

AUDITING WATER WHAT'S REALLY HAPPENING IN THE RIVERS ?

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1. INTRODUCTION

Few national icons inflame Australian passions as much as the Murray Darling River System. This river catchment, our second largest and our most productive, is a cornerstone of our rural culture and pivotal in our history. It connects four states, serving their common interests, yet ironically it has the power to divide them, and with them, the nation itself.

The fortunes of the Australian cotton industry are inextricably entwined with the Barwon-Darling, a major basin within the Murray-Darling system. Debate over the condition of the Barwon-Darling, its degradation and its very future, is for the large part fierce and heated. But although the cotton industry sees the Basin largely within the context of its own productivity, the Barwon-Darling has value in a far broader context, and all eastern Australians must learn to be accountable for their impacts on its streams and tributaries.

The current debate has suffered from a lack of factual and objective data for the Basin. One needs look no further than the newspaper or TV for evidence of this.

In order to put more data in the public arena, the Australian Cotton Foundation (ACF), with the close cooperation of the NSW and Queensland water authorities, is preparing a water audit of the Barwon-Darling Basin system. The audit is being prepared by Bewsher Consulting Pty Ltd, a Sydney based firm of water engineering consultants, for the ACF. The results of the audit should be published in a major report due to be released later this year.

2. WHAT IS THE AUDIT ?

The audit is an examination and presentation of quantitative information relevant to water resource issues in the Barwon-Darling Basin. It is essentially a desk-top study of all available information on water resources and water uses in the Barwon-Darling Basin upstream of Wilcannia. This area extends from Bathurst in the south to Tenterfield in the east and to beyond Charleville in the north. Approximately half of the Basin is within Queensland.

3. WHY AN AUDIT OF THE BARWON-DARLING BASIN ?

Water is a scarce resource in this Basin. There are increasing demands from the various users on this finite and variable resource. In particular there is a recognition that environmental flows must be maintained at levels to support aquatic and riparian ecosystems, as well as dispersing and preventing algal blooms.

The appropriate management of this resource by all users and authorities is of paramount importance and management decisions need to be based on up-to-date quantitative information wherever possible. All decision makers should be familiar with this information and on how it applies to their use of the resource. Further, the wider community needs access to this information to allow informed debate to occur.

The audit seeks to address the information needs of better resource management, particularly by those in the wider community.

4. WHAT'S IN THE AUDIT ?

The audit examines information relating to river flows, water usage and water storage within the major river valleys of the Barwon-Darling Basin. Data will be presented in a user friendly graphical format with explanations of what the data represents, its source and its applicability or limitations in answering resource based issues.

Both 'actual' and 'modelled' data is to be presented in the audit.

'Actual' data refers to real or measured data from such sources as river gauging stations, reservoirs or pump flow metres. The availability of these records is variable and many are only available for the last decade or so.

'Modelled' data comes from the various computer simulation programs that are used to predict river flows, extractions and losses from the rivers and storages. The models can be used to represent 'existing' or 'natural' conditions where 'existing' refers to conditions under current policies, whilst 'natural' refers to pre-irrigation development when there were no extractions from the rivers.

A brief discussion on the data to be presented on each of the aspects and some of the issues that may be answered by the audit is presented below.

4.1 River Flows

Data to be presented in this section of the audit report includes actual and

modelled data for key locations within the ten valleys of the Barwon-Darling Basin. These locations are listed in **Table 1** and are shown on **Figure 1**. Actual data will comprise monthly river flows for the last ten years.

TABLE 1 : WATER AUDIT DATA

VALLEY	RIVER STATIONS	MAJOR STORAGES
1. Paroo	Caiwarro Wanaaring	
2. Warrego	Cunnamulla Fords Bridge	
3. Condamine/ Balonne/Culgoa	Weribone Cashmere	Beardmore
4. Moonie	Gundiblouie	
5. Border Rivers	Boggabilla D/S Mungindi	Pindari Glenlyon
6. Gwydir	Pallamallawa Total outflow	Copeton
7. Namoi	Total Narrabri Total outflow	Keepit Split Rock Chaffey
8. Castlereagh	Total outflow	
9. Macquarie Bogan	Narromine Total outflow	Burrendong Windamere
10. Barwon Darling (Mungindi to Wilcannia)	Walgett Bourke Wilcannia (Total outflow)	

An extensive amount of modelled data is to be presented in the audit as it is regarded as being more representative of the likely situation in the long term. The models used in estimating likely river flows include the Integrated Quantity-Quality Model (IQQM) which has been developed by the NSW Department of Land and Water Conservation and the WARSIM model developed by the Queensland Department of Natural Resources.

The models have been calibrated to measured data (such as river flow records) and are simulated over the period of recorded weather in the catchments. For many of the NSW catchments the IQQM model has been simulated for over a hundred years of data whilst for the Queensland

catchments, model simulation has been undertaken for up to about 70 years of data.

Modelled data to be presented in the audit includes the following:

- , median monthly river flows for natural and existing conditions;
- , flow versus duration in each season for natural and existing conditions;
- , annual river flows for median, dry and wet years under natural conditions;
- , water usage compared to natural river flows for median, dry and wet years.

The issues and questions that will be addressed by the data include:

- , what has been the pattern of river flows over the last ten years?
- , which years have been relatively dry?
- , what are the differences between natural and existing flows for a representative year?
- , what rivers are more significant in terms of flows than others?
- , what is the total water usage in the valleys compared to river flows?

Debate on other issues such as appropriate irrigation allocations and environmental flow requirements will also benefit from the data to be presented in the audit.

4.2 Water Usage

Water usage data to be presented includes recorded information on volumes used for irrigation and other uses. This data is compared to river flows and losses from the river. In addition, maximum licensed rates of water extraction are compared to river flows.

Actual water usage data to be presented in the audit comprises a comparison of regulated irrigation (both on and off allocation), unregulated irrigation and other water uses over the last ten years. In addition, a comparison is made between the maximum rate of extraction from the rivers (as determined from the licence conditions) and the likely river flows at which this maximum extraction rate could take place.

Modelled data to be presented comprises a comparison between irrigation water use, other water uses, river flows and water losses as a result of infiltration and evaporation.

The issues and questions that will be addressed by the data include:

- . how much water is used for irrigation compared to other uses?
- . are unregulated irrigation areas a significant user of water?
- . what is the importance of off-allocation water use in the valleys?
- . what is the relationship between irrigation water use, other water uses, losses and river flows?
- . what is the maximum allowable rate of water extraction in the valleys compared to river flows?

4.3 Water Storage

Water storage information in the audit includes general information on major reservoirs, storage duration data, a comparison of reservoir storage and river flows, and a comparison of reservoir storage and on-farm storage volumes.

The major storages within the Basin for which data is to be presented will comprise Beardmore, Burrendong, Windamere, Keepit, Split Rock, Chaffey, Copeton, Pindari and Glenlyon reservoirs.

Histograms showing the storage volumes during a median, dry and wet year are to be presented for these reservoirs. Storage versus duration curves will also be provided.

Information on on-farm storages will include the number of licensed storages per valley and a comparison of the total on-farm storage within valleys and the major reservoir volumes.

The issues and questions that will be addressed by the data include:

- . what is the yearly pattern of storage within the major reservoirs?
- . what variability can be expected in reservoir storage volumes in the long term?
- . what are the reservoir storage volumes compared to the average annual flow?
- . what proportion of the total water storage is on-farm storages?

5. CONCLUDING COMMENTS

In summary the audit aims to provide managers, water users and the wider community with information to enable better decision making and informed debate.

The audit will address a number of quantitative issues directly. While the audit will not attempt to answer the many qualitative issues of rivers management, such as environmental flow requirements and appropriate allocation policy decisions, it will provide basic data from which these issues can be considered.

The audit provides the opportunity for the cotton industry to enter the current debate by providing factual and definitive data, which puts irrigation use in perspective with other uses in the Basin. The audit will also form part of the move towards achieving sustainable and accountable irrigation practice. The industry should be complemented for having the courage to place the water audit data in the public arena.