Environmental Evaluation of Development Proposals
Case Study: the Adani Project ~ A Need for Review?
Acceptance of Scientific Findings:
Best Available Science -v- Relevant and Reliable Science

Dr Ted Christie, *15 July 2019*

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Environmental planning and evaluation of the 'Adani Carmichael Coal Mine and Rail Project' - an open-cut and underground coal mine project with a yield of up to 60 million tonnes per annum - took almost nine years before Government granted approval.

The reason? Scientific uncertainty and public interest concerns that ignited conflict, litigation and delay.

The issue? Could these problems recur if significant potential adverse environmental impacts are predicted for future development proposals?

This is the second article of a series directed at the need for a review, by Government, of the environmental evaluation and approval processes for the Adani Project – cornerstones relied on by Government in its decision-making process. Without a review, will history repeat?

The focus of this article is on a source of information conflict that created scientific uncertainty for Adani: Different interpretations of the scientific information base as to what is "the best available science".

INTRODUCTION

The data and information upon which environmental conflicts are based are heavily founded on scientific, statistical and mathematical materials that have become increasingly sophisticated.

Science relies on the give and take of criticism, testing, experimentation, peer review and publication to evaluate the validity of a scientific finding or theory.

Contrary to a long-held misconception, science does not generate exact knowledge with logical certainty. Divergent scientific opinion on any issue will invariably exist.

The central test employed by scientists to determine the validity of a finding, reasoning or theory, in any given context, is acceptance through widespread consensus.

The consensus test of science is consistent with the approach taken by some courts in determining whether facts or theory contained in expert opinion evidence forms part of a body of knowledge which is sufficiently organised or recognised to be accepted as a reliable body of knowledge by the relevant branch of science.

CASE STUDY: The Adani Project and *"Best Available Science"*

The *Queensland Department of Environment and Science* described its assessment of Adani's ***Ground-Water Dependent Ecosystem Management Plan*** and the ***Black-throated Finch Management Plan*** as being ***"...based on the best available science"***.

In Australia,
the "norm" by science and politicians
is to rely on
"best available scientific knowledge",
or some variant of it
e.g. "best available science"- as in Adani.

A problem for decision-making with this concept will arise if it is not defined – or given a meaning which could be open to many interpretations.

For example, the Murray-Darling Basin Plan must be based on the "***best available scientific knowledge***". This scientific concept is a legal obligation prescribed in the *Federal Water Act (2007)* in order to prepare the Plan.

Effective regulatory control – and ultimately, decision-making under the Basin Plan - will be entirely dependent on the legal meaning for "*best available scientific knowledge*", as defined in the *Federal Water Act*.

But the meaning given by the *Federal Water Act (at Footnote 1 to Section 21)* for this scientific concept, is limited. In the strict legal sense, it is of little assistance for the interpretation of this scientific concept: -

"The best available scientific knowledge
includes the best available systems
for accounting for water resources."

The challenge for resolving public interest environmental conflicts would be to avoid a future scenario where a poorly defined, or vague, meaning for this scientific concept could make decision-making problematic. Or, in the worst-case scenario, lead to inconsistency in decision-making.

A further problem for decision-makers
is the weight that can be attached
to the best available science ["scientific knowledge"]
if relevant scientific evidence
is incomplete or unavailable?

The prudent course to now take in Australia would be to look at approaches for the interpretation of this concept in other jurisdictions.
The United States Supreme Court
has been the innovator in this regard.

Case Study United States: *"Relevant and Reliable Scientific Evidence"*

In ***Daubert v Merrell Dow Pharmaceuticals Inc.*** 509 U.S. 579 (1993), the United States Supreme Court established a strict test for the judicial assessment of the reliability of scientific claims for the admissibility of expert opinion evidence when Rule 702 [509 U.S. 579, 2] of the *Federal Rules of Evidence* applied: -

To ensure that scientific evidence was
"both relevant and reliable".

This decision 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 rate[1]; 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."***

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 scientific evidence.

Conclusions

1. ***Action is needed by Government to avoid conflict over the meaning of "best available science" and its applications for effective decision-making to resolve public interest environmental conflicts.***
2. ***Such action would also promote procedural fairness in decision-making involving competing interests for natural resource use***

3. ***The application of the "Daubert standard" would be a relevant consideration for reviewing divergent scientific opinion in public interest environmental conflicts.***
4. ***It should be the preferred model for decision-making as it combines the enduring criteria of science of testability, objectivity and impartiality - which complement the test for acceptance of widespread consensus within the scientific community following peer review and publication.***
5. ***Without a definitive meaning prescribed for the "best available science" in the relevant Queensland environmental legislation for the grant of an environmental authority, information conflicts that create scientific uncertainty will remain problematic causing delay and litigation risk.***
6. ***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.***
7. ***This approach is the preferred pathway when complex scientific terms and concepts are prescribed in legislation. The advantage is that it promotes consistency in decision-making - as well as providing a framework of objective criteria to evaluate the available scientific knowledge.***
8. ***The application of the "Daubert standard" would also offset the problem as to what weight should be given to the "best available science" when scientific information is incomplete or unavailable.***

End Note

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[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.