

Murray-Darling Basin Royal Commission & the Law-Science Linkage
Part 2. Best Available Scientific Knowledge ~v~
Reliable and Relevant Scientific Evidence: Conflict Management

[Dr Ted Christie](#), 23 February 2019



Disclosure Statement

Ted Christie does not work for, consult to, own shares in or receive funding from any company or organisation that would benefit from this article, and has no relevant affiliations

Summary of the Key MDB Royal Commission Finding to be Reviewed

As appears throughout this report, a serious and fundamental requirement to act on the basis of the 'best available scientific knowledge' has not been, most regrettably, consistently obeyed.

Best available scientific knowledge is neither secret nor classified. It involves processes and actions that represent science that are capable of being reviewed, checked and replicated.

Rationale for the Review of the Key Finding

Where environmental legislation fails to provide legal meaning for prescribed scientific terms and concepts, or legal definitions are prescribed that do not resonate with their accepted scientific meaning, they may be open to many interpretations.

Decision-making in these circumstances runs the risk of being inconsistent – or in the worst-case scenario, invalid.

Objective Criterion to Review the Key Finding

Whether a statutory interpretation problem exists for 'best available scientific knowledge' in the Water Act 2007 (Cth).

Introduction

*The legislative framework
for developing the Basin Plan
requires the MDB Authority and the Minister
to “act on the basis of the best available scientific knowledge and
socioeconomic analysis”:*

[Water Act, Section 21\(4\)\(b\)](#)

At the very least, the legal meaning of the concept, the “*best available scientific knowledge*” in the Water Act, should conform to the scientific standard: Testability, objectivity and impartiality - together with the general test for acceptance of a scientific finding: widespread consensus within the scientific community following peer review and publication.

In preparing the Murray-Darling Basin Plan under the Water Act, it is for science to establish whether specific management practices are compatible with sustainable development - so that the water resources of the Murray-Darling Basin will be used and managed as a renewable natural resource.

It is for law to achieve the appropriate degree of environmental regulatory control by ensuring the Murray-Darling Basin Plan is prepared under the Water Act based on the “*best available scientific knowledge*.”

Whether decision-making by the MDB Authority, in preparing the Basin Plan, is based on the “best available scientific knowledge” will be entirely dependent on its legal meaning as prescribed in the Water Act.

Any failure to adequately define the concept of “*best available scientific knowledge*” would place in jeopardy decisions made pursuant to the Water Act. A poorly defined, or vague, meaning for the concept would make decision-making problematic under the Act.

But a drafting omission has now led to conflict over the status of “best available scientific knowledge” for preparing the Basin Plan. Different positions exist between the MDB Royal Commission and the MDB Authority.

In regard to this issue, the meaning given by the Water Act for this scientific concept (at [Footnote 1 to Section 21](#)), is limited. In the strict legal sense, it is of little assistance for interpretation to resolve the current conflict: -

*“The best available scientific knowledge
includes the best available systems
for accounting for water resources.”*

Reviewing the *Explanatory Memoranda* for the Water Bills, during the passage of the Water Act through parliament, can be a very useful aid for statutory interpretation by lawyers to construct the meaning of “vague” terms.

However, in this case, the Explanatory Memoranda provide no objective information to assist interpretation of the legal meaning for “best available scientific knowledge”; and, in turn, to resolve conflict over the positions held between the MDB Royal Commission and the MDB Authority.

Comment:

There is no legal meaning provided in the Water Act for the term “best available scientific knowledge”. It is surprising that this omission arose in legislative drafting from the time the Water Act came into force in 2007 – and over a decade later, no steps having been taken to resolve this omission. The outcome has been to ignite an information conflict between the MDB Royal Commission and the MDB Authority.

if this issue is not effectively addressed, there is potential for a challenge to be made that the scientific knowledge relied on by the MDB Authority, in preparing the Basin Plan, may be subjective - not objective.

Peer review is a key element of the [MDB Authority’s approach](#) to the application of the concept of “best available scientific knowledge” to the Basin Plan decision-making process: -

To “manage the Basin, the MDB Authority uses the best available peer reviewed science. Research results and analysis undergo a peer review process internally and often externally. Like all science and research, peer review is independent and provides quality assurance on the research methodology, data and the interpretation of results”.

The [MDB Royal Commission’s](#) observation that “best available scientific knowledge... involves processes and actions that represent science that are capable of being reviewed, checked and replicated” cannot be disputed. However, it does not provide a framework to facilitate resolving the conflict between the MDB Authority and the Royal Commission on this issue.

Framework for Constructing the Legal Meaning for Best Available Scientific Knowledge

Optimising the law-science integration for effective decision-making requires the scientific evidence in public interest environmental conflicts to conform to the standards and criteria to which scientists themselves adhere.

Science relies on the give and take of criticism, testing, experimentation and review. The central test employed by science to determine validity, in any context, is acceptance through widespread consensus.

Contrary to a long-held misconception, science does not generate exact knowledge with logical certainty! So, it is not surprising why divergent scientific opinion can arise and provide a significant challenge for our courts to address

**Relevant and Reliable Scientific Knowledge:
An Effective Alternative to Best Available Scientific Knowledge?**

What options exist for a pathway that could resolve the existing conflict?

The United States Supreme Court in [Daubert v Merrell Dow Pharmaceuticals Inc. 509 U.S. 579 \(1993\)](#), pioneered a significant benchmark for the judicial assessment of scientific expert opinion evidence in United States Federal Courts. It enabled the trial judge to act as the gatekeeper required to make a preliminary assessment of scientific evidence, to ensure that it was “both relevant and reliable” to the case at hand and so admissible.

The Supreme Court concluded that in relation to
*“whether the testimony’s underlying reasoning or methodology
is scientifically valid
and properly can be applied to the facts at issue
[that] many considerations will bear on the inquiry”.*

These considerations include:

- 1. “Whether the theory or technique in question can be (and has been) tested;**
- 2. Whether it has been subjected to peer review and publication;**
- 3. Its known or potential error rate¹; and**
- 4. The existence and maintenance of standards controlling its operation, and whether it has attracted widespread acceptance within a relevant scientific community. The inquiry is a flexible one, and its focus must be solely on principles and methodology, not on the conclusions that they generate.”**

Comment:

There would be little dispute that the approach of the United States Supreme Court in Daubert’s case is consistent with the standards and criteria used by science for evaluating the relevance and reliability of a scientific finding or theory. That is, the enduring criteria of testability, objectivity and impartiality, together with the test for acceptance of widespread consensus within the scientific community following peer review and publication.

Conclusions

- 1.0** *Evaluating the conflict between claims and counter-claims whether or not the "best available scientific knowledge has been consistently obeyed by the MDB Authority" requires a more definitive meaning for this concept than currently exists - as a matter of procedural fairness under the Water Act.*
- 2.0** *The approach taken by the United States Supreme Court in Daubert's case was to define the various elements that constitute "relevant and reliable scientific evidence" - rather than to simply provide a "plain meaning" for this scientific concept. This approach is the preferred pathway when complex scientific terms and concepts are prescribed in legislation. The advantages of this approach are that it promotes consistency in decision-making - as well as relying on objective criteria to evaluate the available scientific knowledge.*
- 3.0** *Some common ground exists in the approach taken by the MDB Royal Commission and the MDB Authority in that both refer to peer review as a component of "best available scientific knowledge".*
- 4.0** *But the problem for the MDB Authority, in preparing the Basin Plan, is to avoid claims whether the peer review processes they relied on were open and transparent. Also, the problem could be avoided if the peer reviewers defined clear, objective criteria they used to evaluate the reliability of the available scientific knowledge.*
- 5.0** *Any failure to address both of these needs by the MDB Authority could lead to a challenge that the peer review processes were subjective, not objective.*
- 6.0** *A prudent course for the MDB Authority to take would be to address the existing information conflict, using "the Daubert's standard" as one model; not only to ensure the validity of scientific information provided for the community consultation process, but also to restore or enhance trust in the MDB Plan in the broader community.*
- 7.0** *The problems for effective environmental decision-making posed by incomplete or unavailable information adds another dimension to relying on the best available scientific knowledge. This issue will be reviewed in another article to be posted on this site*

TAGS: Murray-Darling Basin Royal Commission; best available scientific knowledge; statutory interpretation; peer review; objective criteria; error rate; relevant and reliable scientific evidence; Murray-Darling Basin Authority

End Note

¹ One scientific criterion for an acceptable error rate for experimental ecological field research is based on the statistical concept, standard error of the mean; it is a measure of the variability of the experimental data used for calculating the mean. A standard error of the mean of 10% is a generally accepted scientific standard. Sampling design – especially the number of samples - is the cornerstone for achieving this goal.

Science would generally accept that the scientific criterion for the standard of proof for causality would be founded on a 95 per cent (sometimes 99 per cent) confidence level.

This is a significant difference to the civil standard of proof which is characterized as being on the “balance of probabilities” i.e. it must carry a reasonable degree of probability but not so high as required in a criminal case (“beyond reasonable doubt”).

The criminal standard of proof is better related to the scientific standard of proof than the civil standard of proof.