Changes in groundwater recharge under 2030 and 2050 climates in the Murray-Darling Basin

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Abstract: Previous modelling of recharge under future climates in the MDB have focused upon the diffuse recharge component. Recent work has shown that the recharge from the 2022 flood events was more significant than previous floods and demonstrated the need to consider other forms of recharge when investigating changes in the groundwater resource under future climates. This study investigated the potential change in diffuse, overbank flood and in-stream recharge across the MDB.

The change in the diffuse component of recharge was modelled with WAVES using 120 different future climates derived from CMIP6 GCM runs representing +1.0° and 1.5° of warming relative to 1990. The change in overbank flood recharge and in-stream recharge were modelled from the output of river systems models, the inputs to these models were derived from rainfall-runoff models considering the same suite of 120 CMIP6 GCMs.

The results are expressed as the 10th, 50th and 90th percentiles of all model runs. The 10th and 90th percentiles represent the range in plausible future climates (Table 1). This difference between the 10th and 90th percentiles was greatest in the change in overbank flood recharge, indicating the greatest sensitivity to climate change and the greatest uncertainty in future climate projections. The change in in-stream recharge had the least difference between the 10th and 90th percentiles and the diffuse recharge results were between these two extremes. In comparing the northern and southern Basin, the southern Basin had a greater tendency for less recharge in future and the northern Basin had a greater range between the 10th and 90th percentiles indicating greater uncertainty in the results. This study has shown that the different components of recharge have different sensitivities to climate change which need to be considered where diffuse recharge is not the only source of recharge.

Table 1 Plausible range of change in recharge as a percentage for the northern and southern Basin

Northern Basin	**2030**		**2050**	
	10th	90th	10th	90th
Diffuse recharge	-4	33	-17	36
In-stream recharge	-16	9	-23	13
Overbank flood recharge	-33	28	-50	42

Southern Basin	**2030**		**2050**	
	10th	90th	10th	90th
Diffuse recharge	-10	22	-23	24
In-stream recharge	-18	0	-28	0
Overbank flood recharge	-42	0	-63	0

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