Australia: Environmental Flow Assessment for the Goulburn River

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1.1.1 Background

Study area: location and geography

The Goulburn River lies in Victoria, south east Australia and is a tributary of the Murray River. Some 250,000 people live in the catchment (area of 16,800 km^2) which has been extensively cleared for agriculture. The high country in the south east experiences cool winters with persistent snow and an average annual rainfall greater than 1600 mm. Rainfall decreases northward and in the far north of the catchment is less than 450 mm per year, only one third of the annual evaporation in that area. This study examined environmental flow requirements in the Goulburn River, downstream from Lake Eildon to its confluence with the River Murray

The water-resource development

The headwaters of the Goulburn River were first dammed in 1922 with an impoundment of 3.8×10^8 m^3 capacity (Gippel, 2000). In 1955, a new dam was constructed in the same location, forming Lake Eildon with a capacity of 3.4×10^9 m^3. Lake Eildon has the capacity to meet irrigation needs over at least two drought seasons. While not designed for flood control, Lake Eildon has considerable potential to mitigate floods in the Goulburn River. Water is released from storage via an outlet tower through a hydro-electric power station. Goulburn weir (2.7×10^7 m^3 capacity) is located 218 km downstream of Lake Eildon and has been operated since 1890 to divert water to irrigation areas. On average 91% of the volume of water released from Lake Eildon is diverted for irrigation purposes. This is equivalent to approximately 60% of the natural flow at Goulburn Weir.

1.1.2 Need for an Environmental Flow Assessment

The Murray Darling Basin Commission has established '*the Living Murray*' project to investigate the return of environmental flows to the Murray River and two of its major tributaries, Goulburn River and Murrumbidgee River. As a

preliminary stage in this project, The Cooperative Research Centre for Freshwater Ecology and the Cooperative Research Centre for Catchment Hydrology were asked to convene and manage a Scientific Panel, to identify the flows necessary to maintain or improve key environmental values in the regulated section of the Goulburn River, which lies between Lake Eildon and the River Murray. In particular the panel was to:

1) Collate and assess relevant information and data
2) Undertake a field assessment to confirm environmental/ecological values.
3) Develop an issues paper to identify and establish objectives for the key environmental values/assets of the Goulburn River.
4) Determine the environmental flow regime to sustain the Goulburn River in an ecologically healthy condition, consistent with the Victorian River Health Strategy.
5) Recommend other management actions that are required to sustain the key environmental values/assets of the Goulburn River.

1.1.3 Environmental flow approach used

The scientific panel followed the FLOWS procedure, which was developed by the State Government to assess the environmental flow requirements of rivers and streams (DNRE, 2002). The FLOWS procedure sets out the various stages of the project and information sources. The Flow Events Method (FEM) was used to assess the effect of regulation on physical habitats (Stewardson and Gippel, in press). The FEM is a framework to facilitate analysis of key flow events by comparing the current and natural flow regimes. The Scientific Panel uses expert knowledge to define habitat characteristics based on a set of flow-ecology issues. Issues considered in the Goulburn River project included:

- The infilling of armoured riverbed gravels with fine sediments;
- The seasonal inversion of the flow regime
- Reduced frequency or duration of out-of-channel (flood) flows that inundate the floodplain and fill wetlands;
- Reduced duration of freshes that can serve as life-cycle cues for fish and invertebrates, provide a range of conditions for in-channel and littoral (bank-side) vegetation, mobilise fine particulate material that can smother submerged macrophytes and invertebrate habitat, and help maintain good water quality;
- Reduced duration of flows that inundate river benches, potentially disrupting biochemical processes such as carbon and nutrient cycling;
- Reduced availability of deep water habitat that helps to support native fish populations;
- Barriers to the movement of native fish along the river ;
- Thermal stratification of pools during low flow periods;
- Rates of rise and fall flow.

1.1.4 Management Actions: decisions taken and implications

Recommendations have only recently been provided to the water and river management agencies. Further consultation with community groups is planned before finalising the environmental flow allocations and targets for the Goulburn River.

1.1.5 Lessons learnt

This project gained strong support from the project's Community Reference Panel which included strong representation from the irrigation industry. This support was despite the considerable enhancement of environmental flows recommended for the river with consequent impacts on the security of supply for consumptive water users. This community support is a consequence of a clear and agreed process for deciding on environmental water allocations. In particular, this technical study was carried out to identify environmental flow requirements without consideration of social or economic impacts. These other aspects of the water allocation process are considered in a subsequent and separate process. This removed the political element from the study and allowed all parties to support its conclusions.

References

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