

# NSW Natural Resources Monitoring, Evaluation and Reporting Strategy

## 1. Purpose

The purpose of this Strategy is to refocus the resources of NSW natural resource and environment agencies and coordinate their efforts with Catchment Management Authorities, Local Governments, landholders and other natural resource managers to establish a system of monitoring, evaluation and reporting on natural resource condition.

That system will:

- make best use of existing resource condition information to inform policy and investment decisions and best practice management by all natural resource managers across NSW
- help NSW agencies' to lead the integration of currently disparate monitoring programs and information sources relevant to particular NSW Government State-wide natural resource condition targets
- measure progress against the NSW Government State-wide natural resource condition targets;
- measure progress against some catchment natural resource management targets;
- continue to enable NSW to report on the State of the Environment;
- provide the regional NRM information for local government State of the Environment reports; and
- provide NSW monitoring data to the National Land and Water Resources Audit.

The Strategy has been developed by the Natural Resources and Environment CEO Cluster, after a review of existing programs to ensure that agencies can continue to meet statutory and other monitoring commitments and keep within current budget constraints.

## 2. Background

In 2003 the NSW Government launched a new era of natural resource management based on a professional, outcomes-based approach. Thirteen community-driven Catchment Management Authorities (CMAs) were established to deliver natural resource programs at the regional level. State agencies develop policies and statewide programs to deliver on overarching NRM outcomes. An independent Natural Resources Commission (NRC) was charged with recommending a State-wide standard and targets to guide the work of the CMAs.

The NSW Government has now adopted the standard and targets. The standard is designed to promote high-quality management of natural resources in NSW by ensuring that the process is robust and rigorous. The State-wide targets describe the state's goals to maintain and improve the fundamentals of a healthy landscape, as well as some specific state priorities that contribute to the achievement of these

### **State-wide targets for natural resource management**

1. By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition
2. By 2015 there is an increase in the number of sustainable populations of a range of native fauna species
3. By 2015 there is an increase in the recovery of threatened species, populations and ecological communities
4. By 2015 there is a reduction in the impact of invasive species
5. By 2015 there is an improvement in the condition of riverine ecosystems
6. By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses
7. By 2015 there is no decline in the condition of marine waters and ecosystems
8. By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained
9. By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems
10. By 2015 there is an improvement in soil condition
11. By 2015 there is an increase in the area of land that is managed within its capability
12. Natural resource decisions contribute to improving or maintaining economic sustainability and social well-being
13. There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management

goals. Together they seek to achieve better value for money and to ensure that resources are focussed on government priorities.

CMAs' Catchment Action Plans are designed to achieve catchment targets that will functionally promote the State-wide targets. State agencies are incorporating State-wide targets in strategies and policy, and using them to direct program implementation. Monitoring progress towards these State-wide and catchment targets will enable CMAs and other government agencies to adjust their management to ensure that the targets are achieved.

The monitoring, evaluation and reporting (MER) system to support this uses two main types of monitoring programs, resource condition monitoring and performance monitoring. "Resource condition monitoring" follows trends in particular aspects of a natural resource ("indicators") to understand whether the overall health of the resource is changing. For example, the number of native fish species present is a commonly used indicator of riverine ecosystem condition. Resource condition monitoring shows whether NRM targets are being met. It does not, however, explain

what caused the observed trend. That needs to be identified through a different process, such as a detailed study.

Once the cause for the observed trend has been established, “performance monitoring” is used to determine whether remedial action is effective in reversing that trend. Performance monitoring is useful in designing more effective NRM programs.

### **3. Arrangements for evaluating progress towards targets**

In February 2006 the Environment, Natural Resources and Rural Affairs sub-committee of Cabinet endorsed arrangements recommended by the NRC for evaluating progress towards State-wide targets.

The key elements of the recommended arrangements were:

1. Establishing frameworks for using state-wide datasets and other available information to assess progress towards the targets, and to drive the further development of a more comprehensive set of state-wide indicators and indexes.
2. Identifying a small set of state-wide datasets for which baselines and ongoing monitoring arrangements can be established and which capture key macro-environmental parameters that are relevant state-wide and important inputs for a range of state-wide assessments
3. Identifying and implementing standards and protocols to improve the capacity for linking and adding to existing and future datasets from a range of sources.
4. Allocating clear responsibilities to NRM agencies to lead the establishment, development and maintenance of state-wide monitoring and evaluation programs that allow the assessment of progress against state-wide targets and are fit-for-purpose.
5. Establishing a mechanism for regular, independent reviews of state-wide monitoring and evaluation to assess:
  - progress in implementing the arrangements
  - quality assurance and governance arrangements
  - whether the emerging programs are fit-for-purpose.

### **4. Natural resource MER requirements**

A NSW MER system for natural resources should provide access to resource condition data, and periodic formal reports evaluating that data, to inform the policy, investment and best practice management decisions made by Government, agencies, CMAs, Local Governments, Landcare groups, landholders and other natural resource managers across NSW.

Periodic monitoring and evaluation reports that present this information will include:

- NSW SOE report, produced every three years with the next due in 2006 which:
  - assesses progress towards State-wide targets using Pressure-State-Response model

- assesses other non-NRM environmental issues against the Pressure-State-Response model
- State of the Catchment reports, which use information collected for a range of programs including the NSW SOE report, and also include data from other sources and which:
  - provide a preliminary assessment of the condition of natural resources in each catchment
  - inform investment decisions within and between CMA regions
  - inform other natural resource managers investment decisions in each region
  - assess progress towards catchment targets

Additionally, progress where it can be made towards open-access integrated databases across all resource theme areas will ensure decision-makers will make best use of available information as it emerges, and contribute to the ongoing improvement of that information.

In addition to resource condition information, other progress reporting mechanisms will help to inform Government decision-making:

- CMAs' annual reports on progress towards catchment and State targets for the:
  - NSW Ministers for Natural Resources and Environment, and
  - Joint Steering Committee on the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust (JSC);
- NRC's annual reports and periodic audits of whether CMAs are effectively implementing their CAPs and making progress towards catchment and State-wide targets;
- NSW State of the Environment (SOE) Report and proposed agency responses.

## **5. Frameworks to make pragmatic use of all available information**

State-wide datasets can provide information on a few macro-environmental parameters. There is potential to enrich assessments of progress towards each target by using these alongside other available information that may be region or issue specific.

For example, other resource condition information is available from CMAs, local councils, Rural Lands Protection Boards, landholders and in some cases land developers. NSW agencies intend to establish frameworks to integrate and provide access to these diverse sources of information where they are available and promote the sharing and pragmatic use of all information, consistent with any limitations in the data. The challenge is to draw all of this information together in a meaningful way from a range of sources and with variable spatial extent and resolution. The effort made in gaining this information will need to reflect its expected value.

The NRC recommended several steps that would provide a sound foundation for using state-wide datasets and other information. These steps are to:

- develop conceptual frameworks that show the cause and effect linkages between landscape processes, actions and outcomes that contribute to achieving the state-wide targets.
- develop a fit-for-purpose monitoring and evaluation program for each target area, taking into account existing data collections and prioritising the development of programs to address gaps.
- adopt and promote standards and protocols to improve the quality and consistency of information from a variety of sources, so it can be better integrated into state-wide assessments.
- establish quality assurance and governance arrangements within lead agencies to collect, manage and promote use of data consistent with its inherent reliability.

The Natural Resources and Environment CEO Cluster will establish project teams to lead the development of appropriate frameworks. These project teams will:

- identify the key policy and investment decisions that need to be informed by a State of the Catchment report covering those State-wide targets
- develop a report format designed to meet the needs of those decision-makers and pragmatically make best use of available data recognising its limitations
- establish the links to other monitoring programs and data sources relevant to those State-wide target areas at different scales across NSW
- share the lessons from pilot programs with other project teams, and
- allow other project teams to assess the practicality of covering other State-wide target areas in DNR's State of the Catchment reports where appropriate using information collected for the 2006 NSW SOE report.

The NRC will work with the Department of Natural Resources to pilot this work for the two State-wide targets for Native Vegetation and Riverine Ecosystems.

## **6. State-wide datasets to be compiled by agencies**

The State-wide monitoring programs to be implemented by NSW government agencies are summarised in Table 1. Table 2 lists additional monitoring programs to be implemented if establishment funding becomes available from the Strategic Reserve fund administered by the JSC. Both tables identify lead agencies for each target area, and for each monitoring program.

The programs have been selected to produce information that has multiple uses, applying the principle that data should be collected once but used many times. The following criteria were used to select indicators and scope monitoring programs:

- have an agreed scientifically sound meaning;
- be relevant to an adopted target;
- have a sound and practical measurement process;
- assist decision making by being effective;
- be cost-effective;

- variability is understood well enough for statistically valid data comparisons;
- be useful over a range of scales (particularly the CMA region), time frames (both short and long term) and reporting requirements;
- can be aggregated and disaggregated over a range of scales;
- integrate catchment processes to reflect overall catchment health;
- represent biological endpoints or outcomes;
- be useful in communicating with the community; and
- be responsive to general human impact.

Another strong consideration was the capacity of natural resource agencies to maintain monitoring programs over the long term within their recurrent budgets. CMAs may choose to establish additional resource condition monitoring programs at the sub-catchment and project scale using their own resources or via agencies under Service Level Agreements. They may also choose to commission catchment scale monitoring programs for issues not covered by the State-wide monitoring program.

Agency and CMA monitoring programs will be coordinated to gain maximum use of data sets and to minimise costs. This will occur through the Natural Resources Information Needs Committee (NRINC), a sub-committee of the Natural Resources and Environment CEO Cluster Group. CMAs will be invited to join NRINC.

#### **Future priorities for resource condition monitoring**

Over time it is intended to increase the number of datasets maintained State-wide to gain a more complete understanding of changes in natural resource condition. Priorities for future State-wide monitoring programs are listed in Table 3.

**Table 1: Current capability for State-wide monitoring**

Target	Indicator (* reflects NRC priority)	Method/data	Reporting frequency
1. native vegetation (DNR)	*Native and woody vegetation extent (DNR)	Monitoring of vegetation change in clearing "hot spots".	1 year
	*Native vegetation type (DEC)	DEC State-wide vegetation map.	
4. invasive species (DPI)	*Reduction in impacts due to control programs for some widespread invasives: - Foxes at key locations (DEC) - Bitou Bush at key locations (DEC) - Wild dog stock losses (DPI)	Monitoring and reporting under the Fox Threat Abatement Plan Monitoring and reporting under the Bitou Threat Abatement Plan Wild dog stock losses reports	1-5 years
	*Distribution of some widespread invasives: - Invasive fish in the MDB (DPI) - <i>Caulerpa taxifolia</i> at key locations (DPI)	Invasive fish monitoring under the MDB Sustainable Rivers Audit Monitoring of <i>Caulerpa taxifolia</i> extent in key locations	
5. riverine ecosystems (DNR)	*Hydrology (DNR)	All monitoring will use existing sites. Monitoring network is richer in the MDB than coastal catchments, and is currently being enhanced.	1-5 years
	Temperature (DNR)	Hydrology will be based on the hydrological indicators currently in use for the water-sharing plans. Standard information products from DNR database will be better defined. QA and QC processes will be enhanced for electrical conductivity measurements.	
	Electrical conductivity (DNR)		
	*Aquatic macroinvertebrates (DEC)	Sustainable Rivers Audit for MDB only, which is not statistically robust at the CMA regional scale. Additional monitoring will be carried out in the MDB to improve its statistical significance. The Sustainable Rivers Audit methodology will be applied for coastal rivers.	
	*Fish (DPI)	A riparian vegetation indicator for the MDB is under development through the Sustainable Rivers Audit. A methodology to extend this to coastal rivers will be developed as part of 'native vegetation extent'.	
	*Aquatic and riparian vegetation (DNR)	A research project will trial the viability of monitoring frogs as an indicator.	
6. groundwater (DNR)	*Groundwater usage against sustainable yield (DNR)	Current hydrometric network plus ongoing enhancement to meet WMA Act and National Water Initiative obligations. Standard information products on corporate database will be better defined	1 year
	Depth to groundwater (DNR)		
	Where relevant following a risk assessment: - Change in water quality (EC) - Change in condition of groundwater dependent ecosystems	Currently possible at a limited number of sites only. Monitoring program to be initiated from 2010.	Varied 5 years
7. marine (DPI)	Extent of marine protected areas (DEC)	MPA, DEC and DPI Annual reports.	1 year
	Recreational water quality in metropolitan areas (DEC)	Beachwatch program.	1 year
	Marine biodiversity associated with Marine Parks (DEC/DPI)	The Marine Parks Authority is developing a comprehensive monitoring program. It will build on the current limited monitoring to meet the needs of the Marine Parks system as a whole.	Varied

<b>Target</b>	<b>Indicator (* reflects NRC priority)</b>	<b>Method/data</b>	<b>Reporting frequency</b>
8. wetlands (DEC)	Water level (DNR)	Event based monitoring as part of IMEF program for major wetlands on Murrumbidgee, Lachlan, Gwydir, Namoi & Macquarie. Surrogates for other wetlands will be developed using existing hydrology monitoring against water-sharing plan rules. Standard information products on corporate database will be better defined	1 year
	Waterbird abundance and diversity (DEC)	Aerial waterbird survey.	1 year
	*Wetland vegetation extent (DEC)	Analysis of existing hydrological and vegetation data to model wetland extent.	1-5 years
9. estuaries and coastal lakes (DNR)	End of system flows to major estuaries (DNR)	To be based on existing monitoring for water-sharing plans consistent with WMA Act and National Water Initiative obligations. Standard information products on corporate database will be better defined.	1-5 years
12. economic and social (DPI)	Socio-economic impact of water-sharing plans (DNR)	Methodology for this program is under development.	5 years

**Table 2 New State-wide monitoring programs to be implemented if establishment funds become available (e.g. from JSC)**

Target	Indicator (* reflects NRC priority)	Method/data	Reporting frequency
1. native vegetation (DNR)	*Native and woody vegetation extent (DNR)	Develop methodology for extrapolating data from SPOT5 “hot spot” images State-wide, using supporting information from the AGO/Landsat imagery and the vegetation approvals database.	1 year
	*Native vegetation type (DEC)	Improve the quality of the existing DEC State-wide vegetation map for relevance at CMA scale by incorporating other vegetation distribution data.	Ongoing
	Landscape connectivity (DNR/DEC)	Use DEC biodiversity forecasting tool to establish State-wide baseline.	5 years
	*Native vegetation condition (DNR/DEC)	Use targeted, site based measurement integrated with field sampling of soil condition. Land use and land management practices will also be recorded and then used for predictive modelling of vegetation condition based on these attributes.	5 years
2. fauna (DEC)	Representativeness of faunal diversity inventories (DEC) Maintenance of viable populations of key species of fauna in CMA regions and State-wide (DEC) Report cards for identified management programs (DEC)	Drawing together existing information and determine gaps in fauna monitoring programs; negotiating with CMAs to establish suitable fauna populations to monitor and monitoring methods; establishing suitable State-wide fauna to monitor.	Varied
3. threatened species (DEC)	Changes in the lists under the TSC Act and the FM Act (DEC, DPI) Priorities Action Statements under the TSC Act and the FM Act for identified management programs (DEC, DPI)	Integrating the PASs into the NRM monitoring framework; negotiating with CMAs to establish suitable populations and ecological communities to monitor and monitoring methods; establishing suitable State-wide threatened species, populations and ecological communities to monitor.	Varied
4. invasive species (DPI)	*Number of new invasive species established (DPI) Monitoring of significant species under active control (e.g. management programs for Weeds of National Significance, species within threat abatement plans) (DPI).	Identifying and negotiating access to existing datasets held by agencies, CMAs, councils, RLPB, community groups etc; develop options for future active and passive monitoring programs; developing support materials and metadata statements; developing reporting software and processes.	1-5 years
9. estuaries and coastal lakes (DNR)	*Extent of mangroves, saltmarsh and seagrass (DNR) Abundance of ephemeral macroalgae on seagrass in coastal lakes (DEC)	Field sampling will be used to test methodologies based on remote sensing. If these are unsuccessful, field sampling will be continued.	2-5 years

Target	Indicator (* reflects NRC priority)	Method/data	Reporting frequency
	Concentration of pelagic chlorophyll a (DEC)		
	Estuarine fish assemblages (DPI)	Field sampling at a representative set of estuaries.	
10. soil (DNR)	*Ground cover (DNR) Soil erosion by water (DNR) Soil erosion by wind (DNR) Soil pH (DNR) *Soil carbon content (DNR) and as regionally appropriate (DNR): - Soil sodicity/dispersion - Soil salinity - Recharge and deep drainage - Structural decline - Acid sulfate soils	Initial work to cover the first land management survey, stratify sample sites based on the existing soil landscape program, data management system upgrade & help establish baseline for land & soil capability. Ongoing ground-truthing and modelling will be done on a stratified basis, drawing on and supplementing existing programs (CMA, industry and community data; Rangeland Assessment Program; Wind Erosion Monitoring - Dust Watch; Far West Land Use Change; Environmental Services Scheme). Standard information products aligned to target reporting will be defined.	5 years
11. land capability (DNR)	*Land management practices in relation to land capability (DNR)		
12. economic and social (DPI)	Social and economic changes due to CMA activity	Develop methodology and pilot study using available ABS and other data.	5 years
13. community capacity (DNR)	Characteristics and resources which improve the ability of a community to recognise, evaluate and address natural resource management issues	Adapt the framework of network partnerships, knowledge transfer, problem solving and infrastructure to NRM in NSW. Methodology to be primarily implemented by CMAs but with technical support from State-wide NRM agencies.	5 years

**Table 3: Future priorities for State-wide monitoring programs**

Target	Indicator (* = reflects NRC priority)
4. invasive species (DPI)	*Success of control programs for a representative sample of widespread invasive species in reducing biodiversity impacts (DEC).
5. riverine ecosystems (DNR)	*Wetted area and depth (DNR)
8. wetlands (DEC)	EC (DNR) Turbidity (DNR) Water level (additional sites) (DNR) Wetted area (DNR)

Another future priority is the development of indices that describe in simple terms the overall health of natural resources. Indices combine data from a number of sources into a single measure that summarises, for reporting and communication purposes, whether or not the condition of the resource is improving. The key indices to be developed are:

- Biodiversity index (DEC)
- Riverine condition index (DNR)
- Groundwater index (DNR)
- Near-shore marine condition index (DPI)
- Wetland condition index (DEC)
- Estuary condition index (DNR)
- Land and soil capability assessment index (incorporating soil condition) (DNR)
- Index of contributions to socio-economic outcomes (DPI)
- Index of community capacity (DNR)

## 7. Performance monitoring and evaluation

DNR has been working with CMAs to develop a CMA Monitoring and Evaluation Framework. This Framework helps CMAs to integrate an MER program into their catchment action plans (CAPs), consistent with the adopted State-wide Standard for Quality NRM. By applying the Framework, CMAs can evaluate the effectiveness of their actions, and improve their decision-making in the future. The information generated will contribute to the NRC's audit of CAPs.

Under the MER Framework, various sources of information can be used to build a cause and effect inference. One important source of information will be local-scale monitoring of the performance of local management actions. Where monitoring data is not available, other information can be used to make evidence-based predictions of the resource condition change expected from particular management actions. This could include case studies, scenario modelling, published literature or CAP project reports.

A similar approach, but on a different scale, will be needed to evaluate the effectiveness of NRM programs State-wide. In order to coordinate efforts in this area, and ensure that the State and catchment-scale work is complementary, a joint

CMA-agency research program will be established. This program will aim to improve:

- our understanding of trends observed through monitoring programs at both State and CMA-regional scale;
- our understanding of how effective CMA management actions have been;
- our ability to design and implement effective management actions; and
- our ability to make evidence-based predictions in the absence of monitoring data.

This program will make best use of limited resources by strategically targeting performance monitoring and related research at the State level. Priority will be given to projects that produce results relevant to many parts of the State. This will avoid the risk of duplicate projects being undertaken in separate parts of the State. It will be managed by the Natural Resources Information Needs Committee (NRINC), a sub-committee of the NR&E CEO Cluster Group.

Resources for this research program will be sought from at least four potential sources:

- existing agency science programs;
- CMA monitoring budgets;
- the Commonwealth NAP, NHT and any replacement program;
- other research funding programs.

## **8. Monitoring and reporting system**

A number of support services are required to ensure monitoring programs operate effectively, and the best use can be made of the data collected. Some of these services are currently in place; others will need to be established over time.

### **Monitoring program design**

The lead agency for each State-wide target will establish a multi-agency project team to design and implement monitoring programs and to analyse the results. During the design phase, these teams will:

- State the specific objectives of monitoring, the outputs and the outcomes of the program.
- Develop conceptual models for each resource condition issue.
- Design the monitoring and evaluation program, considering matters such as:
  - spatial and temporal scale
  - type of study
  - indicator selection criteria
  - indicator definition (measurement endpoints)
  - contextual data to support stratification and interpretation
  - required statistical power.

- Develop a method for:
  - analysing the data to assess progress towards the targets and inform identified policy and investment decisions
  - reporting against formal SOE and State of the Catchment reporting requirements.
- Consult with CMAs and other users to ensure that monitoring program reports usefully inform decision-making.
- Develop an implementation plan.
- Commence work on designing the relevant index to meet longer term needs.

These project teams will also provide advice to CMAs on monitoring methods for that target area.

### **Data acquisition and management**

The data collected through monitoring programs will be managed to maximise its usefulness to both current and future users - CMAs, local councils, NSW and Commonwealth government agencies, non-government organisations and private individuals. This will require consistent data quality standards as well as an effective and efficient method of data storage and distribution. For the preliminary assessment of condition, this will require a degree of pragmatism to make best use of data collected without consistent data quality standards.

Data standards will be maintained through the development of a data plan for each monitoring program. This will be the responsibility of the lead agency for each target area. These separate data plans will be drawn together into an interagency Data Management Plan prepared by a newly established sub-committee of the Data and Information Management Working Group (DIMWG). This plan will:

- specify the data being collected as part of the relevant monitoring programs;
- identify cross-linkages or opportunities for cross-linkages between programs;
- identify datasets common to a number of programs and develop mechanisms for the management of these data;
- identify data management issues associated with those datasets and relevant to the reporting processes (eg custodianship, standards, privacy, accessibility);
- identify data gaps that exist within existing programs or beyond; and
- make recommendations on findings.

Data storage and custodianship arrangements will be the responsibility of the agency carrying out the monitoring activity. These data sets will be shared with all potential users through the NSW Spatial Data Infrastructure, an integrated spatial information service based upon a network of geographic databases linked by common standards and protocols.

The Spatial Data Infrastructure is being progressively established under the auspices of DIMWG. Over the next 12 months, DIMWG will:

- Implement a Registry for data and services, including support for internal agency data inventory (metadata) needs.
- Audit the currency and completeness of the metadata records in the NSW Natural Resources Data Directory (NRDD).
- Remediate NRM agency metadata records.
- Develop a plan for remediating non-NRM agency metadata records.
- Develop a long term (4 year) data collection and remediation strategy and an implementation plan for NRM agencies based on the needs of major NSW initiatives e.g. M&E Strategy.
- Assign data custodial responsibilities to NSW agencies for significant and unresolved data themes relevant to the NSW SDI.
- Review existing data custodial responsibilities to ensure alignment with current organisational arrangements

Agencies currently have the capacity to produce maps, graphs and downloads of live water quality information. With establishment funds from the Strategic reserve fund, it will be possible to extend this service to a wider range of indicators.

### **Analysis**

Each project team will develop data analysis protocols which describe how the data collected will be interpreted. In particular, these protocols will outline the statistical methods to be used; how progress towards targets will be evaluated; and methods and data sets necessary for attributing causes to the effects observed.

The analysis of monitoring results will inevitably raise questions that require further investigation. In particular there will be a need to establish the cause of changes in resource condition, and assess the effectiveness of management actions to improve condition. The resourcing of these research priorities will be coordinated through NRINC at the agency level (as discussed in section 5).

### **Reporting**

The results of the monitoring programs outlined in this strategy will be reported at two scales:

- CMA regional scale and sub-catchment scale – through a series of individual State of the Catchments reports;
- State-wide - through the NSW State of the Environment report.

The two reporting processes will be directly linked, using the same indicators and drawing on the same data sets accessed online through the NSW Spatial Data Infrastructure. Where there is additional CMA regional scale information available, this will also be included in the State of the Catchments reports.

The State of the Catchments reports aim to be a simple means of communicating changes in resource condition to the catchment community. They are based around a series of simple indices of land, water, biodiversity and community. These indices will be further developed by the monitoring project teams.

DNR is developing the framework for the State of the Catchments reports in consultation with CMAs and other government agencies. Resources to establish this process are being sought from the Strategic Reserve Fund.

In the NSW SoE Report, the indicators for land, water and biodiversity will be replaced by those described in this Strategy following the publication of the 2006 SoE Report. This will occur in a staged fashion as data on all new NRM indicators will not be available for the first post-2006 SoE Report. Some current SoE indicators for the land, water and biodiversity themes may continue to be reported until the Strategy is fully implemented.

The current three-year SoE reporting cycle is a statutory requirement of the *Protection of the Environment Administration Act 1991*. This means SoE reports will be prepared in 2006, 2009, 2012 and 2015. DEC will produce the NSW SoE report, using data made available to it by the lead agencies for each monitoring program.

As well as including new indicators, in future the NSW SoE report will be directly linked to forward planning and priority setting processes for the NSW Government. Agencies will include selected high level indicators from the SoE report in their annual Results and Services Plans. This will embed the review of progress towards the State-wide targets into the corporate planning processes of agencies, helping to ensure delivery of the targets is resourced as part of departments' core business through adaptive management.

Lead agencies with responsibility for indicators will prepare a response report to the issues and information contained in the SoE report on their indicators. It is intended that this report be made public (for example tabled in Parliament) within six months of the release of the SoE Report. Agency actions within the response report will be used to inform agencies' annual Results and Services Plans. This will ensure that the outcomes of the SoE Report are integrated into agency forward planning and priority setting processes, and ensure that Government programs are contributing towards the State-wide targets for NRM.

### **Quality assurance**

An independent quality assurance process will be used to ensure that the reporting system is transparent and its results credible. This is particularly important where progress against State-wide targets is being assessed.

The quality assurance role will be performed by the State of the Environment Advisory Committee (SEAC). SEAC is a body established by the Minister for the Environment under the *Protection of the Environment Administration Act 1991* to advise the Minister and DEC on the SoE report. It comprises members of the independent EPA Board supported by experts and key stakeholders in the relevant fields.

SEAC will provide an independent review to assure that the processes, protocols and procedures undertaken to complete the assessment are rigorous, transparent and appropriate given the information and resources available. The assurance role will also include an assessment of the currency of the data and information reported, and the objectivity of the analysis to ensure the production of an impartial report.

SEAC will use the State-wide Standard for Quality NRM to determine whether these processes were rigorous, transparent and appropriate given the information and resources available. The NRC will provide a guidance document on how the Standard will apply to NRM/SoE reporting.

### **Community involvement in monitoring**

Community groups, such as Landcare, may be interested in supporting resource condition monitoring, particularly at the regional level. Locally-based monitoring by community groups has the potential to augment State-wide monitoring programs managed by State agencies.

Benefits of such an approach include low ongoing costs, empowerment of local communities and potential field calibration of remotely sensed attributes. Further, if the attributes measured are relevant to a productive use of the resource then long term commitment may be high (for example, soil pH for farmers).

There are a number of impediments to greater community involvement in monitoring:

- the startup costs of equipment and training can be high;
- there may be a high turnover of participants;
- participants may not always follow the data collection protocols.

Opportunities to facilitate community involvement in monitoring will be pursued where these provide a cost-effective supplement or alternative to monitoring programs implemented by CMAs and other State agencies.

## **9. Roles and responsibilities**

Natural resource monitoring, evaluation and reporting at the catchment and State scale will be carried out by the major NRM agencies - DNR, DEC, DPI and Dept of Lands. CMAs will be largely responsible for MER at the project and sub-catchment scale.

Accountability for implementing this Strategy will lie with the NR&E CEO Cluster Group supported by:

- the Natural Resources Information Needs Committee (NRINC) for overall coordination (see section 5), and
- the Data and Information Management Working Group (DIMWG) for data management issues (see section 6 for details).

DEC will be accountable for producing the NSW SoE report.

CMAs will be accountable for any MER programs they run through their current accountability framework. CMAs will be invited to join the Natural Resources Information Needs Committee (NRINC) to help ensure that CMA and other State agency programs are well coordinated.

The CEO Cluster Group will prepare an annual report on progress in implementing the Strategy.

Lead agencies for each target area have been identified in Tables 1 and 2. Lead agencies will not necessarily carry out all the monitoring programs for their targets; rather the role of the lead agency is to:

- establish a project team (comprising agencies carrying out monitoring for that target area) to coordinate the monitoring programs being undertaken;
- establish frameworks for using state-wide datasets and other available information to assess progress towards the targets, and to drive the further development of a more comprehensive set of state-wide indicators and indexes.
- ensure that data collected by separate programs is analysed and interpreted collaboratively through the project team so that final judgements on progress towards the target are informed by information from all available programs; and
- prepare reports on progress towards the target using the agreed reporting framework.

Each lead agency will include its commitments to monitoring activities in its Results and Services Plan and corporate plan.

The role of the State of the Environment Advisory Committee will be to provide a quality assurance role for these monitoring programs, as described in section 6.

## 10. Implementation Plan

The plan below outlines the schedule for implementing this Strategy. The schedule for commencing each individual monitoring program will vary, depending on a range of factors such as whether data is already being collected or new methodologies are required. Despite this variation, it is expected that all programs listed in Table 1, and those implemented from Table 2, will contribute to the 2009 SoE report.

<b>Task</b>	<b>Due Date</b>	<b>Responsibility</b>
Identify monitoring program managers and data custodians	Jul '06	Lead agencies
Establish project teams		NRC & lead agencies
Agree pilot process for State of Catchment report		
Prepare guidance material for SEAC on applying State-wide standard to reporting	Sep '06	NRC
Prepare guidance material for project teams on the reporting format for the 2009 NSW SoE report	Sep '06	DEC
Progress report on pilot of State of the Catchment report	Sep '06	NRC & DNR report

Develop MER implementation plans (including data management plans) for current ongoing monitoring programs	Sep '06	Project teams assisted by NRINC & DIMWG
Develop interagency data management and access plan for current ongoing monitoring programs	Dec '06	DIMWG
Progress report on State of Catchment report (for target areas where elected to proceed)	Dec '06	DNR & Project teams
Assess capacity and timing to develop preliminary assessment of condition for all State-wide targets  Review capacity to accelerate any of the remaining milestones in the Strategy  Report to Cabinet Committee on progress	Dec '06	NR & E Cluster with advice from NRINC
Review implementation plans for current ongoing monitoring programs	Dec '06	NR & E Cluster
Develop long term data collection and remediation strategy for current ongoing monitoring programs.	Mar '07	DIMWG
Develop MER implementation plans (including data management plans) for new monitoring programs	Jun '07	Project teams assisted by NRINC & DIMWG
Report on progress in implementing strategy	Jun '07	NR&E CEOs
Review implementation plans for new monitoring programs	Aug '07	NR & E Cluster
Develop long term data collection strategy for new monitoring programs	Oct '07	DIMWG
Report on progress in implementing strategy	Jun 08	NR&E CEOs
Report on progress in implementing strategy	Jun 09	NR&E CEOs
Report on targets to DEC for SOE	Progressively and by Dec 08	Lead agencies
Publish SOE report	Oct 09	DEC