

Chapter One

Introduction

1.1. Background

All the governments and Ministerial Councils of Australia agree that Australia's water resources need ecologically sustainable management; that is, management with a long-term perspective, for this and future generations. Ecologically sustainable management will ensure that:

- high quality water is available for consumption;
- adequate water supplies are available for both agricultural and industrial production;
- ecological values are enhanced and protected; and
- the community's need for water-based recreation and related amenities are met.

Therefore, the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) have formulated the National Water Quality Management Strategy (NWQMS) (see Appendix 1 for details), with the objective of achieving

sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.

The National Health and Medical Research Council (NHMRC) is involved in aspects of the NWQMS that affect public health. The NWQMS has been adopted as part of the Council of Australian Governments (COAG) Water Reform Framework (Appendix 2).

ANZECC and ARMCANZ are pursuing the NWQMS policy objective by organising the production of high-status national guidelines which are to be implemented locally. The *Implementation Guidelines* (ANZECC & ARMCANZ 1998), NWQMS paper no. 3, outlines the process for protecting water quality. It recommends the use of both regulatory and market-based approaches, in a catchment management framework with community involvement. The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ 2000), NWQMS paper no. 4, provides guidelines for water quality and is complemented by the *Australian Guidelines for Water Quality Monitoring and Reporting*, NWQMS paper no. 7, 'the Monitoring Guidelines', this document. Monitoring is an integral part of the NWQMS, and the Monitoring Guidelines aims to ensure that water quality monitoring in Australia is done in a nationally consistent, systematic and scientifically appropriate manner. This set of guidelines leads the way to better planned water quality monitoring and reporting programs which should collect good quality data and provide useful information to managers of natural resources.

The National Land and Water Resources Audit of water monitoring in Australia (EA/NLWRA 2000), indicates that state and territory agencies are engaged in 70% of water quality monitoring programs, and local government in 19%, and that Commonwealth agencies, industry, tertiary institutions and community groups do the rest. Community groups contribute to monitoring programs either individually or through structures such as integrated catchment management committees and Waterwatch and relevant state programs (Appendix 3). With such a wide range of organisations providing data, incompatibilities can occur, sometimes making it difficult to interpret and compare results.

1.2. Scope of Water Quality Monitoring

Australia is a continent encompassing many diverse water bodies. The water resources of greatest significance include drinking water supplies and catchments, rivers, lakes and aquifers, and estuarine and marine waters that have economic, ecological or cultural value. There is no need to monitor them all; nor are there enough personnel and money for the monitoring of all the resources that need it. Risk assessment of the potential impacts of declining water quality can be used to identify the water resources or water bodies that should be monitored first.

Water quality investigations are undertaken to provide information on the health of water bodies and for the management of catchments and water resources and the environment. They may be single studies to examine a particular issue, or they may be ongoing monitoring programs. Monitoring programs can assess water quality in comparison with water quality objectives, and consider measurement parameters, ranges of concentrations and frequency of measurement, and identify point and non-point sources of contaminants. For example, a monitoring program might be able to demonstrate a relationship between changes in land management and the frequency of algal blooms in a catchment. A uniform, coordinated and efficient series of monitoring programs will improve the information available: for example,

- to provide a basis for auditing contaminant controls and assessing impacts on water quality;
- to underpin the State of the Environment reporting and National Audit reporting;
- to develop better water quality standards and guidelines and to assess water quality against these.

Water quality investigations are expensive, and few organisations have the resources to monitor over a large geographical area or over a long time frame. Resources tend to be targeted to meet specific regional needs. State government agencies will continue to bear the prime responsibility for setting priorities for monitoring and reporting within their own jurisdictions and for meeting nationally agreed objectives. As these agencies improve the coordination of monitoring they will eliminate duplication and gaps in information collection, particularly if they also draw on supplementary information collected by initiatives such as Landcare, State of the Rivers, or State of the Environment reporting (Environment Australia 1996, 1998), as appropriate.

It can be difficult to aggregate data to provide statewide or national reports, such as for State of the Environment reporting. The difficulties are reduced when standard approaches are used for the design, implementation and reporting of water quality monitoring programs, at least with respect to key measurement parameters. Ideally, the design of each program ensures that the data are collected or generated in a form that can be integrated and compared with similar data collected elsewhere in Australia; for example, the program can measure a set of parameters at the same time-intervals as have been used in a comparable program elsewhere. Reports on the monitoring program should include information about the collection, management, analysis and storage techniques used. Communication between water protection groups about a monitoring program that is being planned can also help make concurrent programs compatible with each other. Data sets can be collated and compared at a later stage to develop a wider picture from the data.

1.3. Structure of a Monitoring Program

Effective water quality investigations systematically collect physical, chemical and biological information, and analyse, interpret and report those measurements, all according to a carefully pre-planned design which follows a basic structure.

This Monitoring Guidelines document sets out a standard structure for the design of a monitoring program (see Figure 1.1). The chapters lead the monitoring team through the necessary stages. Each chapter contains a summary flowchart and checklist, and discusses how to:

- define information requirements and objectives for monitoring programs (Chapter 2);

- design a study, including its type, scale, measurement parameters and sampling programs, and preferred methods for sampling (Chapters 3 and 4);
- design a laboratory program including preferred methods for laboratory and field analysis (Chapters 4 and 5);
- set up quality assurance and quality control procedures (Chapters 4 and 5);
- be aware of occupational health and safety concerns (Chapters 4 and 5);
- statistically analyse and interpret the data (Chapter 6 and Appendix 5);
- report and disseminate information to various audiences, and collate feedback (Chapter 7).

Sometimes, more detailed advice will be required and this can either be found in the appendixes or in references or other listed sources.

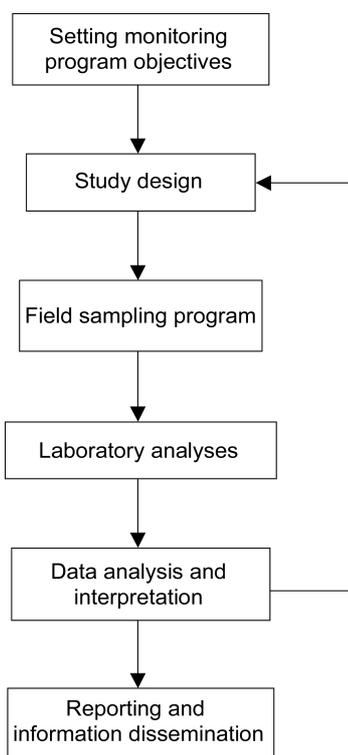


Figure 1.1. Framework for a water quality monitoring program. Each box is dealt with by one chapter of the Monitoring Guidelines, from Chapter 2 to Chapter 7.

It is important to remember that the design of a monitoring program is an iterative process, as indicated in Figure 1.1, and that earlier components in the structure should be refined on the basis of findings in later stages.

The Monitoring Guidelines is intended for use by water quality personnel with basic technical training, involved in environmental monitoring throughout Australia, working in agencies, water authorities, catchment management authorities, councils, industry, consulting companies and tertiary institutions, and it should also be helpful for community groups.

