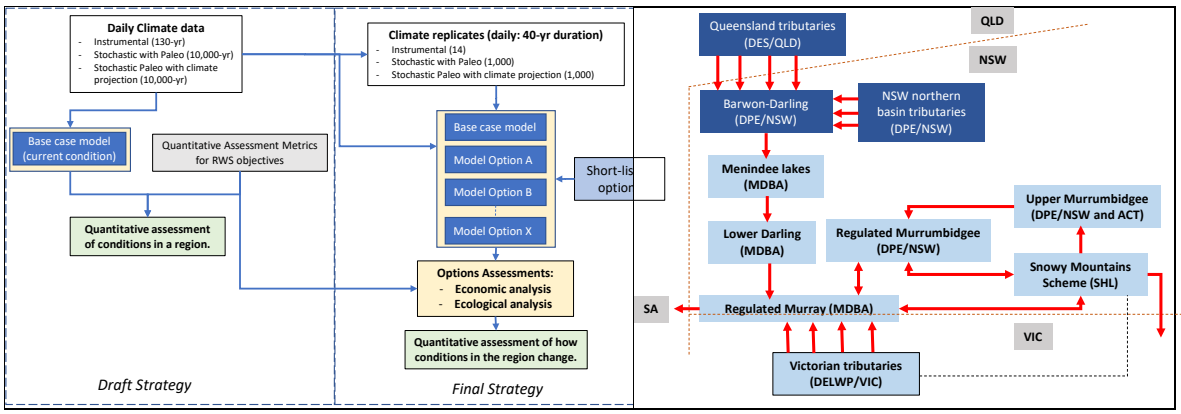


**Figure 1.** (a) RWS hydrological modelling approach, (b) Southern Connected System for hydrological modelling

This paper presents an overview of the overall approach of RWS, describes the hydrological modelling method for SCS and how the outputs of hydrological modelling are used to inform various stages of the development for Murrumbidgee and NSW Murray RWSs. Some key results of the modelling are discussed in this presentation.

***Keywords:*** *Murrumbidgee River, Murray River, stochastic climate data, southern connected system*