



## Community Based Monitoring Framework for Natural Resource Management in the South Australian Murray-Darling Basin

# **Community Based Monitoring Framework for Natural Resource Management in the South Australian Murray- Darling Basin**

## **Logos**

O'Connor NRM

In Fusion Consulting

SA Government

NAP

SAMDB INRM Group

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### **The South Australian Murray-Darling Basin Integrated Natural Resource Management Group Inc**

Level 1, 24 Sixth St, Murray Bridge  
PO Box 2056, Murray Bridge SA 5253

**Telephone** National (08) 8532 1432  
International +61 8 8532 1432

**Fax** National (08) 8532 5300  
International +61 8 8532 5300

**Website** [www.rivermurray.sa.gov.au/inrm](http://www.rivermurray.sa.gov.au/inrm)

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## **Acronyms**

INRM            Integrated Natural Resource Management

MAT            Management Action Targets

NRM            Natural Resource Management

RCT            Resource Condition Targets

SAMDB        South Australian Murray Darling

# Table of Contents

1	Executive Summary .....	6
2	Introduction .....	8
2.1	Purpose.....	8
2.2	Background .....	8
2.3	Structure of Framework.....	11
3	Role of Community Based Monitoring in regional NRM in the SAMDB .....	12
4	Data Quality Framework .....	22
5	Capacity Building .....	25
6	Communication Framework .....	27
7	Roles and responsibilities .....	28
8	Resources and Support .....	30
9	Community Based Monitoring Plan .....	32
	Appendix 1: Community Based Monitoring Plan.....	34
	Appendix 2: Modified EPA Data Category Questionnaire.....	38
	Appendix 3: EPA Monitoring Checklist .....	40
	Appendix 4: EPA Monitoring Logbook Proforma.....	42
	Appendix 5: Metadata Standards.....	43

## Table of Tables

Table 1: Potential for community involvement in reporting against resource condition targets.....	13
Table 2: Data generating MATs (as per Investment Strategy Phase 2).....	19
Table 3: Characteristics of the EPA Data Categories for Community Water Monitoring.....	23
Table 4: Recommended communication tools to inform different audiences for community based monitoring program results.....	27
Table 5: Resources and Support for Community Based Monitoring.....	31

## 1 Executive Summary

This Framework has been prepared as a guide on how to implement community based monitoring so that the greatest benefits are achieved for all stakeholders. It is designed to compliment the South Australian Murray Darling Basin (SAMDB) Monitoring and Evaluation Framework which has been developed to assess and report progress towards Resource Condition Targets (RCTs) and is currently establishing a process for measuring and reporting on Management Action Targets (MATs) and program outputs. An underlying assumption of the Monitoring and Evaluation Framework is that monitoring activities are most effective when they are clearly connected to management decisions in an adaptive management framework. International research demonstrates that community based monitoring can make significant contribution to supporting management decisions about resource management when the process is adequately supported.

The Community Based Monitoring Framework is divided into seven key sections:

1. The Role of Community Based Monitoring in regional NRM in the SAMDB: describes how community based monitoring could be used in reporting against information needs identified in the MERF
2. Data Quality Framework: describes tools for rating the quality of data and information collected from community based monitoring and outlines the steps required to improve data quality achieved through community based monitoring
3. Capacity Building: a description of how community based monitoring can be used to build the interest and skills of community participants in managing natural resources
4. Communication Framework: Framework that proposes tools relevant to different audiences to communicate the results of community based monitoring

5. Roles and responsibilities: Outlines the various roles and responsibilities of stakeholders in community based monitoring and how they interact
6. Resources and Support: Describes the resources and support required to gain the greatest benefits from community based monitoring for participants and other stakeholders
7. Community Based Monitoring Plan: A proforma for community groups to prepare their own monitoring plan

This Community Based Monitoring Framework is based on a Report on Development of a Community Monitoring Framework for The South Australian Murray Darling Basin (2005) which involved a literature review and surveys of community groups and participants in monitoring in the SAMDB region.

## **2 Introduction**

### **2.1 Purpose**

The purpose of the Community Based Monitoring Framework is to guide the stakeholders in the SAMDB on how to achieve the greatest value from community based monitoring for the participants, the regional NRM Board, the broader community and the natural resources of the region.

### **2.2 Background**

#### **Monitoring and evaluation**

Effective sustainable management of natural resources requires an understanding of fluctuations in the condition of resource assets and the potential threats to the long-term viability of these assets. Throughout the SAMDB there are a number of threats that pose a risk to current and long-term viability of the region's natural resources – which could ultimately impact social and economic development within the region. The INRM Group has prepared a Strategic Plan (2004) and Investment Strategies (2003-2004, 2004-2005 and 2005-2008 (currently under consideration) to identify priority issues and implement actions to maintain and restore the condition of natural resources in the region.

These documents have been prepared to meet the requirements of the National NRM Standards and Targets Framework and the National NRM Monitoring and Evaluation Framework. These frameworks set out themes and levels for setting targets within regions that meet National requirements for investment in integrated and accountable natural resource management. To implement the monitoring and evaluation components of the Plan and Investment Strategies the INRM Group has developed the SAMDB Monitoring and Evaluation Framework to assess and report progress towards Resource Condition Targets (RCTs) and is currently establishing a process for measuring and reporting on Management Action Targets (MATs) and program outputs.

The objective of monitoring is to record changes in the resource asset over time; understand the key drivers that are causing the change; and, to measure the performance of management in meeting targets and broader strategic goals. An underlying assumption of the Monitoring and Evaluation Framework is that monitoring activities are most effective when they are clearly connected to management decisions in an adaptive management framework. Community monitoring can make significant contribution to decisions about resource management when it is adequately supported.

The INRM Group's approach to monitoring and evaluation is based on a core set of principles that reflect best practice. These principles state that the monitoring and evaluation system implemented by this INRM plan must:

- be practical and objectively verifiable;
- be complementary to existing systems;
- be developed and implemented in partnership with existing data managers and users;
- recognise the need for regular, long-term data collection to enable credible scientific investigation and assessment;
- enable the determination of baseline conditions (or benchmarks), important and emerging issues, and trends over time;
- provide data that can be aggregated for reporting at a property, local, regional, state or basin scale;
- inform a periodic review against objectives, targets and desired outcomes;
- adapt over time as new knowledge enables refinement of monitoring activities; and
- be cost effective to implement and maintain.

The INRM Group is committed to establishing monitoring systems at an early stage to collect baseline information to guide target setting, and condition and trend analysis, particularly where there are existing information gaps. Management must be based on the best available knowledge, and monitoring helps to improve that knowledge. Monitoring will provide a realistic link between individual projects, regional trends in catchment health, and the overall outcomes and objectives of Strategic and Investment plans.

Involving the community in managing natural resources is the main purpose behind the establishment of the INRM Group to ensure broad scale community support for improvements in the management of natural resource management.

*"Without a high level of involvement and associated behavioural change, it is unlikely that the full range of benefits that could be achieved will be realised."*<sup>1</sup>

The community has been heavily involved in preparing the existing plans, having been written by community based organisations like LAP Committees or Soil Conservation Boards, or prepared through extensive participatory processes such as that required under the Water Resources Act 1997. This has ensured that they have a high level of community ownership and support. Community views, knowledge and aspirations have helped to shape this and other existing plans and their methods of implementation.

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<sup>1</sup> Integrated Natural Resource Management Group for the South Australian Murray Darling Basin Inc. (2003) Integrated Natural Resource Management Plan for the South Australian Murray-Darling Basin

## 2.3 Structure of Framework

The Community Based Monitoring Framework is divided into seven key sections:

1. The Role of Community Based Monitoring in regional NRM in SAMDB: describes how community based monitoring could be used in reporting against information needs identified in the MERF;
2. Data Quality Framework: describes tools for rating the quality of data and information collected from community based monitoring and outlines the steps required to improve data quality achieved through community based monitoring;
3. Capacity Building: a description of how community based monitoring can be used to build the interest and skills of community participants in managing natural resources through community based monitoring;
4. Communication Framework: Framework that proposes tools relevant to different audiences to communicate the results of community based monitoring;
5. Roles and responsibilities: Outlines the various roles and responsibilities of stakeholders in community based monitoring and how they interact.
6. Resources and Support: Describes the resources and support required to gain the greatest benefits from community based monitoring for participants and other stakeholders.
7. Community Based Monitoring Plan: A proforma for community groups to prepare their own monitoring plan.

This Community Based Monitoring Framework is based on a Report on Development of a Community Monitoring Framework for The South Australian Murray Darling Basin (2005) which involved a literature review and survey of community groups and participants in monitoring in the SAMDB region.

### 3 Role of Community Based Monitoring in regional NRM in the SAMDB

Community monitoring can play an important role in achieving monitoring required under the MERF. This is summarized in the table below (Table 1). Of particular value would be:

- Surveys of vegetation condition and extent
- Surveys of wetland condition, extent and connectivity
- Fish surveys

There are other measures of condition where community groups have a valuable role to play in monitoring, but there is still no agreed methodology (for example: lake edge erosion). Involving community groups in thinking through what appropriate methodologies could be is encouraged, as they bring a wealth of experience and a different perspective in developing practical solutions to technical problems.

Table 1: Potential for community involvement in reporting against resource condition targets

RCT	Required Info	Details	Potential Community Monitoring	Methodology
1. Maintain and improve the extent and condition of 65% of current floodplain vegetation communities in areas of high priority by 2020	Floodplain vegetation condition, extent, composition and structural classifications	On going vegetation survey: River Murray floodplain region of SA - SA/Vic/NSW border to the barrages - extending to the 1956 flood level; every 15 years for floodplain vegetation extent, composition and structural classifications and every 5 years for floodplain vegetation condition	Yes	Guide to a Native Vegetation Survey Using the Biological Survey of South Australia Methodology. Dept Housing and Urban Development. 1997
	Priority system to define or identify areas not established with native vegetation	Priority system - potential methodology and output under progress through Department for Environment and Heritage (completion expected mid 2005) - to be applied to the SAMDB and potentially remaining SA NRM regions - anticipated output includes ecological classification of landscape with polygons of vegetation communities based on landform, soil type and habitat value for regional and sub-regional priority	Yes with some direction	

RCT	Required Info	Details	Potential Community Monitoring	Methodology
2. By 2020, a 30% reduction in priority areas of floodplain currently affected by salinity from groundwater discharge.	Salt affected floodplain extent	'On going vegetation survey and Flood Impacts Model (revised) incorporated: River Murray floodplain region of SA - SA/Vic/NSW border to the barrages - extending to the 1956 flood level; Every 5 or 10 years		
3. Maintain and improve the condition and connectedness of 60% of wetlands of high priority by 2020	Wetland condition	Wetland condition - "condition" difficult to assess in an efficient manner due to variety of potential condition parameters - methodology used in Tree Health dataset has been adapted and used in "Your Wetland: Monitoring Manual - Data Collection" (Tucker P 2004) and Floodplain Impacts Model (CSIRO 2003). No planned, systematic monitoring program - option RMCWMB Wetlands Community Monitoring Program: need to investigate data quality and timing of availability; Every 5 or 10 years	RMCWMB Community Wetland Monitoring Program	Tucker. P. (2004) Your Wetland: Monitoring Manual - Data Collection. River Murray Catchment Water Management Board, Berri and Australian Landscape Trust, Renmark

RCT	Required Info	Details	Potential Community Monitoring	Methodology
3. Maintain and improve the condition and connectedness of 60% of wetlands of high priority by 2020	Wetland "connectedness"	Wetland connectedness/connectivity - Systematic monitoring program not in place - Incorporating wetland management licence system Every 5 or 10 years	RMCWMB Community Wetland Monitoring Program	
4. Maintain and improve the condition of 60% of the littoral zone of high priority and high significance by 2020	Health of the littoral zone of the River Murray and Coorong	Monitoring program and vegetation survey for the littoral zone of Coorong, River Murray and waters	Potential with support	Standards developed by DEH and David Paton (University of Adelaide)
5. By 2020, improve the habitat in all waters to permit successful recruitment of native fish, particularly Murray Cod, resulting from natural or manipulated flows.	River health	Additional monitoring sites are needed to develop regional models (autumn edge, spring edge and combined edge models for the River Murray) and from selected sites yearly to show temporal patterns in response to different source water effects (e.g. Murray River or Darling floods, drought effects, managed flows from Lake Victoria) along selected section of River Murray and tributaries twice annually	Potential - develop simpler monitoring programs to complement the more detailed sampling and analysis of the larger program	<a href="http://ausrivas.canberra.edu.au/Bioassessment/Macroinvertebrates/Man/Sampling/SA/SA_Training_Manual.pdf">http://ausrivas.canberra.edu.au/Bioassessment/Macroinvertebrates/Man/Sampling/SA/SA_Training_Manual.pdf</a>

RCT	Required Info	Details	Potential Community Monitoring	Methodology
5. By 2020, improve the habitat in all waters to permit successful recruitment of native fish, particularly Murray Cod, resulting from natural or manipulated flows.	Native fish numbers	Ongoing fish monitoring at key sites along selected section of River Murray and tributaries every three years	Yes	Methodologies developed for Baseline Survey (Community Wetland Management Program)
	Murray Cod recruitment	Ongoing fish monitoring at key sites along selected section of River Murray and tributaries every year	Yes	
6. Recover 30% of water dependent ecosystems from pest infestation and minimize any further infestations by 2020.	Aquatic pest extent and distribution	Fish survey annually	Yes	Methodologies developed for Baseline Survey (Community Wetland Management Program)
6. Recover 30% of water dependent ecosystems from pest infestation and minimize any further infestations by 2020.	Wetland condition	A number of attributes would determine 'condition' which would be monitored at differing times in the year to detect change. No protocol developed yet.	RMCWMB Community Wetland Monitoring Program	
7. By 2020, to have salinity of water in the River Murray less than 800EC for 95% of the time at Morgan to ensure drinking water standards	In river salinity	Mostly achieved through modelling with BIGMOD. Contextual information would be valuable	Waterwatch Program - neighbouring location for contextual information	Internal Standards - meet and exceed National Standards

RCT	Required Info	Details	Potential Community Monitoring	Methodology
14. Maintain and improve the stability of riverbanks, lake edges, sanddunes and cliffs by 2020	Riverbank erosion	Systematic monitoring program not in place	Develop a Riverbank watch program	
	Lake edge erosion		Inclusion of monitoring with Waterwatch program groups	Informal methodologies developed and tested as part of trials
	Sand dune erosion		Develop a Sand dune watch program	
	River cliff erosion		Develop a Cliffwatch program	
21. Recover 30 % of quality native vegetation, habitat and agricultural production areas from pest infestation and minimize any further infestations by 2020	Vegetation habitat extent	Habitat extent monitoring	Yes	

RCT	Required Info	Details	Potential Community Monitoring	Methodology
22. By 2020 improve or maintain condition of terrestrial native vegetation focusing on identified priority areas and improve condition of 50% or remnant vegetation on private land as well as increasing vegetation cover by 1% in the agricultural region.	Vegetation condition Extent of native vegetation	Surveys of vegetation condition Habitat extent monitoring	Yes Yes	Guide to a Native Vegetation Survey Using the Biological Survey of South Australia Methodology. Dept Housing and Urban Development. 1997

The Investment Strategy (Phase 2) for the SA MDB Region identifies Management Action Targets (MATs) that will generate data and information that may be useful for communities in the management of natural resources in the following ways:

- As baseline information to compare progress against;
- As a monitoring tool that can be used by community groups;
- As a process for identifying monitoring needs and priorities;
- Involves the use of community monitoring as a methodology for collecting information.

Table 2 suggests how the achievement of MATs could be useful for community groups interested in managing natural resources.

**Table 2: Data generating MATs (as per Investment Strategy Phase 2)**

Management Action Target	Useful for Community Monitoring?
7: To have completed a biological survey of the River Murray Corridor including the river system by 2005	Yes, as baseline information to compare progress against
10: To have assessed vegetation health and the potential future impacts of changes in the salt and water balance on vegetation health by 2006	Yes, to identify priorities for monitoring
21: To enable the baseline information required	Yes, as baseline information to compare progress against
22: To have implemented a system for cost effective consistent measurement and recording of water use efficiency at farm, district and regional scales for priority LWMP areas by Dec 2005	Yes, as monitoring tool
24: By 2007, to have constructed and implemented a rigorously maintained accounting system for recording, monitoring and reporting on salinity impacts of water trade; supporting salinity policy through the provision of up to date, accurate information	Yes, as monitoring tool
31: To design and construct a web-based system for cost effective, consistent measurement and recording of water use efficiency at farm, district and regional scales for priority LWMP areas by 2008	Yes, as monitoring tool
37: To increase irrigation efficiency throughout the Tintinara Coonalpyn irrigation area by 20% through improved irrigation management by 2006	No

Management Action Target	Useful for Community Monitoring?
42: To establish an inventory of assets currently or in the future likely to be affected by increasing dryland salinity by June 2005	Yes, to identify priorities for monitoring
53: High priority target areas for revegetation identified and documented by June 2005	Yes, to identify priorities for monitoring
54: 45,00 ha perennial vegetation established in high priority areas by 2007	No
55: 9,000 ha perennial vegetation established through community engagement program by 2007	No
61: To identify and develop the zones of high conservation significance, floodplain health and risks to the floodplain	Yes, to identify priorities for monitoring
65: Identify monitoring objectives, appropriate trials and design native fish survey	Yes, to identify priorities for monitoring
68: Identify areas that can be influenced by environmental flow enhancement and groundwater lowering (DTM and surface water modelling)	Yes, to identify priorities for monitoring
70: Commence baseline data collection and develop long-term monitoring program	Yes, as baseline information to compare progress against Perhaps also work together to collect data
71: Identify threatened species, communities or critical habitats within land system units across the Chowilla RR and GR	Yes, to identify priorities for monitoring
72: Identify priority areas or hot spots across the Chowilla (Regional Reserve and Game Reserve)	Yes, to identify priorities for monitoring
74: Regional wetland monitoring networks and data management mechanisms to fill wetland monitoring gaps	Yes, this involves community monitoring as a methodology
88: To have all water users metered by 30 June 2007	Yes, as monitoring tool
95: By 2006, to have increased the area of priority native vegetation retained and restored in HA and NPWSA reserves to over 2000ha	No
96: By 2006, 50% of regionally identified threatened communities are protected, conserved and managed in HA and DEH reserves	No

Management Action Target	Useful for Community Based Monitoring?
103: By 2006, an additional 85km of native vegetation protected and managed along 6 priority roadsides and a Bushcare site established in each area	Yes, this involves community based monitoring as a methodology
104: by 2006, to have re-established 950 ha of native vegetation to provide viable habitat and links between vegetation and habitat fragments in priority areas	No
108: To have developed and be implementing coordinated control plans for introduced plants and animals for areas of threatened species and ecosystems by 2006	Yes, to identify priorities for monitoring
115: To have identified pests of significant impact by June 2005	Yes, to identify priorities for monitoring
116: To have identified priority pest plant and animal locations in areas of cultural and conservation significance and/or greatest need by June 2005	Yes, to identify priorities for monitoring
123: Identify baseline to establish on-going monitoring schedules by 2005	Yes, as baseline information to compare progress against
133: By 2006, an additional 10% of public land managed to maximise Ramsar values	No
134: By 2008, an additional 20% of currently eroding lakeshore is stabilised	No
137: By 2008, improved management of 100ha of existing riparian vegetation	No
140: By 2006, a description of the ecological character of the Ramsar site that can be used as the basis for future land, water, species and ecological community management	Yes, to identify priorities for monitoring
145: By 2006, a comprehensive ecosystem monitoring program that will enable evaluation of the impact of land, water, species and ecological community management actions	Yes, as monitoring tool
149: To restrict stock access to 25% of riparian zones in priority areas by 2006	No
151: To have commenced a trial by 2004 of an alternative operating regime to enhance the ecological health of the lower Lakes, Coorong and Murray Mouth	No

## 4 Data Quality Framework

The application of standardised community based monitoring methods can provide knowledge to management agencies to reduce uncertainty in decision-making<sup>2</sup>. Despite the variable expertise levels of volunteers, non-professional data collection can be accurate, reliable and a valuable contribution to the scientific understanding of the environment<sup>3</sup>.

The Environment Protection Authority (EPA) is working with Waterwatch programs across the State to develop a framework for community water monitoring in an effort to improve the value of data collected. The goal is to enable the quality of community data to be clearly identified, and therefore enable data from programs such as Waterwatch to be more confidently used in environmental reporting (eg. State of Environment Reporting). The EPA framework been adapted and modified for this framework to make it more applicable to a broader range of resources than water.

The 'EPA Data Categories for Community Water Monitoring' are divided into three monitoring levels (refer to Table 3 for more details)

- 'General' level monitoring
- 'Standard' level monitoring
- 'Advanced' level monitoring

In order to obtain known quality data, records must be kept of equipment and it's maintenance (including information on any standard solutions used for calibration of equipment) and data must be recorded accurately (ie. in the correct units). The EPA have prepared a Data Category Questionnaire (Appendix 2) which can be used to determine what level of data confidence communities are willing to strive for. The EPA have also prepared a monitoring checklist (Appendix 3) and Logbook (Appendix 4) for those groups who wish to achieve data standards of "standard" or "advanced".

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<sup>2</sup> Brad Zeller, Andrew Petroeschovsky and Christina Dwyer (2003) Monitoring coastal marine habitats and waterways: Government and community partnerships in action.  
<http://www.regional.org.au/au/apen/2001/r/ZellerB.htm>

<sup>3</sup> Barbara Musso, Graeme Inglis. Developing Reliable Coral Reef Monitoring Programs For Marine Tourism Operators And Community Volunteers. CRC REEF RESEARCH CENTRE TECHNICAL REPORT No. 24 <http://www.reef.crc.org.au/publications/techreport/TechRep24.html>

Table 3: Characteristics of the EPA Data Categories for Community Water Monitoring

Data Category	Requirements	Desired result	Potential Uses of Data
General/ Educational level monitoring	<ul style="list-style-type: none"> <li>• participation in 'general' monitoring training</li> <li>• provision of data to NRM Officers or environmental managers</li> </ul>	Unknown or variable data quality	<ul style="list-style-type: none"> <li>• educational tool in the classroom</li> <li>• trend data about catchment health</li> </ul>
Standard/ Reportable level monitoring	<ul style="list-style-type: none"> <li>• meeting the requirements of the 'general' level monitoring</li> <li>• participation in 'standard' equipment training</li> <li>• reference against a known standard once a year (eg. "mystery solutions for water quality monitoring)</li> <li>• calibration of equipment prior to sampling</li> </ul>	Known quality of data, but not the highest attainable	<ul style="list-style-type: none"> <li>• educational purposes</li> <li>• catchment and natural resource management reporting</li> <li>• general trend data about catchment health</li> </ul>
Advanced/ Publishable level monitoring	<ul style="list-style-type: none"> <li>• meeting the requirements of the 'standard' level monitoring</li> <li>• development of a monitoring plan</li> <li>• keeping a logbook of monitoring activities</li> <li>• participation in an additional testing against known standards</li> </ul>	Known quality of data – highest quality attainable for community based monitoring	<ul style="list-style-type: none"> <li>• State of Environment Reporting</li> <li>• catchment and natural resource management reporting</li> <li>• information about specific sites for academic or scientific studies</li> </ul>

The steps required to improve the quality of data collected via community based monitoring is to:

- Widely publicise how quality data collected with the assistance of community participants is being used to influence investment and management decisions across the region (See Communication Framework). People will be unwilling to spend the extra time and resources to improve data quality unless it is clear that there is likely to be a positive impact on the resource base;
- Provide community groups with tools to identify appropriate standards (many of the Waterwatch groups are already using the EPA data standards) and record the process of collecting data as well as the data itself (eg through the EPA Logbook and the collection of standard metadata as listed in Appendix 5);
- Provide community groups with technical assistance, advice and support if they are willing to improve their data quality standards. Working collaboratively with “experts” obviously ensures that advice on how to maintain high data standards is on hand but also helps keep motivation levels high for maintaining quality data standards and with analysing and interpreting the data once it is collected. Technical assistance can be provided by Technical Officers, Government Agency Staff or University Researchers. The Community Wetland Support Officers in the region provide a useful model which could be implemented more widely across other resource issues.

## 5 Capacity Building

A significant proportion of the investment identified in the Investment Strategy is for:

- raising awareness in the community of the region about threats to natural resource condition across the area,
- skills development of interested community members to understand and manage these threats and
- broader-scale education to create support from the broader community for actions to abate potential and real threats to the underlying natural resource base.

Individuals from the community are encouraged to take on leadership positions to lead groups of people from government, industry and the community to make the decisions and trade-offs that are required to reverse natural resource degradation. Community members are also encouraged to change their own management actions to improve the condition of natural resources on their land, and to be part of an ongoing dialogue with scientists, government officers and officials and independent companies and industry collectives about the best strategies for managing natural resources across the region. The collective term for this awareness, skills development, education and participatory activity is “capacity building”. Community capacity building is seen as being critical to the success of the planning and investment activities undertaken by the INRM group.

Both the INRM Plan and the Catchment Plan for the region identify the central importance of community capacity building (see 2.3 for a definition of capacity building) to achieve the goals and objectives of their plans.

*“Community capacity building provides a foundation to this plan and the strategies it contains”<sup>4</sup>*

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<sup>4</sup> Integrated Natural Resource Management Group for the South Australian Murray Darling Basin Inc. (2003) Integrated Natural Resource Management Plan for the South Australian Murray-Darling Basin

The Framework is based on the assumption that community based monitoring is an effective tool for building community capacity and local networks as well as stewardship and public education<sup>5</sup>.

Community Based Monitoring is a tool that can be used to a) initiate dialogue between community groups involved in on-ground works and regional planners, and b) to place a level of primary knowledge in the hands of community groups. The use of such a tool empowers local groups to evaluate their own effectiveness so they need not feel the constant pressure of external assessment. The benefits may also extend to increasing knowledge of natural processes, building a greater sense of teamwork and partnership and greater confidence to accept constructive criticism if it is based on information collected by community groups. These positive feedbacks within successful community programs will result in them becoming increasingly embedded within the community.

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<sup>5</sup> Canada Community Monitoring Framework  
<http://www.ccmn.ca/english/library/whitelaw/introduction.html>

## 6 Communication Framework

Community based monitoring is undertaken to inform a group of people about the condition of and trends in resource condition in a particular area. Communicating the results to this audience is obviously an important part of the community based monitoring methodology. Community based monitoring is often undertaken with quite limited resources, so it is important that the most appropriate tools are chosen to communicate the results and interpretations from the monitoring effort. Table 4 lists a range of communication tools and suggests the audiences they are most relevant to. All groups involved in community based monitoring should describe how they will communicate their results and think through which tools would be most appropriate to get their message across to their target audience.

**Table 4: Recommended communication tools to inform different audiences for community based monitoring program results**

Target Audience/Organization	Project or Data Report	Conference or Forum	Scientific Journal Article	Regional Newsletter	Field or Demonstration Days	Pamphlet or Brochure	Project Newsletter	Project Meetings	Local Newspaper	Word-of-mouth	State Newspaper	Local/State Radio	TV	Magazine
NRM Board														
Sub-regional NRM Groups														
Researchers														
Government agency														
Local government														
LAP group														
Regional NRM Project Officers														
Land managers														
Project/community group														
General community														

## 7 Roles and responsibilities

The Commonwealth Government has been working with the States to develop a national Monitoring and Evaluation Framework. The State Government's role is to provide a coordinating function across regional groups and act as a partnership broker, working to promote the value of community participation in NRM and providing innovative solutions aimed at improving data confidence.

The NRM Boards have been established under the Natural Resource Management Act (2004) in South Australia to take an active role in the management of natural resources in their region and to build the capacity of the community within each region to manage their natural resources. There is a clear requirement for the Boards to set and report against targets for natural resource condition and management action. With respect to community based monitoring, the SAMDB Board's role is to coordinate monitoring activities across the region and encourage and support communities to participate in monitoring activities where appropriate.

With some exceptions, community groups have no legal or statutory requirements to participate in monitoring activities. Their participation is dependent on there being sufficient motivation and support. A survey of community participants in monitoring showed that there is a willingness of community groups to participate in community based monitoring if it will improve their knowledge and result in improved management of local habitats or issues of interest<sup>6</sup>. The challenge then for the NRM Board is to ensure that the participants reap the benefits of a) increasing their knowledge and b) feeding the information back into better management. It is clear from the report cited above that the community have a stronger interest in planning, coordination, equipment management and communication than data entry, analysis and interpretation (Section 4.6) and so the latter functions may require support from the NRM Board.

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<sup>6</sup> Development of a Community Monitoring Framework for the South Australian Murray Darling Basin (2005). SA MDB INRM Group

A key finding of international research on community based monitoring is that methods for involving communities must take into account the self-interest and biases of individual community members<sup>7,8,9</sup>. Other research on involving communities in decision making suggest the need to apply rigorous methodologies to maximise the benefits of collective decision making to ensure one or two individuals do not bias decisions made by broader groups<sup>10</sup>. Mechanisms for overcoming the biases of individuals within small groups are well known and simply require effective facilitation of group processes to ensure all views are heard equally, and to maximize the diversity of views and knowledge presented to a group.

Table 1 documents where community monitoring may fill gaps in the monitoring and evaluation framework for the region. There is great potential for communities to assist regional decision makers and investors collect information about the condition of natural resources that would feed into regional and state level decision making processes. This includes:

- Extent of native vegetation and its quality
- Condition and connectedness of wetlands
- Fish numbers
- In river salinity
- Erosion of rivers, lake edges, sand dunes and river cliffs

With the right support and the participation by community members and groups, the collection by community based monitoring of this information would assist in measuring progress against 10 resource condition targets. There are also activities that have been identified in the Investment Strategy (listed in Table 2) that would provide useful information to community groups.

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<sup>7</sup> Grant, Jane A.(1989) Consumer Participation in Health Planning: Policy and Political Implications. *Nonprofit & Voluntary Sector Quarterly*, 18, 2, summer: 147-165

<sup>8</sup> Putland C, Baum F, MacDougall C. (1997) How can health bureaucracies consult effectively about their policies and practices?: some lessons from an Australian study. *HEALTH PROMOTION INTERNATIONAL* 12 (4): 299-309 DEC 1997

<sup>9</sup> Pinto, Rodger; Fiester, Alan. (1979) Governing Board and Management Staff Attitudes toward Community Mental Health Center Citizen Participation. *Community Mental Health Journal*, 15, 4, winter: 259-266

<sup>10</sup> Surowiecki, J. (2004) *The Wisdom of Crowds. Why the many are smarter than the few.* Abacus Books. London.

## 8 Resources and Support

Community based monitoring should be viewed as a valuable tool for building community capacity and motivation and to underpin more effective management of natural resources, not as simply an inexpensive mechanism to collect data for regional or state-wide monitoring programs. To be effective, community based monitoring requires adequate resources and support from the NRM Board and government agencies.

To ensure participants receive benefits from their involvement in monitoring, they will require adequate support through the provision of technical advice, data analysis and interpretation support and require a communication strategy be developed by each group. Table 5 lists the resources and support that would increase the value of community based monitoring to the participants, the NRM Board and the broader community. These recommendations are made following a study on how to develop a more effective community based monitoring program in the SAMDB region<sup>11</sup>.

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<sup>11</sup> Development of a Community Monitoring Framework for the South Australian Murray Darling Basin (2005). SA MDB INRM Group

**Table 5: Resources and Support for Community Based Monitoring**

<b>Resource</b>	<b>Implementation</b>	<b>Benefits</b>
Support Officers	Support Officers adopt the Community Based Monitoring Framework and are trained in maintaining data quality, communicating results and accessing and using other information sources for supporting management decisions.	<ul style="list-style-type: none"> <li>• Improved effectiveness of community groups to undertake monitoring activities</li> <li>• Information collected is communicated to appropriate organizations and interested parties and stored in Regional Information Centre</li> <li>• Natural resources are managed based on improved scientific information</li> </ul>
Monitoring and Evaluation Coordinators	Restructure role to also provide assistance to community based monitoring groups and project officers on the analysis and interpretation of their data	<ul style="list-style-type: none"> <li>• Data is correctly analysed and interpreted in the context of local knowledge and community member input</li> <li>• Natural resources are managed based on improved scientific information</li> </ul>
Framework	Require support officers to adopt this Framework, with the support and resources provided by the NRM Board	<ul style="list-style-type: none"> <li>• Provides community groups with tools to maximize the benefit of their monitoring activities</li> </ul>
Regional Information Centre	Provide funding for the establishment of a Regional Information Centre	<ul style="list-style-type: none"> <li>• Community based monitoring groups can access a wider variety of data sources and products</li> <li>• Central database of all community based monitoring data and information</li> <li>• Natural resources are managed based on improved scientific information</li> </ul>
Communication	Adoption of Communication Framework by Support Officers and NRM Board	<ul style="list-style-type: none"> <li>• Community is aware that high-quality data collected with the assistance of community participants is used to influence investment and management decisions across the region</li> <li>• Increased motivation and appreciation of community participants in monitoring</li> </ul>
Materials and consumables	Access by community based monitoring groups to some consumables required for monitoring (containers, monitoring tools etc)	<ul style="list-style-type: none"> <li>• Monitoring activities are not unduly delayed by the long timeframes and difficulties in attracting funding from state and government agencies</li> </ul>

## 9 Community Based Monitoring Plan

It is clear that community based monitoring has a value in capacity building and informing local decisions about natural resource management. Community groups are willing to explore ways to improve the value of the information they collect, and there are some identified gaps in the MERF that could be filled through community based monitoring. However, many community groups have also made it clear that they are unwilling to spend significantly more time to improve their data quality if the benefits are not substantial at the local level. To achieve the objectives of higher data quality, and to maximize the benefits of community based monitoring to a wider audience than the participants, it would be helpful if community groups prepared a documented plan for how they will undertake their monitoring. Some community groups already have a monitoring plan (eg. Community Wetland Monitoring Plans) which can be used as examples of the information which should be included in the plan.

A Community Based Monitoring Plan should have the following components:

- A clearly articulated purpose for the monitoring. The remainder of the Plan should be consistent with the original purpose;
- The methodology should be clearly described so that the methodology remains consistent even with the loss of key individuals;
- The data quality should be documented, using tools such as the EPA Data Category Questionnaire (Appendix 2) to determine the level of data quality;
- The location of the monitoring should be clearly described, and preferably in a form that can be displayed electronically (eg GPS coordinates), and appropriate metadata collected and stored with the data;
- A clear description of how the data will be stored, analysed and reported;
- A plan for communicating the information collected to achieve the purpose of the monitoring;
- A description of technical and other support available.

The preparation of a Plan will serve as a useful exercise to clarify the intent of the monitoring, and can be used as a resource for the community group involved on all of the information relevant to the monitoring effort. An example proforma of a Community Based Monitoring Plan is described in Appendix 1.

## Appendix 1: Community Based Monitoring Plan

### 1. Objective of monitoring

*Why is the monitoring being done? Is it for the interest of the participants, to inform local planning, as a formal part of regional monitoring against targets?*

### 2. Methodology used

*What methods are used, where are the methods described? How often is data collected and when, who is responsible for making sure the monitoring happens and who is willing to participate? Using the EPA data confidence categories, what is the quality of the data that will be collected?*

Method	Reference (where are the methods described?)	Timing	Responsibility	EPA Data category (See EPA Data Category Questionnaire)

3. Location of monitoring

*Include as much detail on the location of the monitoring sites as possible, eg. GPS location (or GPS points of a polygon that describes the area), map reference, diagram or map of the location*

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4. Data storage

*In what format will the data be stored (eg. excel spreadsheet, government database, paper-based files), what data will be stored, where will the data be stored, who is responsible for storing the data*

Format	Data to be stored (eg. Fields, maps, photos)	Location of data storage	Responsibility

5. Data analysis reporting

*Who will do the analysis, what analyses will they use, how will it be presented, who will it be presented to?*

Analysis tool	Responsibility	Presentation	To Whom

6. Additional metadata

*Use the categories and elements in Appendix 5 to record additional project metadata required for others to understand and use the data you have collected*

## 7. Communication Strategy

*How will you communicate your message to the right audience?*

Monitoring is undertaken to inform a group of people about the condition of and trends in resource condition in a particular area. Communicating the results to this audience is obviously an important part of your monitoring effort. There is a range of tools that can be used to communicate effectively to different audiences, some of which are listed in the table below against different target audiences. Your Monitoring Plan should describe how you will communicate your results and identify which tools would be most appropriate to get your message across to your target audience.

### Recommended communication tools to inform different audiences/organisations for community based monitoring program results

Target Audience/Organization	Project or Data Report	Conference or Forum	Scientific Journal Article	Regional Newsletter	Field or Demonstration Days	Pamphlet or Brochure	Project Newsletter	Project Meetings	Local Newspaper	Word-of-mouth	State Newspaper	Local/State Radio	TV	Magazine
NRM Board														
Sub-regional NRM Groups														
Researchers														
Government agency														
Local government														
LAP group														
Regional NRM Project Officers														
Land managers														
Project/community group														
General community														

Target Audience	Communication Tool	Frequency	Responsibility

8. What support is available?

*What technical support resources, volunteer assistance etc is available to assist with the monitoring?*

## Appendix 2: Modified EPA Data Category Questionnaire

The following questions will help you determine which data category you want to aim for in your monitoring activities for 2005. Please tick the relevant options.

If you require assistance completing these questions contact:

- Regional Coordinator on 8532 3573
- or the EPA Community Monitoring Scientific Officer on 8204 2099

Name of Group: \_\_\_\_\_

Suburb/ town or region where group is monitoring: \_\_\_\_\_

Contact for Person: \_\_\_\_\_

Phone Number: \_\_\_\_\_

### Determining your Data Category

All groups need to participate in a 'general' level of training to be proficient in monitoring. In order to meet 'standard' or 'advanced' level monitoring, you will need to receive additional training and take extra steps in your monitoring.

#### 1. Is your group willing to receive additional training in monitoring procedures, and undergo quality assurance and quality control (QA/QC) checks?

If no go to Option A, if yes go to Option B.

Option A Excellent! Your data will be a valuable educational tool for determining trends in catchment health.

You will be aiming for the 'general' level of monitoring

Option B Fantastic! Your monitoring data will be of a known quality, proceed to question 2.

**2. Please select the option that best suits, and can be reasonably achieved, by your monitoring group in 2004.**

- Option C - Annual equipment training  
- Calibration of equipment prior to sampling  
- One standard/reference testing event per year

You will be aiming for the 'standard' level of monitoring

- Option D - Annual equipment training  
- Calibration of equipment prior to sampling  
- Two standard/reference testing events per year  
- Completing a monitoring plan  
- Keeping a logbook of equipment maintenance and monitoring activities

You will be aiming for the 'advanced' level of monitoring

## Appendix 3: EPA Monitoring Checklist

*for 'advanced' and/ or 'standard' community water monitoring groups*

This is a checklist for you work through each time you monitor to ensure you have completed all the required Quality Assurance and Quality Control (QA/QC) steps to aim towards advanced or standard community monitoring data.

Please make multiple copies of this checklist and complete it each time you undertake monitoring. Keep a copy of the completed checklist along with your Monitoring Logbook proformas for future reference if required.

### Group Information

**Date of monitoring:**    /    /200....

Group Name:

\_\_\_\_\_

Contact person:

\_\_\_\_\_

Circle yes or no for the questions below each time you monitor.

### Before Monitoring

1. Have you completed a monitoring plan? Yes / No
  - if not contact your regional NRM Officer to complete a monitoring plan before you start monitoring
  
2. Do you have a copy of the following information? Yes / No
  - Data Record Sheet
  - Log Book Proforma to record your equipment maintenance and training information
  - Monitoring Instructions for each test you are going to undertake
  
3. Have you cleaned and maintained your equipment since your last monitoring event? Yes / No
  
4. Have you calibrated your equipment? Yes / No

5. Do you have all the required equipment and solutions to undertake your monitoring? Yes / No

- do you have the appropriate reagents?
- have you checked the expiry date for your reagents and solutions?

6. Do you have the required safety equipment? Yes / No

### **During Monitoring**

7. Have you followed the instruction sheets for each test step by step? Yes / No

8. Have you recorded all your monitoring information on your data record sheet?  
Yes / No

9. Have you indicated the units for all your measurements? Yes / No

### **After Monitoring**

10. Have you cleaned and maintained all equipment as required once measurements have been completed? Yes / No

12. Have you faxed your data record sheet to your regional NRM Officer Yes / No

For further information about the EPA Data Categories or for assistance in meeting the requirements for your data category please contact:

- your regional NRM Officer by obtaining details from the SAMDB NRM Board website
- EPA Community Monitoring Scientific Officer (Water Quality) phone 8204 2099 or e-mail [linda-marie.mcdowell@state.sa.gov.au](mailto:linda-marie.mcdowell@state.sa.gov.au)

## Appendix 4: EPA Monitoring Logbook Proforma

*for 'advanced' and/ or 'standard' community water monitoring groups*

Please complete this logbook each time you monitor to provide evidence that you have completed all the required Quality Assurance and Quality Control (QA/QC) steps to aim towards advanced or standard community water monitoring data.

### Group Information

Group Name: \_\_\_\_\_

Contact person: \_\_\_\_\_

### Record of training and QA/QC workshops attended

Date eg. 12/4/04	Time eg. 2pm to 3pm	Training Topic eg. Waterwatch equipment training	Training Provider eg. Onkaparinga Waterwatch Network (OWN)

### Record of Equipment Calibrations

Date eg. 12/4/04	Time eg. 2pm to 3pm	Solutions used for calibration eg. 1400u/cm	Reading before calibration	Reading after calibration

### Record of participation in Control/Reference testing events

Date eg. 12/4/04	Time eg. 2pm to 3pm	QA/QC event eg. Saltwatch	Parameters tested eg. salinity (EC)

**Thank you for taking the time keep your logbook up to date**

## Appendix 5: Metadata Standards

Metadata is information used to describe data. For example it tells the data user:

- What was collected,
- When was it collected,
- Who collected it,
- Where was it collected; and
- How was it collected.

More and more users of spatial data are gaining access to and using spatial information from varied sources. Consistent information and increased availability of geographic information systems makes the spatial datasets more reliable and effective to help solve, plan or manage for geographical problems. ANZLIC (the Spatial Information Council - responsible for spatial information management in Australia and New Zealand) has determined core metadata elements for projects generating spatial data. Table 1 provides a summary of the core metadata elements to be recorded as part of a project generating spatial data.

**Table 1: A Summary of the ANZLIC Core Metadata Elements<sup>12</sup>**

Category	Element	Definition of Element	Obligation	Field
Dataset	Identifier	The unique identifier given to the dataset	Mandatory	Text(15)
	Title	The ordinary name of the dataset	Mandatory	Text(160)
Custodian	Custodian	The business name of the custodial organization or responsible party associated with the dataset.	Mandatory	Text(30)
	Jurisdiction	The state or country in which the Custodian of the dataset is domiciled.	Mandatory	Text(30)
Description	Abstract	A brief narrative summary of the content of the dataset.	Mandatory	Text(2000)
	Search Word	Words likely to be used by a non-expert to find the dataset.	Mandatory	Text(60)
	Geographic Extent Name	The ordinary name of one or more predefined, known geographic objects that reasonably show the extent of geographic coverage of the dataset. This element is usually implemented as three discrete elements as listed below	Optional	
	Geographic Extent Name Category	Category to which the Geographic Extent Name belongs including map series, local government area, and drainage divisions and major river basins.	Conditional	Text(80)
	Custodial Jurisdiction	Country, state or territory that is responsible for maintaining the detail of the geographic object	Conditional	Text(30)

<sup>12</sup> ANZLIC Metadata Working Group (2001). *ANZLIC Metadata Guidelines: Core metadata elements for geographic data in Australia and New Zealand*.

Category	Element	Definition of Element	Obligation	Field
	Name	Name of the geographic object.	Conditional	Text(80)
	Geographic Extent Polygon	Boundary enclosing the dataset expressed as a closed set of geographic coordinates (latitude, longitude) of the polygon referenced to GDA94. This is an alternate way of describing geographic extent of the dataset if no pre-defined area is satisfactory.	Optional	Text(1000)
	Geographic Bounding Box	A rectangle defining the minimum and maximum coordinates of the entire data. This element is implemented as four discrete elements as listed below.	Mandatory	
	North Bounding Latitude	Northern-most coordinate of the limit of the dataset expressed in latitude, in decimal degrees.	Mandatory	Signed Real Number
	South Bounding Latitude	Southern-most coordinate of the limit of the dataset expressed in latitude, in decimal degrees.	Mandatory	Signed Real Number
	East Bounding Longitude	Eastern-most coordinate of the limit of the dataset expressed in longitude, in decimal degrees.	Mandatory	Signed Real Number
	West Bounding Longitude	Western-most coordinate of the limit of the dataset expressed in longitude, in decimal degrees.	Mandatory	Signed Real Number
<b>Data Currency</b>	Beginning date	Latest date at which the phenomena in the dataset actually occurred.	Mandatory	Text(10)
	Ending date	The status of the process of creation of the dataset.	Mandatory	Text(10)
<b>Dataset Status</b>	Progress	The status of the process of creation of the dataset.	Mandatory	Text(20)
	Maintenance and Update Frequency	Frequency of changes or additions that are made to the dataset after its initial completion.	Mandatory	Text(20)
<b>Access</b>	Stored Data Format	The format in which the dataset is stored by the custodian	Mandatory	Text(500)
	Available Format Type	The format in which the dataset is available.	Optional	Text(240)
	Access Constraint	Any restrictions or legal prerequisites that may apply to the access and use of the dataset including licensing, liability and copyright.	Mandatory	Text(500)
<b>Data Quality</b>	Lineage	A brief history of the source and processing steps used to produce the dataset.	Mandatory	Text(4000)
	Positional Accuracy	A brief assessment of the closeness of the location of spatial objects in the dataset in relation to their true position on the Earth.	Mandatory	Text(4000)
	Attribute Accuracy	A brief assessment of the reliability assigned to features in the dataset in relation to their real world values.	Mandatory	Text(4000)
	Logical Consistency	A brief assessment of the degree of adherence of logical rules of data structure, attribution and relationships. Data structure can be conceptual, logical or physical.	Mandatory	Text(4000)
	Completeness	A brief assessment of the extent and range in regard to completeness of coverage,	Mandatory	Text(4000)

Category	Element	Definition of Element	Obligation	Field
		completeness of classification and completeness of verification.		
<b>Contact Information</b>	Contact Organisation	Name of the organisation from which the dataset may be obtained.	Mandatory	Text(120)
	Contact Position	The position in the contact organisation that will answer questions about the dataset.	Mandatory	Text(40)
	Mail Address	Postal address or delivery point of the Contact Position.	Mandatory	Text(40)
	Locality	Locality associated with the Mail Address.	Mandatory	Text(60)
	State	Aust: State associated with the Mail Address NZ: Optional extension for Locality.	Mandatory	Text(40)
	Country	Country associated with the Mail Address	Mandatory	Text(40)
	Postcode	Aust: Postcode associated the Mail Address. NZ: Optional postcode for mail sorting.	Mandatory	Text(10)
	Telephone	Telephone number of the Contact Position.	Optional	Text(25)
	Facsimile	Facsimile number of the Contact Position.	Optional	Text(25)
	Electronic Mail Address	Electronic Mail Address of the Contact Position.	Optional	Text(80)
<b>Meta-data Date</b>	Meta-data Date	Date on which the Meta-data record was created or modified.	Mandatory	Text(10)
<b>Additional Meta-data</b>	Additional Meta-data	Any additional Meta-data the supports documentation of the dataset including a reference to another directory or report.	Optional	Text(4000)