

The Murray-Darling Basin

- The Australian Alps provide an average of 9,600 gigalitres of water per year into the Murray-Darling Basin, which is around 29% of the Basin's total annual flows.
- Water from the Snowy Mountains NSW region is worth between \$43.6 million and \$1.974 billion annually (average \$498.09 million) based on water allocation prices. These calculations are extremely conservative as they do not account for the social, environmental, or cultural values of water.
- Water from the Australian Alps is worth approximately \$15 billion annually in 2024 prices, when all social and production benefits are considered (noting that this figure was originally calculated in 2009 using 2005 water prices and has been adjusted for inflation).
- Climate change will directly reduce precipitation in the Australia Alps by up to -11% by 2050 and -20% by 2080. Increased temperatures, droughts, and bushfires will alter high country vegetation and soils, and dry out peatbogs, further decreasing the catchment yield.
- There is already water conflict in the Murray-Darling Basin between agricultural production, domestic drinking water, regional communities, tourism, cultural flows for First Nations, and the environment. Reduced inflows from the Australian Alps will exacerbate this conflict, make trade-offs between water uses more difficult, and are likely to exacerbate a decline in community mental health and wellbeing.

The Australian Alps intercept west-east moving weather fronts to receive significant precipitation (including winter snow) and are the highest yielding and most efficient catchments in Australia¹. The Alps feed the Murray, Murrumbidgee, Goodradigbee, Tumut, and Snowy rivers and provide critical water for irrigation, domestic consumption, tourism, First Nations, ecosystems, and associated ecosystem services. The Australian Alps provide potable water for downriver towns and cities including Canberra, Albury, Wodonga, Echuca, Mildura, and Adelaide.

The Australian Alps release an average of 9600 gigalitres of high-quality water per year into the Murray-Darling Basin², which is around 29% of the Basin's total annual flows³. This is particularly

impressive as the Australian Alps makes up just 1% of the Murray-Darling Basin's 1 million km² area⁴. The Basin contains about 70% of Australia's irrigated crops and pastures, and contributes 40% of Australia's total agricultural production⁵. Irrigated agriculture and tourism in the basin are estimated to be worth \$22 billion and \$15 billion annually respectively⁶. The Basin is also home to more than 2.4 million people, over 50 different First Nations, 16 wetlands of international significance, 35 endangered species, and 120 species of native and migratory birds⁷. The value of the 3,980GL of water flowing from the Victorian Alps catchments has been estimated to be at least \$4 billion annually (calculated using 2005 water volumes and prices), when all social and production benefits

are considered⁹. Based on the Victorian figures of 1,000GL being worth approximately \$1 billion, the 9,600GL provided by the Australian Alps would be worth \$9.6 billion to the Australian economy in 2005 prices. Adjusting only for inflation, the \$9.6 billion value of Australian Alps flows is worth approximately \$15 billion in 2024 prices⁹. This is a rough and conservative estimate and the value of water from the Australian Alps, including all social and production benefits, should be recalculated for 2024.

The value of water from the Snowy Mountains NSW region was also calculated using water allocation prices in the Murrumbidgee and NSW and VIC Murray catchments from the 2004-05 financial year until the

2022-23 financial year with Snowy Hydro's required annual releases (RARs). This timeframe was chosen to include both drought and flood periods. Snowy Hydro's RARs for the Snowy Murray development and Tumut development are 1062GL and 1026GL respectively. Where these RARs flow is illustrated in Figure 5.1.

The Snowy Murray development RARs and Tumut Development RARs were multiplied by water allocation prices for NSW and VIC Murray-above-choke catchments and the Murrumbidgee catchment respectively. Table 5.1 provides these results.

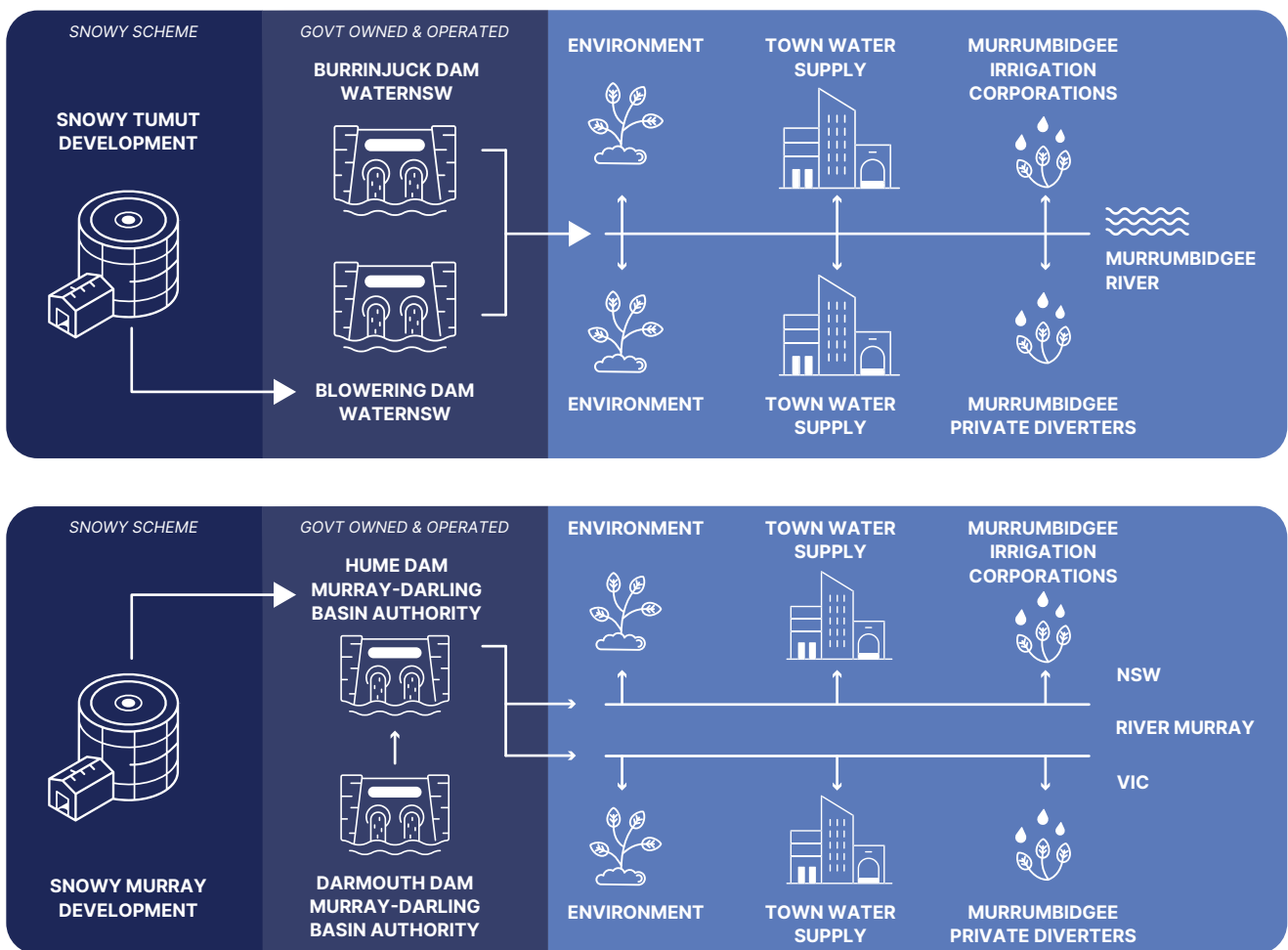


Figure 5.1: Snowy Hydro Required Annual Releases for the Snowy Tumut development and the Snowy Murray development Figure adapted from Snow Hydro.¹⁰

Highest Price (\$/ML)	Lowest Price (\$/ML)	Average Price (\$/ML)	Total Water value at highest price (\$ million)	Total Water value at lowest price (\$ million)	Total Water value at average price (\$ million)
Tumut Development - Murrumbidgee Catchment					
886.3	22	232.73	909.34	22.57	238.78
Snowy Murray Development - NSW and VIC Murray-above-choke Catchments					
1,002.7	19.8	244.17	1,064.87	21.03	259.31

Table 5.1: Water allocation prices from the Water Market Outlook (April 2023), ABARES, from 2004-05 FY to 2022-23 FY¹¹.

Based on these calculations, water from the Snowy Mountains is worth between \$43.6 million and \$1.974 billion, averaging at \$498.09 million, based on water allocation prices. This does not include water from the Victorian alps and only includes the production value of water. These calculations are extremely conservative as they do not account for the social, environmental, or cultural values of water.

Projections indicate that climate change will directly reduce precipitation in the Australia Alps by up to -11% by 2050 and -20% by 2080¹². Of this reduced precipitation, a greater proportion will fall as rain, rather than snow, which decreases soil moisture and will further decrease overall catchment yield¹³. Groundwater recharge in the high country region is also projected to decrease, in both the near and far future, as the result of increased temperatures and changes to rainfall patterns¹⁴.

Climate change will also impact the Australian Alps water catchment indirectly through ecological change. High country bog and fen communities, wetlands, and soil retention play a critical role in retaining and regulating waterflow from the Alps¹⁵. Vegetation affects snow accumulation, snow depths, and groundwater recharge. The relationship between hydrology and Snow Gums requires further research, as there are indications that Snow Gums may increase catchment inflows by intercepting moisture-laden air and increasing snow accumulation¹⁶. The moderate canopy density vegetation in Australia provides shade and snow accumulation, resulting in less water lost to sublimation¹⁷. Vegetation therefore increases

snow depth, which correlates with greater soil moisture and runoff¹⁸, while forest cover and litter contribute to higher rates of groundwater recharge¹⁹. Increased droughts, temperatures, and bushfires in the Alps is altering vegetation, reducing forest cover and litter, and drying out wetlands and bog and fen communities, which decreases the quality and quantity of water in the alps.

Water in the Murray-Darling Basin has been over-allocated for consumptive use, resulting in significant ecological degradation²⁰ and conflict between different water uses²¹. Reductions in water availability due to climate change mean that trade-offs between agricultural production, tourism, domestic water consumption, cultural flows for First Nations, and the environment will be made over increasingly scant resources. The inevitability that there will be “winners” and “losers” in the Murray-Darling Basin has made this one of Australia’s most contentious topics, with intense media coverage and politicisation of water policies designed to address climate change²². Regional and rural communities in the Basin are already experiencing declining mental health and wellbeing as the result climate change and uncertainty²³. Reduced inflows from the Australian Alps will further exacerbate conflict in the Murray-Darling Basin and are likely to exacerbate the decline in community wellbeing. It is therefore critical that climate mitigation and adaptation actions occur to maintain the quality and quantity of water flowing from the Australian Alps as much as possible.

Recommendations

- Ecosystem functions need to be maintained where possible, such as through maintaining canopy cover, soils, and healthy wetlands, to maximise the quality and quantity of inflows from the Australian Alps.
- Trade-offs that result in ecosystem function decline (such as tourism or hydroelectricity expansion), should only be made with full consideration of impacts to the Murray-Darling Basin.

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