



5th Western Australian State

COASTAL CONFERENCE 2009

*Whose Coast Is It?
adapting for the future*

5A:

Planning Marine
Environments for
the Future:
3.30–4.00pm
Thursday 8th
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Pleiades Room

Natural Resources Management: Monitoring and Indicators in the Marine Environment

PRESENTER:

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Introduction

Federal and State governments in Australia have committed themselves to a program of actions to support long-term management and sustainable utilization of the nations' natural living resources. Part of this program included the establishment of 56 Natural Resource Management (NRM) regions, each with an NRM committee consisting of representatives from the community, government agencies and academic institutions. Each region is required to set long-term and interim goals for natural resources management within a national framework.

Environmental monitoring is a critical element in assessing the status of marine assets and it is therefore important that monitoring programs focus on relevant issues in the most cost-effective ways. Monitoring is deceptively easy to conceptualise, but there are many pitfalls in design, execution and interpretation that need to be avoided if a program is to meet its objectives. One of the biggest technical challenges is choosing appropriate indicators and methods of measurement.

Background

As part of its strategic planning for management of marine resources, the Perth Region NRM commissioned a review of marine monitoring programs in Western Australia, with an emphasis on the Perth region. The aims were to assess what has been and is being done in relation to marine monitoring in the Perth region and to provide a basis for designing monitoring programs to assess progress towards achieving resource condition targets for natural resource management.

Methodology

The study was based on library and internet searches and interviews with Perth NRM members, representatives of local academic institutions, government agencies and NGOs. Thirty research reports, focused on south west Western Australia, and covering topics ranging from seagrass monitoring to remote sensing, were critically reviewed. Over 180 published papers provided additional information on marine environmental monitoring to give a wider Australian and international perspective. A significant part of the

work comprised a critical appraisal of monitoring studies and the indicators of marine condition that have been used in this context. This was coupled with a review of threats to marine resources to identify ecological impacts and the best ways in which monitoring can be used to provide early warnings of adverse effects. The study also included a review of current best practice in environmental monitoring and analysis of data.

Project Outcomes/Conclusion

The study identified the major classes of indicators that have been used and the degree to which these have been validated in the field. There was a clear bias towards static indicators (abundance, amount of habitat, concentrations of contaminants, etc.), with relatively little attention paid to processes (such as nutrient cycling, recolonisation after disturbance, etc.), despite the fact that these can give much better information on changes in ecosystems long before impacts become obvious. One reason for this is undoubtedly that process indicators are technically more challenging and expensive to use than many 'traditional' indicators.

The reports reviewed used, collectively, 100 indicators of environmental or habitat/species condition. In 65% of cases there was a statement about what an indicator was supposed to be indicating. Only one third, however, provided evidence that the indicator had been validated, either by work done within the report, or with reference to other published work. There was considerable vagueness about what the indicators were supposed to indicate and whether they were in fact appropriate and whether they were being used at meaningful scales of space and time.

Threat/impact matrices for major marine resources (seagrass, reef communities, marine sediments, invertebrates, fish, megafauna and ecological processes) in the Perth Region were developed and appropriate indicators (or combinations of indicators) on which to base monitoring programs were identified. Emphasis was placed on the use of indicators of ecological function to complement static indicators, and also on indicators that give information about potential effects on multiple resources (multi-purpose indicators). An example of the latter would be measures of rates of denitrification as an indicator of a system's ability to process nutrients, as opposed to only measuring the concentrations of nutrients.

The principal conclusion of the study is that while there is a great deal of good monitoring work being done, the complexity of the questions that need to be answered about the effects of human activities on ecosystems requires a more sophisticated approach to monitoring in which indicators of ecological processes play a more important role. This will require a reassessment of the role of community monitoring in NRM as the technical expertise and resources required would be beyond what could be reasonably expected from non-specialist groups.

The study made several recommendations for developing NRM monitoring programs including setting clear objectives, appropriate choice of indicators and design of monitoring programs and addressing institutional arrangements to ensure cost-effectiveness, consistency and continuity.