

The development of estuarine, coastal and marine indicators and information systems.

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I Background

This paper relates to the management of Estuarine, Coastal and Marine (ECM) data and information, within the context of the National Monitoring and Evaluation Framework (NM&EF). This Framework has been approved by the Natural Resource Management Ministerial Council (NRMMC). It aims to provide a basis for reporting on the health of the nation's natural resources and to help assess the performance of government policies and programs, particularly the NHT and NAP programs.

The NM&EF sets out broad thematic areas or "matters for target" (MfT) which can be reported against using a range of possible indicators. <http://www.nrm.gov.au/monitoring/indicators/index.html#list>

The indicators were initially developed by the Monitoring and Evaluation Working Group (MEWG) which had representatives from all jurisdictions. One of the MfTs is **Estuarine, Coastal and Marine habitat integrity**.

2 Why is the Audit involved?

2.1 Audit activities 1997 - 2002

During the first phase of the National Land & Water Resources Audit (Audit) between 1997- 2002, an estuary assessment was undertaken with information collected on 979 estuaries. Estuaries were classified into a range of types, and using a set of criteria were assessed as being either extensively modified (9%), modified (19%), largely unmodified (22%) or near pristine (50%). See **Figure 1**.

Although the assessment made considerable progress, the following limitations were identified:

- Although existing data was used where available, the assessment was highly subjective and relied on expert opinion
- Insufficient data was available for a quantitative assessment of the condition of many estuaries
- The assessment was unable to define precise benchmarks to establish the extent of change in modified estuaries
- Assessments were conducted as snapshots and did not provide trend information.

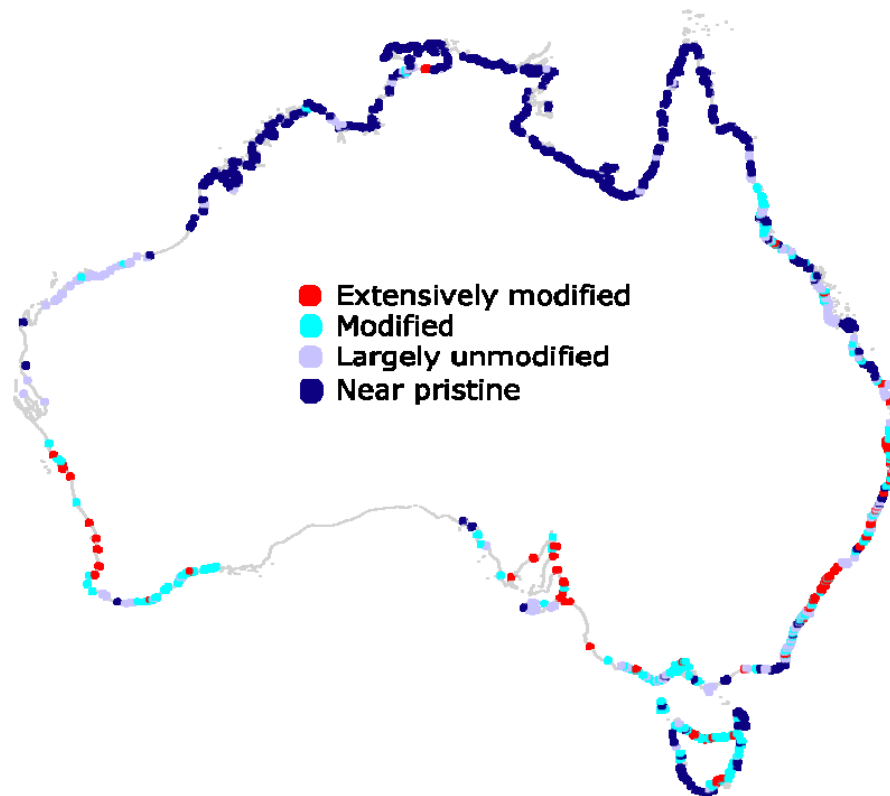


Figure 1 Condition of Australia's estuaries

Source: Australian Catchment, River and Estuary Assessment 2002 NLWRA

Challenges and possible future directions were outlined, including recommendations for improvements in monitoring and the management of data. Information on Australia's coasts and estuaries was made available in final reports and through an online information system "Ozestuaries"

<http://www.ozestuaries.org/>

2.2 Audit activities 2002 – 2008

The Australian Government ministers responsible for both the environment and agriculture, fisheries & forestry identified key roles for the Audit at the outset of its second phase in 2002. These included coordinating the collation of data and information against agreed indicators within the NM&EF, and to help develop linked data and information systems.

In addition, the Audit was asked by the Natural Resources Policies and Programs Committee (NRPPC) to take over certain tasks of the MEWG after that group was disbanded in December 2004. These tasks included ongoing development of indicators within the NM&EF. At the time of taking on this role, there was still not final agreement on all the indicators between state, territory and Australian Governments. Those indicators that are not agreed have been provided "for advice".

Each of the themes / MfT has a responsible National Coordinating Committee (NCC) (or in some cases a technical advisory group) which includes representatives from Australian and state / territory governments and possibly other organisations such as CSIRO. The NCCs for all MfTs, other than "estuarine, coastal and marine", have been established under the auspices of the NRPPC. The NRPPC has agreed that the NCCs for each thematic area report to the Audit on matters of data and information management, and report to the NRPPC on matters of policy. NRPPC in turn reports to the Natural Resource Management Standing Committee (NRMSC).

The Marine and Coastal Committee (MACC) also reports to the NRMSC in relation to the Estuarine Coastal and Marine MfT. MACC have tasked the Intergovernmental Coastal Advisory Group (ICAG) as the NCC to develop natural resource condition indicators for the ECM MfT.

The Australian Government Department of Environment and Heritage (DEH) plays a significant role in this regard, providing the secretariat for both MACC and ICAG.

The Audit is working with the various NCCs to undertake the following activities:

- Refine and reach final agreement on the **indicators** and measurement methods / protocols
- Define **information products** (eg maps, tables, graphs or descriptive text) that may be derived from one or more of the indicators in order to support defined policy or management needs
- Identify appropriate **data and information management systems** in relation to each “matter for target”.

The Audit is progressively developing workplans with the NCCs that outline specific tasks and budgets to achieve the above activities. A summary of the ECM [workplan](#) is provided in **section 6** of this paper.

3 Progress to date in reaching agreement on indicators

ICAG, DEH and the MEWG previously engaged the Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management (Coastal CRC) to develop ECM resource condition indicators. A draft Users Guide to Estuarine, Coastal and Marine Indicators for Regional NRM Monitoring was produced in May 2004, listing 31 possible indicators that could be used by regional NRM bodies to report on progress towards targets as a result of management actions. This report was presented to the MEWG secretariat during a period when that group was effectively not operational, prior to it being formally disbanded in late 2004. The document therefore was not formally endorsed by the MEWG and remained “for advice”.

Discussions between ICAG, DEH and Audit representatives during 2005 highlighted the need to formally resolve the status of the draft indicators and to rationalise the number of indicators with a focus on those most likely to be used. ICAG representatives from each state / NT then went through a process of identifying which of the indicators were seen as relevant within each jurisdiction in advance of a national workshop in February 2006.

4 Outcomes of the national workshop

One of the main aims of the workshop in Hobart in February 2006 was to reach agreement on a common set of ECM indicators that could be used around the country, building on the previous work of the Coastal CRC and ICAG.

There was a strong view from many participants that we need to be clear on how the indicators would be used. It is important that the indicators relate to the key issues facing governments and communities. Clarity is required as to what the policy and management questions are that we need information to provide answers for.

Background research prior to the workshop, and discussions held during the workshop, identified consistent and recurring broad issues that commonly challenge, and are being addressed by, jurisdictions.

Key estuarine, coastal and marine issues include:

- Coastal development and landuse change
- Catchment impacts on quantity and quality of flows
- Water / sediment quality (receiving)
- Habitat loss / degradation
- Biological resource use (especially fisheries)
- Resource management (institutional arrangements)
- Pest species
- Climate change

Workshop sessions aimed to ensure that the resource condition indicators were selected on the basis that they could provide information to assist in addressing one or more of the above issues. In many cases one indicator may be relevant to more than one issue. In some cases an indicator may have been selected because it was specific to a particular issue, for example shoreline position and coral bleaching were seen as useful indicators in relation to climate change.

As a result of the workshop, and subsequent work by ICAG members, a nationally agreed set of resource condition indicators has been developed. These indicators are aligned to the indicator headings for the ECM matter for target within the NM&EF as shown in Table 1 below.

Table 1 Nationally agreed estuarine, coastal and marine resource condition indicators

NM&EF indicator heading	Indicator
Estuarine, coastal and marine habitat extent and distribution	1 Extent and Distribution of key habitat types
Estuarine, coastal and marine habitat condition	<p>Biological condition</p> <p>2 Algal blooms</p> <p>3 Animal or plant species abundance</p> <p>4 Chlorophyll a</p> <p>5 Coral bleaching</p> <p>6 Mass mortality events</p> <p>7 Pest species (number, density, distribution)</p> <p>8 Targeted pathogen counts</p> <p>9 Vertebrates impacted by human activities</p> <p>Physical/chemical condition</p> <p>10 Dissolved oxygen</p> <p>11 Nutrients</p> <p>12 pH</p> <p>13 Presence / extent of litter</p> <p>14 Salinity (EC)</p> <p>15 Sedimentation/erosion rates</p> <p>16 Shoreline position</p> <p>17 Temperature</p> <p>18 Toxicants (in water / sediments / biota)</p> <p>19 Turbidity / water clarity</p>

A nationally agreed indicator was defined at the national workshop as being useful in terms of assessing the health and trends in the condition of estuarine, coastal and marine resources. This would provide information to assist jurisdictions address key issues. It is important to note that monitoring or reporting against these indicators is not mandatory or binding on any jurisdiction. Jurisdictions and / or regional NRM bodies would be free to select a subset from the list, they may also wish to collect data outside of these indicators to meet their specific needs.

Other key points that emerged from the workshop include the following:

- The actual data available for many of the indicators is often geographically specific and has been collected for specific purposes. It may therefore not be suitable for national aggregation, depending on the specific management question for which data collection was designed.
- Some indicators require further work on the specific protocols or methods. This includes identifying which of the indicators need to be used in conjunction with others in order to make a meaningful assessment of resource condition.
- The progressive development of a more comprehensive index of estuarine condition / health could be further developed in the future, building on the current analysis of data availability.
- Further work is required to develop social and economic or pressure indicators to provide context for the resource condition indicators.
- Biodiversity indicators also require further work.
- There is a need for ongoing links with other NCCs to ensure that some issues and information needs do not fall through the gaps eg nutrients in freshwater systems that enter estuaries, coastal vegetation, weeds in marine environments etc.

5 Progress since the workshop

A Draft ECM information work plan 2006-2008 has been developed by the Audit in consultation with ICAG and DEH which outlines specific projects to advance this work. See summary below.

In late July 2006 the MACC noted the Work Plan and agreed to the indicators for referral to the Audit Advisory Council for endorsement. In September 2006 the AAC agreed to the further development of the indicators consistent with the Work Plan.

Additional work is now required on the nationally agreed indicators, for example to:

- Refine methods or protocols for the collection and management of data
- Document the extent of existing information
- Determine the utility of each indicator based on the available information
- Develop information products to meet management and policy needs
- Develop linked data and information systems

Since February there has been ongoing activity in several jurisdictions. A project has now been completed in Tasmania to document existing monitoring and research programs across Tasmania relevant to the agreed indicators (Report on Audit website http://nlwra.erinanetspeed.com.au/downloads/final_reports/UTII_TasIndicators_Report.pdf). A similar process has now commenced in Queensland and SA. The Audit will also seek the involvement in similar projects in all other jurisdictions in the 06 / 07 financial year consistent with the work plan.

A national coordinator has now been appointed.

6 Where to from here?

The [Estuarine Coastal and Marine Information Work Plan 2006- 2008](#)

A draft work plan has been developed in a consistent format to work plans the Audit and relevant NCCs have developed for other thematic areas. The workplan outlines broad activity areas and sub projects with an indicative allocation of \$560,000 over two years from the Audit's budget. Refer to the Workplan for further details. Key components of the workplan are outlined below:

6.1 Project co-ordination and reporting

A part time project co-ordinator will be engaged for about 18 months. The coordinator will oversee implementation of the work plan, ensure that the various project milestones are met, and ensure co-ordination between the various projects.

6.2 Information needs and indicator development

This will involve working with jurisdictions to trial the agreed indicators to ensure they are relevant to meeting information needs, and to document existing data that is available to report against the indicators. This would build on the project already carried out in Tasmania.

Geoscience Australia will host updated indicator fact sheets including recommended methods on the Ozestuaries website, in association with jurisdictional representatives.

The focus on indicator development to date has been specifically on resource condition indicators. However there is also a need to develop social and economic and / or pressure indicators. This will enable a more meaningful and comprehensive assessment of trends in resource condition, and to help develop the most effective management responses. A project is proposed to pursue this area of work.

6.3 Development of information products

It is proposed to initially develop a select number of information products at a range of scales from regional to national (eg maps showing trends in habitat extent and condition). The development of products would depend on the availability of data as identified in 6.2 above, and would be assessed by ICAG and MACC for relevance in meeting policy and management needs. Depending on availability of data, and input from ICAG / MACC, additional information products would be progressively developed.

The products would be developed in association with jurisdictions these would be made available on the Ozestuaries website.

6.4 Data infrastructure and systems

This would aim to develop links between local, state/NT and national data and information systems. An initial pilot is proposed in Tasmania to develop links between the Tasmanian SoE data system (which provides access to site specific data) and Ozestuaries. Project activities would aim to test and identify potential improvements in data infrastructure, data access and management arrangements and skills and capacity.

6.5 Analysis and communication

The work plan does not include a comprehensive assessment of estuarine, coastal and marine resource condition. It does provide for a report on the status of ECM data and a report on the status of data and information systems with recommendations for ongoing development. The final project in the workplan is for a scoping study to assess what would be required to undertake a comprehensive coastal assessment based on an analysis of policy needs and drivers, for example the National SoE report in 2011.