CRC for Catchment Hydrology

Submission to House of Representatives Inquiry into Catchment Management

Summary of main points

- The catchment is the necessary planning scale for understanding the movement of water, sediment, and dissolved salts on land surfaces.
- Major problems can arise if a whole-of-catchment approach is not adopted for land and water management. In this context, there is an urgent need for analysis and resolution of the impact of proposed afforestation on the water industry.
- When implemented, a whole of catchment approach can have benefits for both catchment landholders and the users of water from the catchment.
- Research is currently underway in organisation including the CRC for Catchment Hydrology to develop knowledge/tools for catchment managers.

This submission is presented in the form of a number of points, with two examples to illustrate the importance of the whole-of-catchment approach.

Introduction

A catchment is the area of land 'upslope' of a point on a waterway or stream; water from rain falling inside the catchment can potentially contribute to streamflow at this downstream point.

There are many hydrologic processes which take place on a catchment, including infiltration, overland flow, evaporation, transpiration, groundwater flow, and river flow. These greatly affect the proportion of rainfall which ultimately reaches the catchment outlet. Water also carries sediment and dissolved substances or solutes (eg salt) to streams; thus hydrologic processes directly affect stream-water quality (as well as quantity).

Land-use impacts on rivers

There is a clear link between land cover, and the amount of water, sediment, and solutes delivered to streams. There are problems with ignoring this link. For example, in terms of water *quantity*:

> Afforestation is now being advocated in a bid to reverse the salinity trend in major rivers, and to exploit a lucrative timber market. However, this course raises serious concerns. For instance, an area of up to 300,000 ha of pine plantations are proposed for NE Victoria; if these trees reduce streamflow by 2 megalitres/ha/y (a typical value), the potential reduction in flow (600,000 ML) is equivalent to about a quarter of Victoria's diversions from the Murray.

[It should be noted here that planning for plantations has not appeared to consider the potential water-use impacts. Organisations like Goulburn-Murray Water need to be consulted about actions that clearly affect the flow quantity (and quality) to their supply system.]

For water supply authorities, the traditional approach has been to *collect the water, treat the water, and then sell the water.* In recent years, it has been shown that it is more cost effective (by a factor of about 4) to *treat the catchment, not the water.* In other words, water supply agencies are beginning to see clear benefits in improving land use practices inside their water supply catchment to improve water *quality*. As the community shares many of these benefits, the whole-of-catchment approach has the potential to be 'win-win'.

> In 1991, blue-green algal blooms occurred in the Tarago Reservoir (Vic.). Sediment flow to the reservoir, carrying phosphorus, was believed to be a key factor.
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> Melbourne Water (the new operating agency for the reservoir) investigated three options to address the water quality issues:
> - acquisition and revegetation of privately owned land within the catchment;
> - diversion drains to intercept runoff from farmland;
> - land improvement works within the catchment, and improvements to land management practices.
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> The first two options were considered impractical on a cost-benefit and political basis. The third option, which has just been implemented with major landholder involvement, involved a program of land improvement works would not only improve water quality in the Tarago Reservoir, but had significant benefits for the farming community.

Water allocation

The recent COAG reforms have had a major impact on water allocation. It has stimulated water trading (the 'movement' of water-use from one location to another) and the requirement that environmental flows for river health be maintained. These can only be sensibly (and sustainably) achieved if planning is done at catchment scale.

For water allocation issues, the linkage between catchment land-use and the streams is a dominant one. In addition to the impact of land-use on river flow itself (see above), catchment use affects the demand for river water diversions. Drainage from irrigation practices in turn affects groundwater and stream water quality. A whole-of-catchment approach is the only way to include these factors.

Institutional Arrangements

The new Catchment Management Authorities (CMAs) in Victoria, and similar initiatives in other States, are important steps in the right direction. They are catchment based, and include specialist and local input in important land and stream decisions. However, there is still some way to go before achieving a whole-of-catchment approach to land and water management. Links between water authorities and catchment management authorities are not formal ones, so that the links between land-use and river flow (as in the first example above) can be easily overlooked for regional management.

For smaller or local areas, there are often different authorities dealing with soil conservation on farms and river management, even though there are clear linkages between the two. Stock access to streams can be a landholder issue, while the management of streamside (riparian) vegetation is the province of other agencies (although this varies from state to state).

Time scales are also important, as much of our land and water degradation in long term and persistent. We are still seeing impacts from land clearing practices from last century. There have been some initiatives to counter this (eg trees on farms), but again without any serious planning to estimate the short and long-term impacts of such practices.

The Need for Catchment Management Tools

The development of predictive modelling tools (eg. Decision Support Systems), for a wide range of catchment areas and time scales, needs to be a high priority for land and water management in Australia. Such catchment models have to be able to answer the short-term and long-term 'what-if' questions, and will include linked hydrological, environmental, and socio-economic capability to fully meet land and water management needs.

The CRC for Catchment Hydrology is aiming (in partnership with other research groups) to meet these needs, but the problem is a large and urgent one. Further resources will be needed.

The CRC for Catchment Hydrology
(funded under the Commonwealth CRC Program)

The Cooperative Research Centre (CRC) for Catchment Hydrology has, as its vision for Australia, the "sustainable management of the nation's water resources through adoption of an integrated approach to land-use, water allocation, hydrologic risk, and environmental values". Its mission is "to deliver to resource managers the capability to assess the hydrologic impact of land-use and water-management decisions at whole-of-catchment scale".

The emphasis on catchment-scale processes arose from the detailed planning that went into the development of the Centre's research and industry transfer initiatives. The land and water agencies that are Parties to the Centre identified key issues of concern as:

- water allocation (sustainable allocation of water resources and more efficient water use)
- land-use impacts on rivers (addressing the consequences of land clearing and afforestation)
- climate variability (the potential to reduce hydrologic risk)
- urban runoff quality (the opportunity to improve city rivers and bays)
- river restoration (to halt and reverse the degradation of streams and waterways).

All of these require a catchment scale approach to be adopted for successful land and water management.

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