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Submission to Inquiry: Sustainability Reporting in the New South Wales Public Sector Inquiry

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Confidentiality	**General submission**
Readers	**[All Committees], [Public Accounts], [LA Ecru]**

Work carried out by the Bureau of Rural Sciences over the last 6 years has direct relevance to Term of Reference 3a, namely that the Committee should 'consider sustainability reporting initiatives within the public sector in Australia and in international jurisdictions.'

The Bureau of Rural Sciences has developed a flexible, yet rigorous, framework for sustainability reporting that has been applied to many different subjects (catchments, government agencies, industries, government programs) and at a variety of scales (national, sectoral, local). The framework emphasises a participatory process with specific components and indicators tailored to particular agency or regional needs while remaining with a common organising structure.

I have attached the following documents for your information:

- Science for Decision Makers: Sustainability indicators: measuring our progress. Sept 2002
- An evaluation framework for sustainable development. Jan 2004.

The following web addresses provide examples of applications of the BRS ESD Evaluation Framework:

- National ESD Reporting Framework for Australian Fisheries – www.fisheries-esd.com
- Signposts for Australian Agriculture - http://www.nlwra.gov.au/signposts.htm

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Australian Government
Bureau of Rural Sciences

EXECUTIVE DIRECTOR

Ms Vicki Buchbach
Committee Manager
Public Accounts Committee
Parliament House
Macquarie Street
Sydney NSW 2000

Inquiry into Sustainability Reporting in the New South Wales Public Sector

Dear Ms Buchbach

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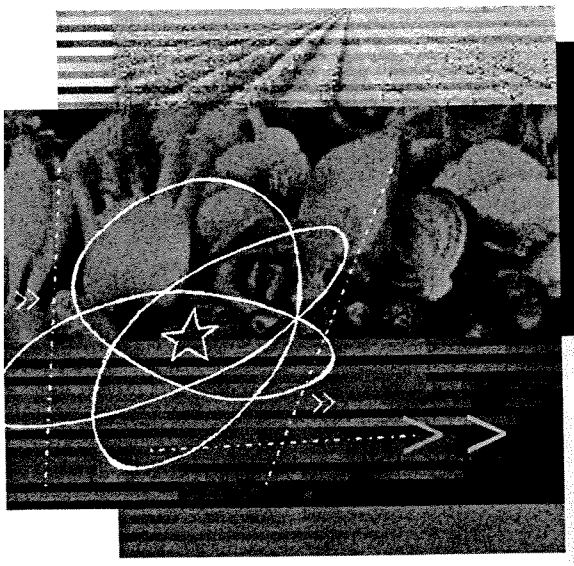
Yours sincerely

P. H. O'Brien

Peter H O'Brien
29 October 2004

Attachments (2)

SEPTEMBER 2002



Science FOR DECISION MAKERS

SUSTAINABILITY INDICATORS

Measuring our Progress

Dr Jean Chesson, BRS

Science for Decision Makers is a new series published by the Bureau of Rural Sciences. It describes the latest developments in scientific advice, assessments or tools relating to agricultural, fisheries and forestry industries, including their supporting communities.

Its purpose is to make rural science more accessible to those needing to quickly understand the benefits and implications of the most recent research as a basis for decision-making.

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KEY POINTS

- Indicators are needed to help us achieve our goal of sustainable development.
- Indicators should be clearly related to the objectives they are meant to address. Attempts to develop indicator sets often fail to gain broad support because they invest too much effort in specifying indictors and not enough in understanding the objectives.
- BRS advocates a process driven by objectives identified through extensive consultation with stakeholders.
- Several groups, including the Australian fisheries management agencies, have begun to apply this process.

INTRODUCTION

There is now broad agreement that sustainable development is the key to a profitable and lasting future. Australia's agricultural, fishing and forestry industries are committed to sustainable development. But how do we know whether we are making progress?

The idea of a core set of indicators to measure sustainability has an irresistible allure and has sparked initiatives at all levels within the public and private sectors. But attempts to date have had mixed success. Are we doing it right?

In Australia, we have defined sustainable development as using, conserving and enhancing the community's resources to maintain ecological processes on which life depends and to increase the total quality of life, now and in the future. Not surprisingly, indicators that

BOX 1

EXAMPLES OF CORE INDICATOR SETS

United Nations Commission on Sustainable Development

Fifty-seven indicators in four categories—economic, social, environmental and institutional. Further subdivided into themes and sub-themes.

Australian and New Zealand Environment and Conservation Council Headline Sustainability Indicators

Twenty-four indicators in three categories—individual and community well-being and economic development; equity within and between generations; biological diversity, ecological processes and life support.

Australian Bureau of Statistics Measuring Australia's Progress

Thirteen indicators in three domains of progress—economic, social and environmental.

The indicator-driven approach 'puts the cart before the horse' and often fails

measure this broad spectrum of human aspirations are difficult to develop, and consensus on any particular indicator set has proved difficult to reach.

The Bureau of Rural Sciences has developed a structured process for improving the way we develop indicators. We emphasise the construction of a conceptual framework and the spelling out of objectives before moving to the identification of individual indicators. This contrasts with most efforts to date that attempt to develop indicators first, often leading to an unstructured shopping list that subsequently struggles to gain broad support.

In 1992, The United Nations Programme for Action for Sustainable Development, Agenda 21, advocated the development of indicators to evaluate progress towards achieving sustainability at the national and global level.

Since then, work on the indicators has continued through the United Nations Commission for Sustainable Development (CSD), as well as in other international organisations, such as OECD, within individual countries and within various sectors.

Indicator sets are used at the national scale to enable a country to report on its progress towards sustainable development. Some examples of indicator sets are listed in *Box 1*.

Processes to develop core indicator sets often have some typical features:

- support for the process ranges from very high to lukewarm
- limited time for consultation or broad discussion
- enthusiastic nomination of specific indicators by individuals
- significant technical investigation into data availability, measurement methods etc
- 'too many' indicators are proposed, leading to some sort of 'culling' to reach a 'core' set
- lack of support from those not involved in indicator development, but required to implement them.

Problems include inflexibility, over-simplification and the high cost of data collection

There are a number of reasons why this process often fails to develop effective indicator sets.

People may be suspicious of the potential use of the indicators. For example, there is concern that CSD indicators may be used in determining the distribution of development aid. While this is not the intention, these apprehensions need to be addressed.

A specific indicator may not be appropriate in all circumstances. One size rarely fits all and different countries and regions discover that indicators need to be modified to suit their needs. For example, indicators such as length of hedgerows that are appropriate in some European countries have little relevance in Australia.

Considerable resources are also needed to collect, collate and report on the indicators. These are difficult to justify when the people being asked to collect the information receive no obvious, short-term benefit.

Simple indicator sets have trouble measuring all aspects of human aspirations, or adequately addressing complex concepts. If an indicator set omits aspects that are regarded as important, it is unlikely to receive widespread support.

> An alternative four-step approach addresses these problems and increases chances of broad support

The Bureau of Rural Sciences has suggested a four-step approach to indicator development that would address the problems inherent in the current method. The steps are illustrated in *Box 2*.

> Progress in Australia is being achieved by some industry sectors

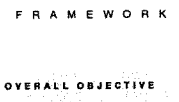
An evaluation of sustainability must measure performance to date and predict performance into the future. We have not yet achieved this on a national level. However, some sectors are making progress at an industry level.

> Fishery and forestry industries are leading the way

The Australian fisheries management agencies have an ambitious project underway to develop a national ESD reporting framework. (See *Case Study*). The Australian forest industry has also made significant progress. The Montreal process, Regional Forest Agreements, and the development of the Australian Forestry Standard, have articulated objectives and incorporated indicators into a continuous improvement cycle.

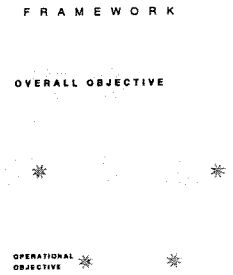
BOX 2

FOUR-STEP APPROACH TO INDICATOR DEVELOPMENT

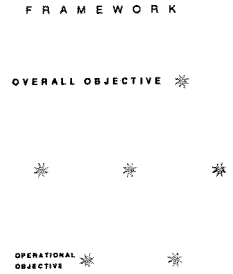


STEP ONE Develop a conceptual framework. The framework should clearly define who or what is being evaluated. It should explore the meaning of 'sustainable development' and articulate our visions and aspirations in achieving it. This would be in the form of an overall objective such as increasing total quality of life.

STEP TWO Sub-divide the overall objective into successively more specific objectives until we get down to objectives that can be measured. These are operational objectives. Their identification requires extensive consultation involving all stakeholders.



STEP THREE Identify indicators that address the operational objectives. An indicator often follows fairly easily once an operational objective has been defined. Technical effort is not wasted on indicators that are not relevant.



STEP FOUR Aggregate indicators at lower levels to form a core set if this is needed for reporting convenience. This does not mean destroying the information at lower levels. Information should remain accessible at whatever level of detail is required.

CASE STUDY

NATIONAL REPORTING FRAMEWORK FOR **AUSTRALIAN FISHERIES**

Australian fisheries management agencies have begun an ambitious project to develop a national reporting framework to demonstrate how well they are meeting the objectives of ecologically sustainable development (ESD).

The project was initiated by the former Standing Committee on Fisheries and Aquaculture (SCFA) composed of the directors of all Australian fisheries management agencies, and is continuing under the new Natural Resource Management Standing Committee. The project is advised and supported by a reference group consisting of Environment Australia, industry, non-government organisations and other relevant stakeholders. The Fisheries Research and Development Corporation contributes funding to the project.

Each reporting unit is a fishery, as defined by the management agency. The framework is designed to document a fishery's contribution to ESD where ESD is defined as:

> *using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

ESD has been divided into eight major components relevant to fisheries:

Contributions of the fishery to ecological wellbeing

- Retained species
- Non-retained species
- General ecosystem

Contributions of the fishery to human wellbeing

- Indigenous wellbeing
- Community and regional wellbeing
- National social and economic wellbeing

Ability of the fishery to contribute

- Governance arrangements
- Impact of the environment on the fishery

These components are further sub-divided into more specific sub-components (*Figures 1 and 2*). For example, the generic component tree for 'general ecosystem' (*Figure 1*) covers effects on the biological community, and on air, water and substrate quality. Taking the generic component tree as a starting point, each fishery can tailor the component tree to suit its circumstances, expanding some sub-components and collapsing others.

For each of the lowest level sub-components, the fishery completes a report which includes the operational objective for that sub-component, the indicator to be used to measure performance with respect to that objective and the associated management responses.

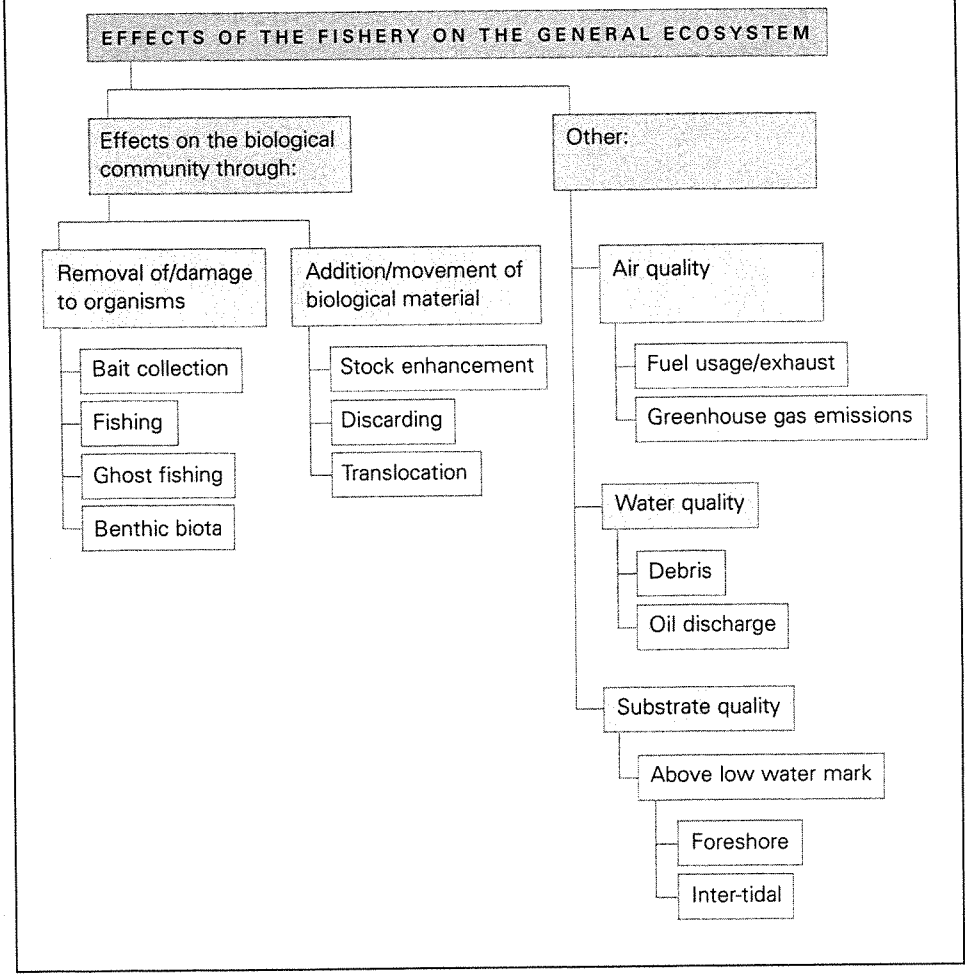
The approach differs from 'top down' approaches where a set of indicators and performance measures is imposed on all fisheries without regard to their individual circumstances.

PROGRESS TO DATE

Nine case studies have been used to apply the framework to various fishing methods and jurisdictions. Each case

FIGURE 1

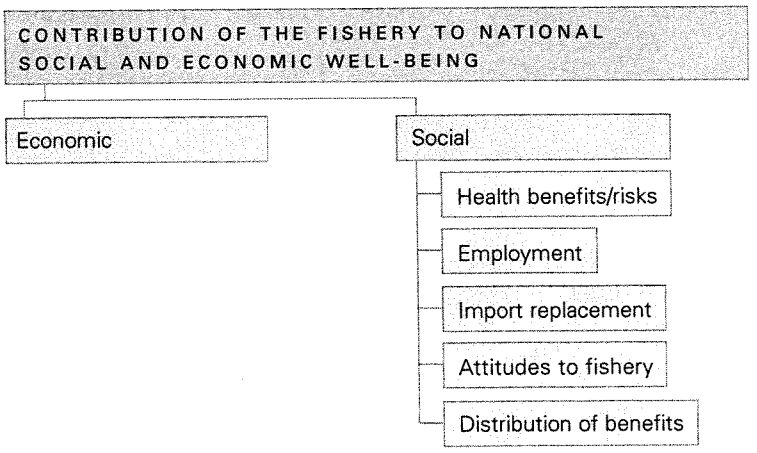
EXAMPLE ONE OF THE EIGHT GENERIC COMPONENT TREES



CASE STUDY *continued on page 6*

FIGURE 2

EXAMPLE TWO OF THE EIGHT GENERIC COMPONENT TREES



study began with a two-day workshop at which stakeholders developed a set of component trees and started to identify operational objectives and associated indicators and performance measures. The component trees have been very useful in promoting and structuring discussion. At the higher levels, the trees tend to be similar for all fisheries, whereas at the lower levels they diverge considerably in response to the different types of fisheries and the social, economic and bio-physical environments in which they operate. A 'how to' guide has been published to assist other fisheries to apply the framework. (www.fisheries-esd.com).

THE WAY FORWARD

It is intended that this national reporting framework will be progressively applied to all Australian fisheries and will become an integral part of fisheries management. Although the primary goal is to assist and improve fisheries management, the reporting framework is also intended to address an increasing number of environmental and other requirements imposed by legislation, certification schemes, and consumer and community demands. With a comprehensive, national approach, individual fisheries should be well placed to show how they are performing against ESD objectives.

ACKNOWLEDGEMENT: *This material is derived from a Fact Sheet prepared by BRS for the former Standing Committee on Fisheries and Aquaculture.*

CONCLUSION

National and international experience demonstrates that the search for a core set of indicators to tell us everything we want to know has a very low success rate. The search needs to be directed not at indicators, but at understanding what we want to achieve. This is a consultative process requiring time and thought. However, once it has been achieved, the technical details regarding measurement and reporting of indicators can be addressed relatively quickly and generate a real indication of how we are performing.

The Bureau of Rural Sciences advocates the development of a framework that specifies overall and operational objectives. Indicators are a means to report against the objectives, not an end in themselves. Achievement of common objectives, rather than measurement of common quantities, becomes the basis for reporting progress and is more likely to be accepted on industry, national and global scales.

Specification of objectives should be the focus of the process, not indicator development

Consultation is critical in this process

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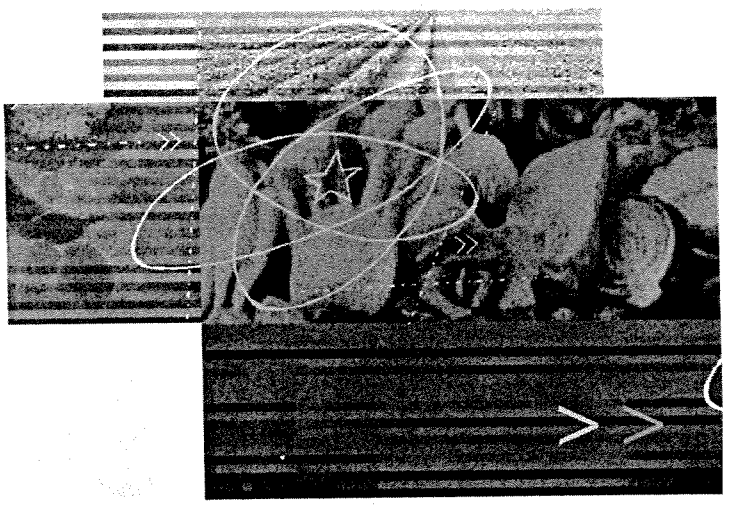

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DRAFT
5 January 2004

An Evaluation Framework for Sustainable Development

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Abstract

In 1998 the Bureau of Rural Sciences published an evaluation framework for fisheries. Since then the framework has been developed and applied to a wide range of situations. This paper describes some of those applications, the lessons learned and future directions. The framework is designed to address the question 'How does it contribute to sustainable development?' where 'it' can be almost anything. The framework has proved applicable at a variety of scales (industry, regional, national) and in a range of situations (planning, performance evaluation, monitoring and evaluation). Key features important for its success include: 1) The framing of the underlying question; 2) A hierarchical structure to disaggregate general high-level components to a level at which operational objectives can be specified; and 3) Emphasis on the specification of objectives rather than the development of indicators.

Introduction

In 1998 the Bureau of Rural Sciences published an evaluation framework for fisheries (Chesson and Clayton 1998). Since then the framework has been developed and applied to a wide range of situations. This paper describes some of those applications, the lessons learned and future directions.

The Framework

Sustainable development is:

> *meeting the needs of the present without compromising the ability of future generations to meet their own needs* (World Commission on Environment and Development 1990)

or, as elaborated in Australia's National Strategy for Ecologically Sustainable Development:

> *using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased* (Commonwealth of Australia 1992).

We regard these definitions as equivalent and use the terms 'sustainable development' and 'ecologically sustainable development' interchangeably.

Application of the framework involves five steps:

1. defining the subject of the evaluation (the identity of 'it')
2. identifying the contributions (both positive and negative) that the subject makes or could make to sustainable development
3. specifying objectives for each contribution
4. measuring performance with respect to the objectives
5. evaluating options for improving performance

Step 1: Defining the subject of the evaluation

This step was not explicit in the original formulation of the framework because 'a fishery' was the only subject considered. However, even within that limited context

the need for a precise definition quickly became apparent. 'A fishery' was defined in terms of an administrative unit, that is, a group of people carrying out certain activities subject to various rules, regulations and codes of conduct. It is the performance of people (not fish or ecosystems) that we need to evaluate because only people can take actions to improve performance. A spatially defined subject such as a nation, region or catchment can be interpreted as the collection of human activities that comprise that subject. While the framework can be applied to almost anything, there is little point unless the subject can respond to the results of the evaluation.

A clear definition of the subject at the beginning of the evaluation also helps distinguish measures of performance from the numerous factors that influence performance but are beyond the control of the subject. The subject must deal with these factors, but the factors themselves are not measures of the subject's performance.

Step2: Identifying contributions

The BRS framework is distinguished from standard performance evaluation by its use of a hierarchical structure to organise the subject's contributions to sustainable development. This approach follows from an area of decision support theory known as the analytical hierarchy process (Saaty 1980).

Contributions of the subject to sustainable development are first classified as either direct contributions to human wellbeing or contributions to environmental wellbeing[1]. Since contributions to environmental wellbeing are almost certainly going to affect human wellbeing sooner or later, this classification simply distinguishes contributions according to the route by which they are delivered. Contributions to sustainable development, whether directly to human wellbeing or indirectly through environmental wellbeing may be either positive or negative and may be short term, long term or somewhere in between.

The two main components are progressively subdivided to suit the subject being evaluated (Figure 1). Ideally, each set of sub-components should form a complete and non-overlapping description of the component from which they are descended. We have found this process to work surprisingly well in a workshop situation involving multiple stakeholders. The creation of component 'trees' is sufficiently flexible to allow stakeholders to organise components in ways that make sense to them while the requirement for logical consistency ensures a workable outcome. The visual effect of a component tree growing and changing before their eyes encourages participation and clearly communicates the state of the discussion at any particular time.

The goal is to subdivide components to a point where it is possible to specify objectives against which performance can be measured.

Step 3: Specifying objectives

While high level objectives may be articulated and generally accepted, there is often a lack of clarity and even outright disagreement by the time the high level objectives are translated to the operational level where actions are taken and performance can be measured. Some of the difficulties are a result of lack of knowledge about the complex systems within which we operate but more often, in our experience, there

[1] This classification follows directly from the ecologist's definition of environment which distinguishes a species or individual (in this case *Homo sapiens)* from everything else that surrounds it (the environment of *Homo sapiens*). In a different context, an ecologist would refer to the environment of, say, a flat worm. *Homo sapiens* is part of the flat worm's environment but not part of *Homo sapiens'* environment.

has been little attempt to work through and document objectives as they move from the general to the specific.

Objectives are rarely at the sole discretion of the subject. Objectives must be consistent with the legal and regulatory environment in which the subject operates and once publicly articulated, become subject to scrutiny by all interested parties. Fear of scrutiny and accountability is one of the reasons given for not clearly stating objectives. However, lack of transparency is, at best, a temporary refuge.

Objectives for components at the tips of each branch of a tree should qualify as operational objectives, that is, objectives that have a direct and practical interpretation and against which performance can be measured. There should be only one objective per component. If more than one is required, the component should be further subdivided.

Step 4: Measuring performance

Indicators enter only at this penultimate step in the evaluation process. An indicator is defined as a quantity that can be measured directly and used to track changes over time with respect to an operational objective. With the hard work completed in Step 3, working out how to measure performance with respect to a particular objective follows relatively easily. Much has been written about the desirable properties of indicators (for example Gallopin 1997) and acronyms such as SMART (simple, measurable, accurate, relevant, timely) are in common use. When an indicator is linked to an operational objective embedded within a structured set of objectives, many of the desired properties are automatically satisfied. Seeking indicators without first developing a well-defined structure and clearly articulated objectives tends to produce a haphazard collection that fails to generate widespread support.

An important issue that has received relatively little attention is the extent to which an indicator measures only performance to date or anticipates future performance. For example, suppose there is an operational objective to maintain the abundance of a particular species above a certain limit. An annual estimate of abundance is indicative of performance to date. An estimate of the probability that the population will remain above the limit over the next 50 years anticipates future performance and highlights situations where the current status may be acceptable but the outlook under current management is not optimistic. The development of indicators that anticipate future performance may be difficult but increasingly necessary in order to address long-term objectives.

An indicator must be accompanied by instructions for its interpretation. The original description of the BRS framework did not give these instructions a name. In more recent applications the term 'performance measure' has been adopted. A performance measure is defined as a function that converts the value of an indicator to a quantitative measure of performance with respect to the operational objective.[2] Performance measures can take many forms as illustrated in Figure 2. Although they do not need to adopt any particular scale, a scale between 0 and 1 with 0 representing unacceptable performance and 1 representing maximum performance has advantages for subsequent aggregation of performance across objectives[3]. Introducing the performance measure as an entity distinct from the indicator emphasises the fact that the indicator is essentially an objective measure of some quantity, whereas the performance measure is a statement about acceptability or desirability from the point

[2] The definition of performance measure is consistent with the mathematical definition of a measure.
[3] The use of a 0,1 scale can be linked to the use of utility functions in economics.

of view of society or some subset of it. A performance measure can be regarded a very precise statement of an objective.

While there is little disagreement over concepts, terminology is not consistent throughout the performance evaluation literature. The terms indicator, performance measure and performance indicator are used differently by different authors and definitions need to be checked in each case.

The original formulation of the BRS framework focussed on determining whether overall performance was improving over time. This necessitates some method for combining results across operational objectives to give an aggregated result at whatever level is deemed appropriate.

Aggregation is controversial because it requires specifying the relative importance of each objective. Assigning equal importance to each objective is no less subjective than assigning any other set of relative weights. The BRS framework was designed so that a wide range of decision support tools falling under the broad range of multi-criteria analysis can be applied (Janssen 1992). The appropriate method depends on the purpose of the evaluation. An evaluation may be carried out to assess performance against a standard, to compare different subjects or to monitor performance over time.

Many of the limitations of simple aggregation methods such as weighted sums can now be overcome using expert systems (Negnevitsky 2001). Expert systems capture complex 'expert' knowledge or stakeholder preferences in the form of a multi-dimensional surface that specifies how the indicator values are to be combined to give an aggregated result.

Whatever level of aggregation is applied, it is important to recognise that the underlying information is not lost in the process. Ideally, aggregated results can be presented in an electronic form so that a click on a button immediately reveals the indicators and performance measures for the level below.

The results of applying the BRS framework can be displayed in a variety of forms. Isometric kites have proved useful for displaying fisheries performance over time with respect to the major sub-components (Chesson 1999, Whitworth et al. 2000). The 'Dashboard of Sustainability' developed by the International Institute for Sustainable Development (http://www. iisd.org/) is another form of display that can be used.

Step 5: Evaluating Options

The goal of performance evaluation is to improve future performance. At this point in the evaluation cycle we move from analysis of the past to prediction of the future under alternative scenarios. Observed values of the indicators are replaced by predicted values using whatever tools are available. These range from computer simulation, modelling and risk assessment through to expert opinion and educated guesswork.

The framework provides the means for integrated decision-making, ensuring that possible impacts on *all* objectives, not just the objective being targeted, are taken into account when considering each option. It therefore ensures that a key principle of ecologically sustainable development, that '*decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations*' (*Environment Protection and Biodiversity Conservation Act 1999*), is applied.

While the evaluation of options is listed as Step 5 in the evaluation cycle, it may often be implemented long before Step 4 is complete. Decisions, including the decision to take no action, have to be made before indicators can be fully developed and their values measured. Evaluation of options can proceed as soon as objectives have been sufficiently articulated. There may be a greater range of feasible indicators since the values will be model predictions rather than actual measurements. It is likely that Steps 4 and 5 will inform each other, not only in terms of feedback about how well particular options worked in practice, but also in the selection of indicators and performance measures.

In the applications of the BRS framework to date, it could be argued that the greatest benefits have come from Step 5.

Applications

National ESD (Ecologically Sustainable Development) Reporting Framework for Australian Fisheries

Background

The National ESD Reporting Framework for Australian Fisheries was initiated by the Standing Committee for Fisheries and Aquaculture (SCFA)[4] in response to a growing need for fisheries to account for their performance with respect to the environment in particular and sustainable development in general. The SCFA was composed of the heads of all Australian fisheries management agencies. Action was prompted by a change to the administration of the *Wildlife Protection Act 1982*[5] that required all fisheries wishing to export their product to meet a set of environmental criteria. The SCFA decided that a coordinated effort to develop a national reporting framework would be more efficient than each fishery responding in its own idiosyncratic way to the increasing number of reporting requirements at the Commonwealth, State and local level. A coordinated approach to reporting would benefit all parties even though each regulatory body would make its own assessment of what was acceptable performance with respect to its specific requirements.

The National ESD Reporting Framework for Australian Fisheries addresses the question 'How does fishery 'x' contribute to sustainable development?' where a fishery is a group of people defined by the management agency.

Achievements

The National ESD Reporting Framework for Australian Fisheries was developed through a series of case studies covering a variety of fishery types. Contributions of a fishery to sustainable development were initially sub-divided into six major components as shown in Figure 3. Another two components were added under the heading 'Factors affecting the ability of the fishery to contribute to sustainable development.' They were 'impact of the environment on the fishery' and 'governance arrangements.' These two components do not measure the performance of the fishery, but were seen as important factors to be aware of when evaluating performance and especially when attempting to improve performance.

Each of the major components was further subdivided and refined through a series of stakeholder workshops. The ecological component trees reached their current form fairly quickly, whereas the human well-being components required more work and are still less well-developed. The resulting 'generic' component trees are now available for individual fisheries to adapt to their particular circumstances. Some examples are

[4] The SCFA was replaced by the Australian Fishery Managers Forum after a reorganisation of ministerial councils in 2001.

[5] Now incorporated into the *Environmental Protection and Biodiversity Conservation Act 1999*.

given in Figure 4. Since the generic component trees are designed to cover the broadest range of components, the most usual adaptation is deletion of components that do not apply to a particular fishery. Guidance on how to do this is provided in Fletcher *et al* (2002).

The National ESD Reporting Framework for Australian Fisheries includes a risk assessment step to assign priorities to components. This is particularly appropriate for components of ecological well-being where there may be a large number of potentially negative impacts, but with some of much greater significance than others. Components assigned a moderate or higher risk must be reported on in full under the headings listed in Table 1.Those assigned a lower risk require only a justification for their exclusion.

Further information on the National ESD Reporting Framework for Australian Fisheries is provided in Chesson *et al* (2000), Fletcher *et al* (2002) and Whitworth *et al* (2003). These and other materials are available on the National Fisheries ESD Website (www.fisheries-esd.com).

The National ESD Reporting Framework has been taken up to varying degrees around Australia. In Western Australia it is being applied to every fishery. In other states elements of the framework have been used to help develop fishery management plans (eg Victorian Abalone Fishery) and to address legislated requirements (eg New South Wales Estuarine Fisheries). It continues to have Ministerial Council support and further work is underway to develop common assessment standards.

Lessons learned

Developing the National ESD Reporting Framework for Australian Fisheries demonstrated the power of component trees. Participants in the case study workshops responded very positively to the component trees and entered enthusiastically into their development. Starting with a set of generic component trees, we were able to generate a set specific to a particular fishery in just over half a day. The component trees allowed all stakeholders to register their issues of interest without getting embroiled, at this stage, in arguments about objectives.

Industry participants were pleased that both their positive and negative contributions to sustainable development were being recognised, not just their negative ones. As well as the standard economic and socio-economic contributions, less-recognised contributions such as the provision of search and rescue services, of which the participants were justifiably proud, often emerged.

A formal way of recognising external drivers such as land-based sources of marine pollution or changes in the exchange rate was important. This was done through the extra component tree 'impact of the environment on the fishery' and also when reporting on individual components. The external drivers are beyond a fishery's control, but affect their performance. In less structured approaches to evaluation, there is a tendency to embed external drivers into the evaluation so that the subject of the evaluation is muddled between the community at large and its impact on fisheries and the contributions of the fishery to the community. By stating the subject of the evaluation as its first step, the BRS Evaluation Framework avoids this muddle, but it then needs to provide an outlet by which the subject can vent its frustration at external drivers.

The method of assigning priority to components through a qualitative risk assessment was popular with fisheries managers. Whether the risk assessment actually reduces the total effort is debateable, but managers who otherwise felt overwhelmed at the

huge number of components requiring their attention were pleased to place first priority on those assigned high or medium risk.

The case studies emphasised the importance and challenge of specifying objectives. Even in relatively well-developed components such as the impact of the fishery on the target species, some fisheries had difficulty in articulating their objective. While high-level components and objectives tend to be common across fisheries as evidenced by the ability to construct generic component trees, lower-level components and operational objectives tend to be fishery-specific. Since indicators have to be selected to measure performance with respect to an operational objective, our experience demonstrates the futility of trying to measure performance by imposing a set of standard indicators in a 'top down' approach.

Overall, the development of the National ESD Reporting Framework for Australian Fisheries has been the most extensive and exhaustive application of the BRS Evaluation Framework to date. Although the ultimate level of uptake by fisheries is still to be determined, other industries such as the aquaculture industry are seriously considering a similar approach.

OECD Agri-environmental indicators

Background

The Organisation for Economic Cooperation and Development (OECD) is a group of 30 countries working to coordinate domestic and international social and economic policies. One of its many tasks is to 'foster sustainable development through analysing and measuring the effects on the environment of domestic agriculture and agri-environmental policies and trade measures' (OECD 1999). In 2001, OECD published the set of indicators listed in Table 2 and requested suggestions on how to construct a set of core indicators that would meet certain criteria including 'comprehensiveness in capturing the key elements and linkages of sustainable agriculture' (OECD 2001). We used the BRS Evaluation Framework to suggest a way of constructing a set of core indicators.

Achievements

Applying Step 1 of the BRS framework we determined that the subject of the evaluation was Australian agriculture and that in this special case, it was only agriculture's contributions to environmental well-being that were being considered. Other contributions would be dealt with elsewhere. For this reason, we argued that the 'contextual' indicators should not be part of the core set. We also argued that while farm management indicators may have a role in predicting future contributions to environmental well-being, they do not measure actual contributions and should therefore be excluded from the core set.

We applied Step 2 by first structuring the remaining OECD indicators (Figure 5). This revealed some inconsistencies and overlap that we resolved in Figure 6. We then suggested a simplified structure that would require 16 indicators, 7 of which are already included in Australia's set of sustainable agriculture indicators (Standing Committee on Agriculture and Resource Management 1998) (Figure 7)[6].

Lessons learned

This exercise showed us that the BRS Evaluation Framework could work at the national scale and provide a useful tool for generating sets of indicators. Having to

[6] This work influenced, but does not represent, Australia's position on OECD agri-environmental indicators.

clearly specify the subject and scope of the indicator set immediately reduced the number of indicators. This does not imply that the rejected indicators have no role, only that their role is elsewhere. Placing the OECD indicators in a component tree revealed the structure that was present in Table 2 but not immediately apparent.

The OECD process skips Step 3 of the BRS Framework, i.e. the specification of objectives. The objective is assumed to be self-evident. This may be true for some components, but is not true for others. For example, the desirability of a particular change in agricultural land use pattern will depend on local circumstances. Similarly, an increase in the rate or amount of change may be desirable or undesirable. Our experience suggests that disagreement about inferred objectives rather than disagreement about the indicators themselves is the main reason why particular sets of indicators fail to gain widespread acceptance.

National Natural Resource Management Monitoring and Evaluation Framework

Background

The Australian Natural Resource Management Ministerial Council, consisting of state and federal agriculture and environment ministers, has commissioned the development of the National Natural Resource Management Monitoring and Evaluation Framework (National M&E Framework) to 'monitor and evaluate outcomes of (natural resource management) policies, strategies and programs and the health of the nation's natural resources.' The National M&E Framework intends to carry out this monitoring and evaluation through the development of indicators and various processes have been initiated to achieve this. We applied the first three steps of the BRS Evaluation Framework to demonstrate how the BRS Framework could help articulate the complex set of objectives that represents 'natural resource management outcomes.'

Achievements

The implied subject of the evaluation is the collection of natural resource management policies, strategies and programs. Applying Step 1, we asked which natural resources and what management activities should be included. Based on our knowledge of the responsibilities of the Ministerial Council we generated lists of resources and activities that are within the scope of the evaluation. For example, we suggested that water is 'in', but minerals are 'out.' Similarly, rural residences (hobby farms) are 'in', but urban planning is 'out.'

We interpreted natural resource management outcomes to be contributions to sustainable development, both positive and negative, long term and short term. Based on outputs of various working groups, we proposed the component tree in Figure 8 as a starting point for developing a structured set of outcomes. The tree needs to be further developed so that operational objectives and indicators can be specified for the components at the tips of each branch. This would ideally be done in a consultative manner involving all stakeholders. The resulting 'generic' tree could be used as a common basis for communication and a tool for developing regional and local monitoring and evaluation programs.

Some components have already been designated as compulsory (matters for targets) and certain indicators have been recommended at the national level. These are shown on an expanded version of the proposed component tree (Figure 9).

Lessons learned

We found the BRS Evaluation Framework helpful in providing a visual interpretation of what had been covered by the National M&E Framework to date and believe that it

would be a useful tool in its further development, especially the coordination of regional M&E Programs and the flow of information from the regional to national level. An agreed generic component tree could also be used to evaluate proposals for specific actions (Step 5). A proposed action should be evaluated according to its predicted impact on all components in the tree, not just the one for which it is specifically targeted. For example, a proposal for engineering works to reduce water salinity should be evaluated in terms of its potential impact on biodiversity, employment etc. as well as its intended impact on water salinity.

This exercise illustrated the distinction between the BRS Framework and the application of program logic. Program logic ((Owen 1993, Funnell 1997)) is a structured way of setting out how actions at each stage of a program should together lead to the desired program objectives. Program logic diagrams have been developed for the two main natural resource management programs, namely the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality. The BRS Evaluation Framework and program logic are complimentary tools that create structures in two different dimensions (Figure 10). The BRS Evaluation Framework elaborates the natural resource management outcomes that appear at the top of a program logic diagram. Program logic links actions with those outcomes. Both tools are needed for effective program implementation and evaluation.

Regional Planning

Background

In this example, the BRS Evaluation Framework was used to design a performance assessment scheme for a regional plan. The region was created as a result of new government policy and there were no existing institutional structures or planning processes in place for the region per se. From the beginning it was evident that the performance assessment scheme and the plan were intrinsically linked. The objectives of the plan are the objectives in Step 2 of the evaluation framework. Therefore, the details of the performance assessment scheme cannot be specified until the regional plan has been developed and agreed. The identity of the region is concealed in this paper to avoid prejudicing the development of the plan.

Achievements

To assist the process, a demonstration performance assessment scheme was developed based on previously released material. The high level components are shown in Figure 11. The policy underlying the development of the plan emphasises increased community awareness and understanding as an outcome of the plan and not just a means to an end. This is reflected by several components under human and social capital. In addition, a separate set of components was developed to cover desired properties of the process (inclusiveness, consultation, etc). This resulted in a 'how' component tree as well as a 'what' component tree. Details of three components, two from the 'what' component tree and one from the 'how' component tree, are shown in Figure 12. It is expected that the performance assessment scheme will develop in parallel with the plan itself and will help focus the planning process.

Lessons Learned

In this application, the task was defined as performance evaluation but, given the context, essentially became part of the planning process. The overarching policy provides a number of high-level objectives that are a mix of social, economic and environmental outcomes and principles to be followed in achieving those outcomes. We were able to distinguish these by creating a 'what' component tree and a 'how' component tree. The 'how' component tree represents principles that are required by the policy and should not be confused with the actions proposed to achieve desired

outcomes. For example, improved participation and engagement of indigenous people in planning and management arrangements is a desired outcome required by the policy and is a component of the 'how' component tree. Organising workshops or field trips by or for indigenous people is an action intended to achieve the outcome and is depicted in a program logic diagram.

The close links between planning and evaluation were clearly illustrated in this application and emphasise once again the importance of articulating objectives at the operational level. Without them progress on either planning or evaluation is difficult and of limited value.

Conclusions

The applications above demonstrate the flexibility and utility of the BRS Evaluation Framework. The original formulation in the context of fisheries (Chesson and Clayton 1998) has proved applicable at a variety of scales (industry, regional, national) and in a range of situations (planning, performance evaluation, monitoring and evaluation). This is not surprising, since the framework is based on fundamental aspects of decision-making and performance evaluation. Our accumulated experience has identified key features that are important for its success and distinguish the BRS Evaluation Framework from other frameworks.

The first key feature is the framing of the underlying question 'How does it contribute to sustainable development?' This not only eliminates confusion with questions of long-term survival and the meaning of 'sustainability', but also provides a conceptual basis for accumulating contributions across different types of entities and geographical scales. The notion of contributions (positive and negative) can be linked directly to interpretations of sustainable development in terms of inclusive wealth and the various types of capital (natural, human, produced, etc.) (Dasgupta and Maler 2001).

The second key feature is the hierarchical structure used to disaggregate general high-level components to a level at which operational objectives can be specified. The complexity of the component determines the level of sub-division, not an arbitrary requirement to have a set of indicators with only two, three or sometimes four levels. Flexibility in terms of the level of sub-division avoids a common stakeholder complaint that important aspects of a component are being ignored because of a bureaucratic aversion to 'too many indicators.' A complex system requires a complex set of indicators to adequately monitor performance. This does not imply that reporting has to be complex. Results can be aggregated and reported at any desired level of detail. National summaries will concentrate on aggregated results for high level components. Reports intended to inform individual business owners or local mangers will need to provide information on individual components at the lowest levels of the hierarchy. Some high-level components require little or no sub-division for adequate evaluation. The BRS Evaluation Framework encourages sub-division where necessary and discourages use of indicators that are redundant or otherwise lack a well-defined role.

The third key feature, and arguably the most important, is the emphasis given to the specification of objectives rather than the development of indicators. Objectives are the primary source of contention. Technical experts employed to develop indicators are not the appropriate group to resolve disagreements about objectives. Much time and effort is wasted on technical investigations into indicators without first articulating the operational objective that the indicator is meant to be addressing.

Although operational objectives will evolve over time, they are expected to be more enduring than the indicators used to measure their achievement. Initially an inferior indicator may have to be used because of data or resource constraints. As these constraints are overcome, a superior indicator may be substituted. Improvements in indicators can be confused with changes in objectives if the two are not clearly distinguished.

There are many opportunities for further work within the existing framework. They include development of indicators that incorporate future as well as current performance, further development of the human well-being components, in particular which components are measured adequately by existing economic measures and which need additional consideration, and creating more explicit links with the Program Logic. As applications move into more routine monitoring and reporting, there will also be a need for further work on performance measures and methods of aggregation and display. Many methods developed in disciplines such as decision theory, systems analysis and artificial intelligence are presently under-utilised in performance evaluation. The first step is to make them more available.

Experience in a variety of situations has emphasised the inter-relationships between decision-making and performance evaluation. Although the BRS Evaluation Framework was initially formulated to evaluate performance, it has actually had more use in planning and decision-making. Admittedly this should not be a big surprise since planning, evaluation and decision-making are all part of the one continuous improvement cycle. Nevertheless, it gives further justification for the integration of decision-making and performance evaluation tools within a single framework.

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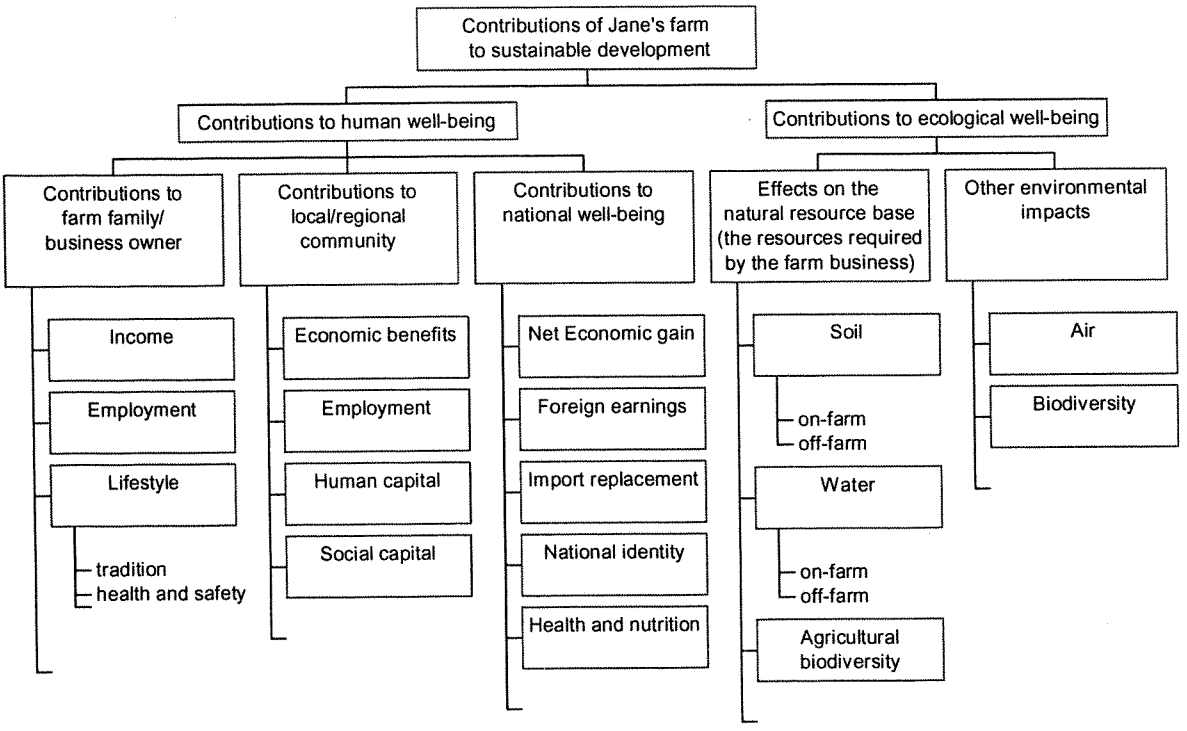


The components shown here are indicative only. Components are further subdivided until a level is reached at which it is feasible to specify measurable objectives.

Figure 1. Creation of a component tree for a hypothetical farm business.

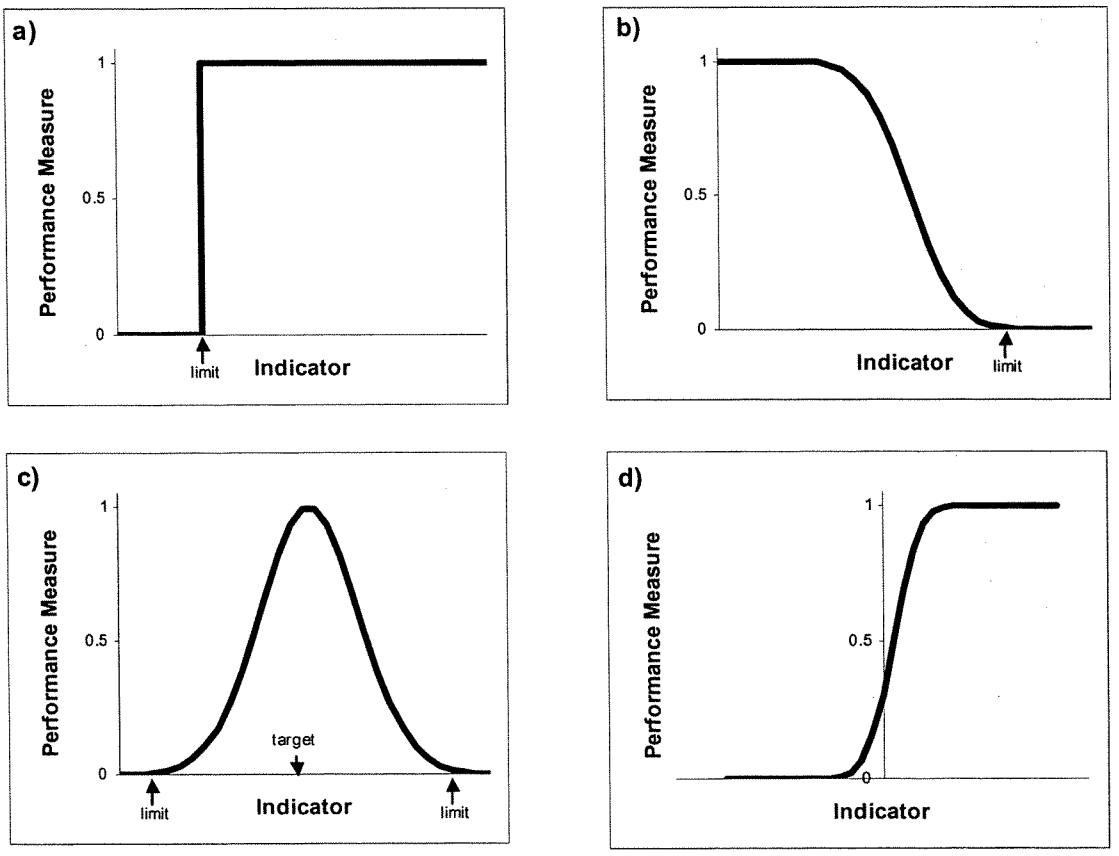


Figure 2. Some examples of the many forms performance indicators can take: (a) 'all or none'- only values above the limit are acceptable; (b) 'not too big' - increasing values are less desirable becoming unacceptable above the limit; (c) 'the happy medium' – the target is ideal, values outside the upper and lower limits are unacceptable; and (d) 'bigger is better, but only up to a point' – small negative values tolerated, larger positive ones preferred but with diminishing returns.

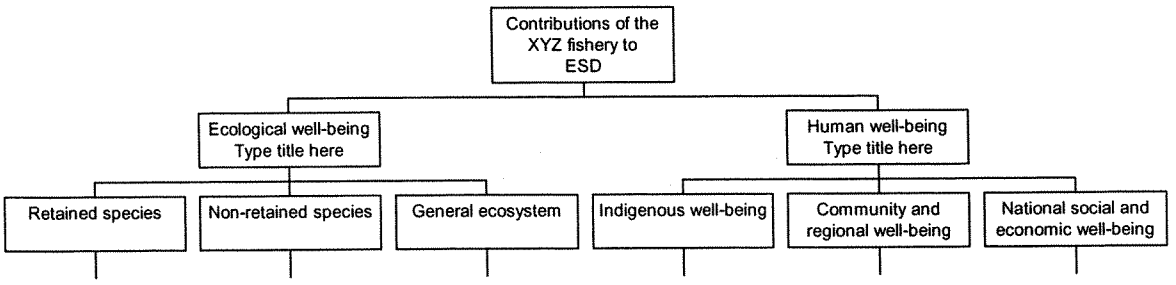
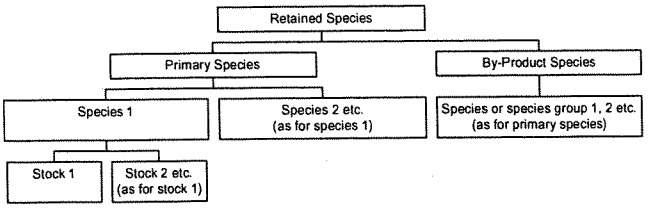
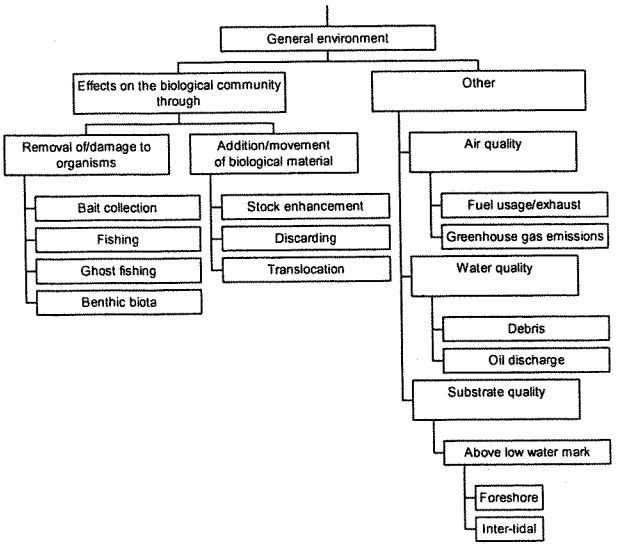


Figure 3. The six major components of the National ESD Reporting Framework for Australian Fisheries.

(a)



(b)



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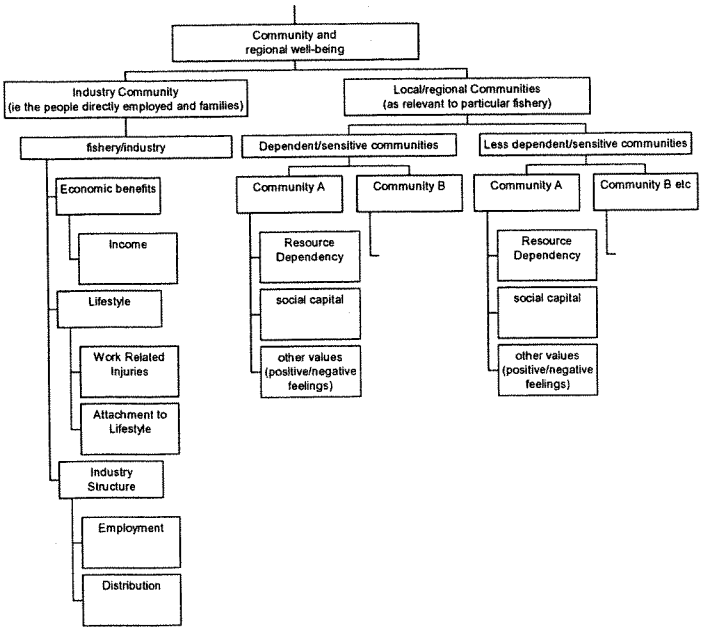


Figure 4. Examples of generic component trees generated for the National ESD Reporting Framework for Australian Fisheries: (a) Retained species, (b)General ecosystem, (c) Community and regional well-being.

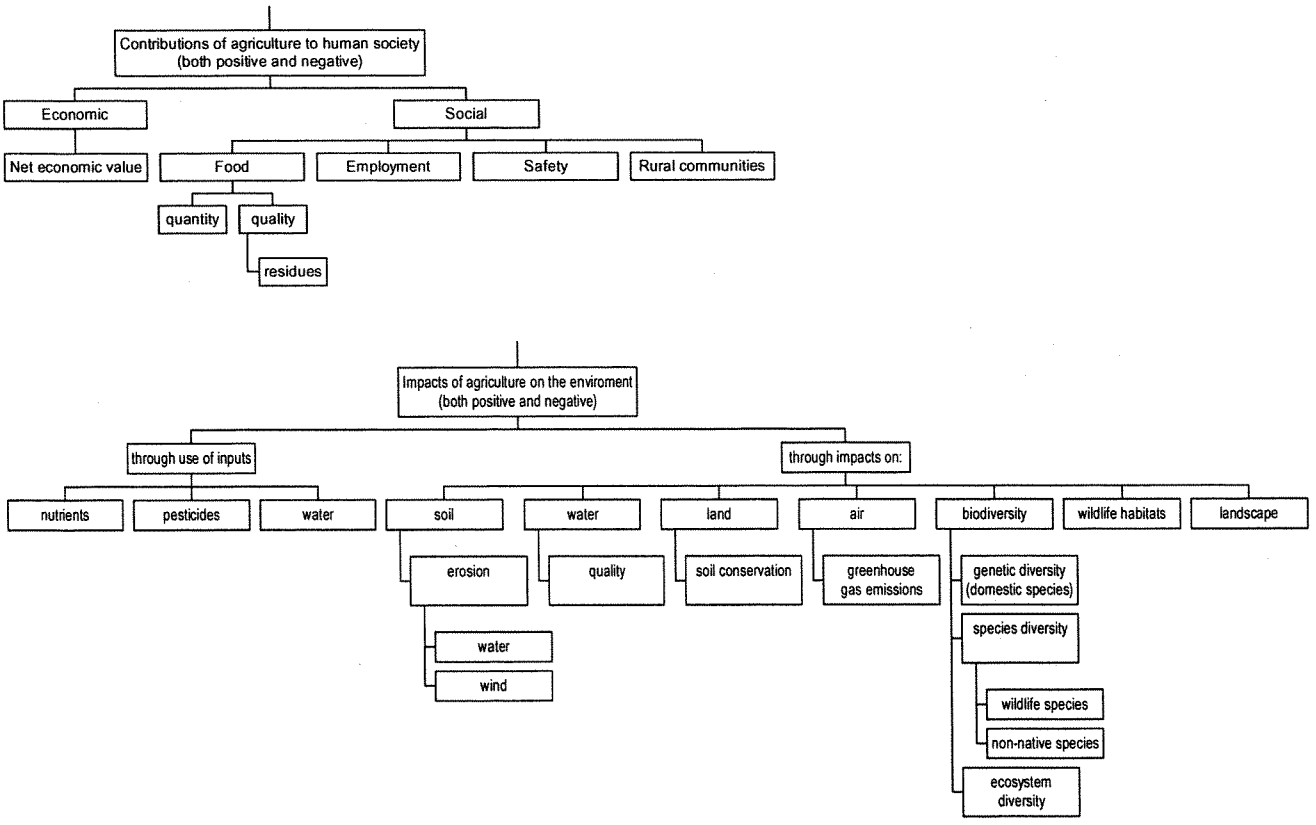


Figure 5. Component trees created to provide a structure for OECD agri-environmental indicators.

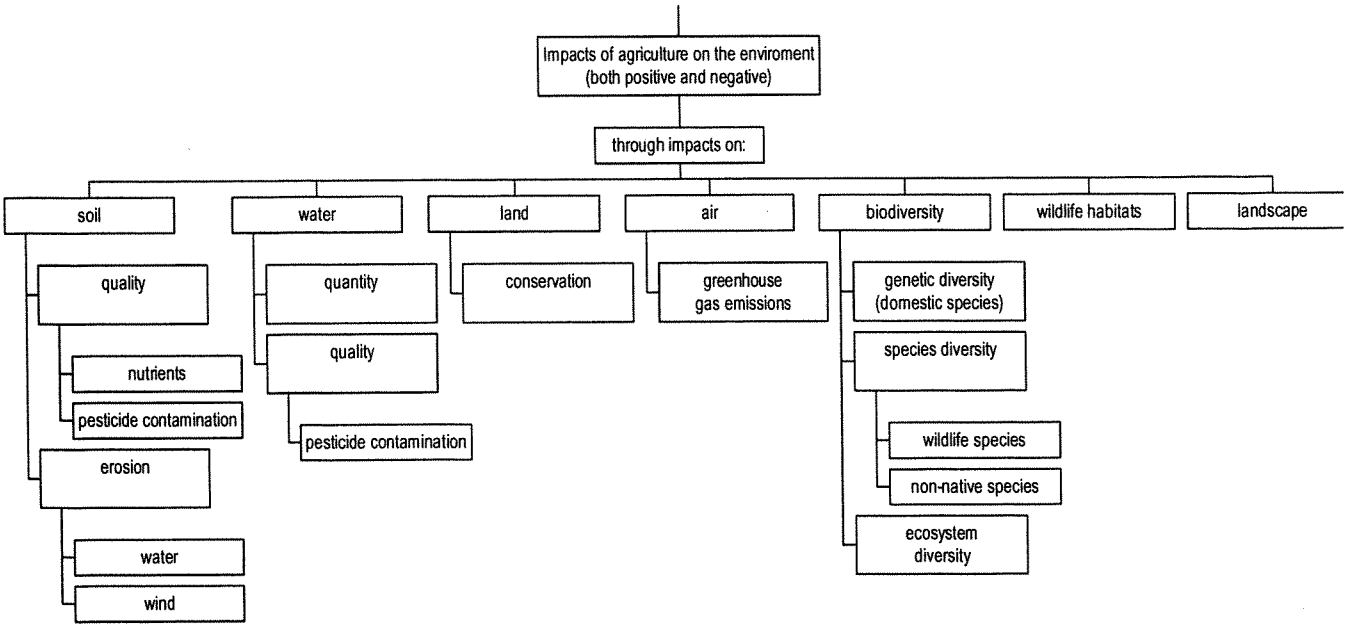


Figure 6. Consolidation of the 'impacts of agriculture on the environment' component tree through removal of inconsistencies and overlaps.

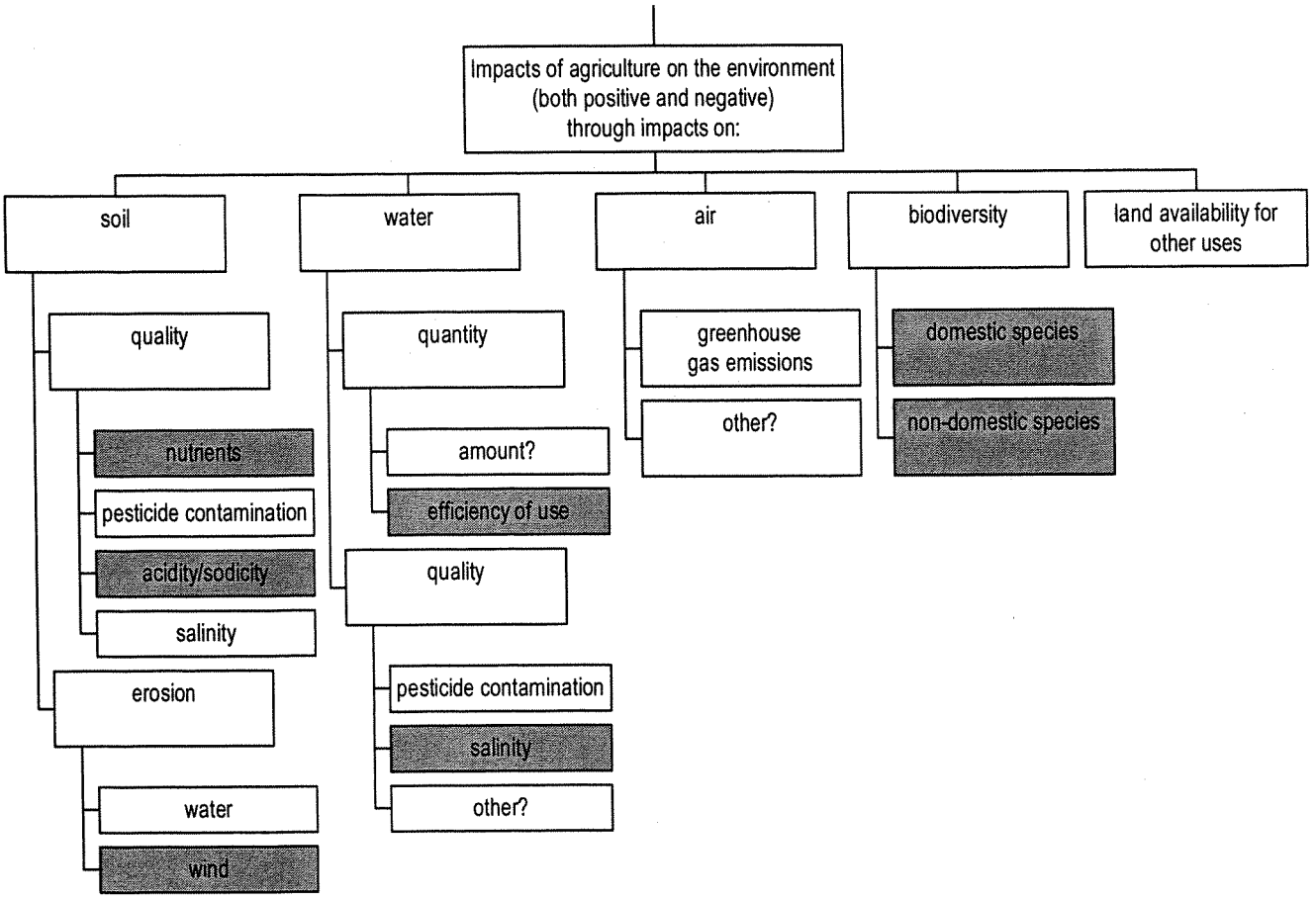


Figure 7. Suggested component tree after further simplification and some additions. Shading indicates sub-components addressed in Australia's set of sustainable agriculture indicators (Standing Committee on Agriculture and Resource Management 1998).

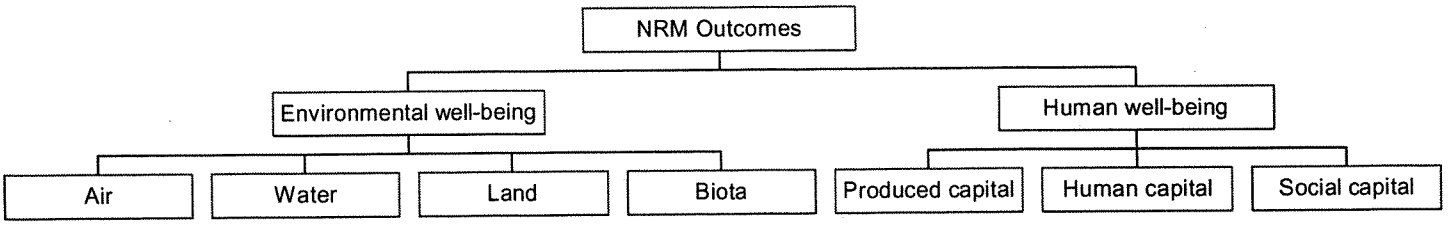


Figure 8. An initial attempt at developing a structured set of natural resource management outcomes for which objectives can be specified.

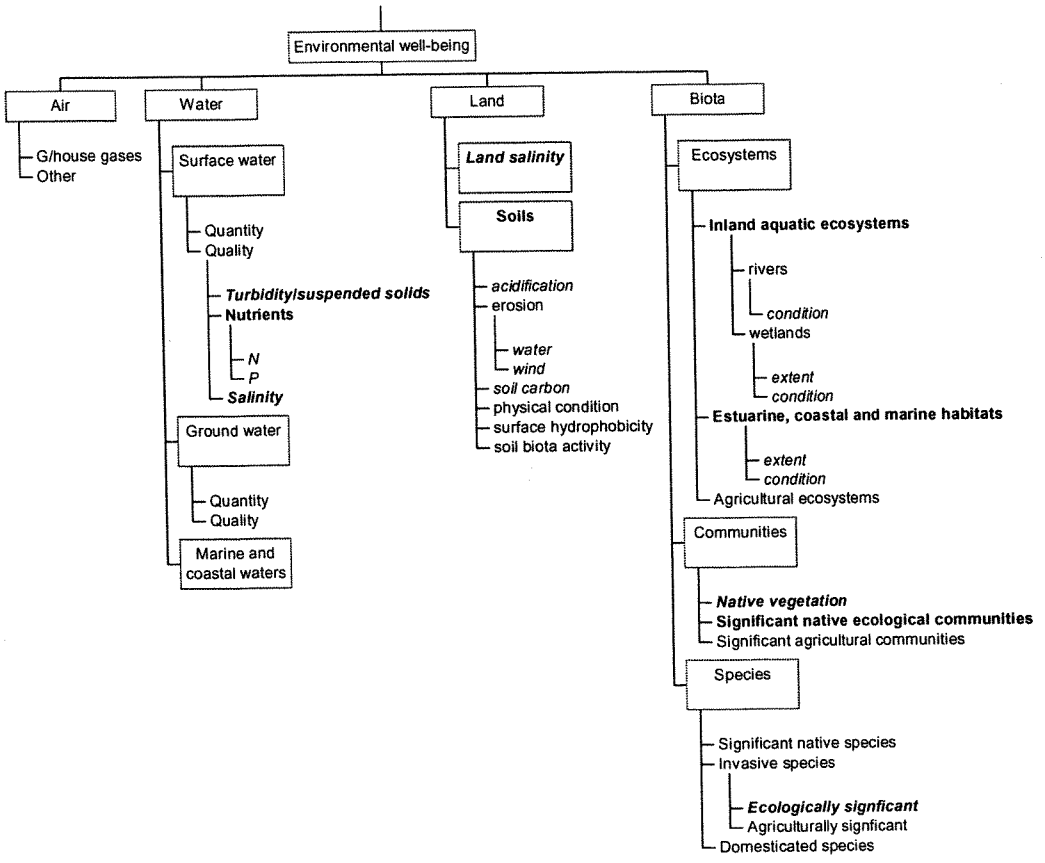


Figure 9. Expanded version of the 'contributions to environmental well-being' component tree showing components for which targets must be specified (bold) and components with recommended indicators (italics).

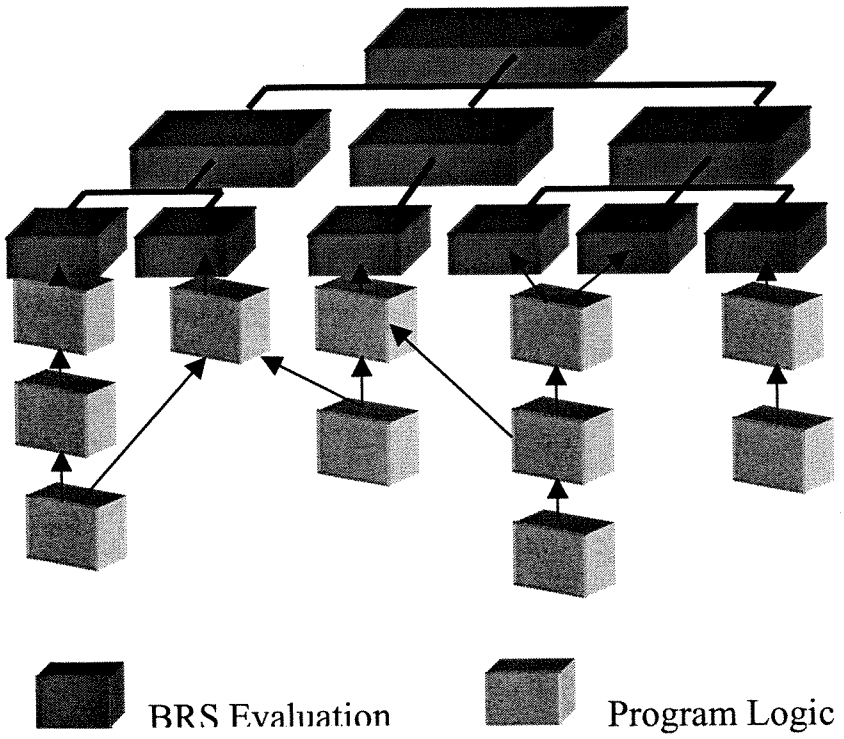


Figure 10. The relationship between the BRS Evaluation Framework which disaggregates complex objectives into measurable operational objectives and Program Logic that links ends with means.

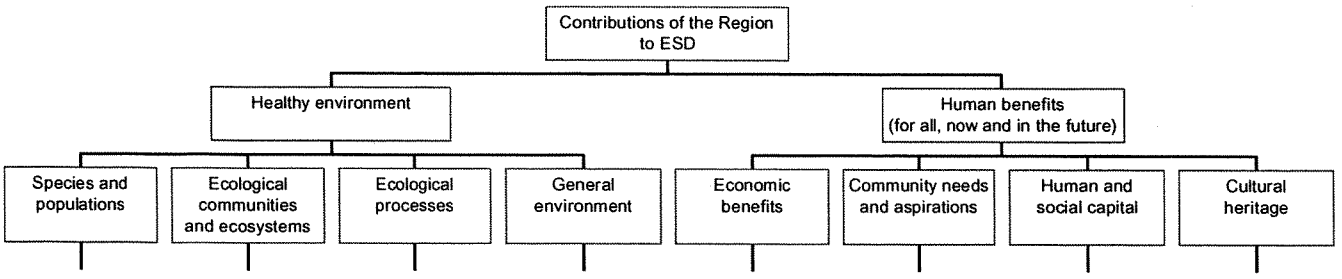
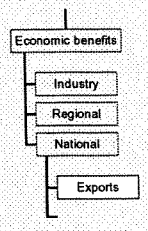
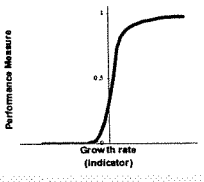


Figure 11. High-level components of a hypothetical performance monitoring scheme for a regional plan.

(a)



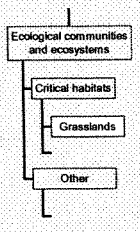


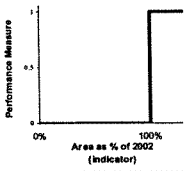
Objective: Maintain or increase the contribution of the region to Australia's export income

Indicator: Annual growth in export income from region's industries

Performance Measure: Small negative growth rates assigned low, but non-zero performance; large positive growth rates preferred

(b)



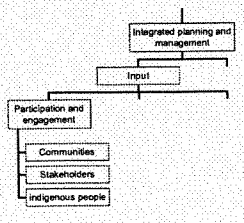


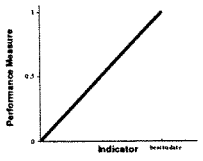
Objective: No reduction in the area of native grassland relative to 2002

Indicator: Area of native as percentage of area in 2002

Performance Measure: Indicator should not be less than 100%

(c)





Objective: Increased participation by Indigenous people in regional planning and management

Indicator: Proportion of advisory/decision-making bodies with Indigenous representation

Performance Measure: Indicator should increase over time; assign '1' to best performance to date and score current performance relative to it

Figure 12. Selected detail of a hypothetical performance monitoring scheme for a regional plan showing position of the component in the structure and a suggested objective, indicator and performance measure: (a) Exports, (b) Grasslands, and (c) Participation and engagement of Indigenous people.

Table 1. Report headings used for each terminal component in the National ESD Reporting Framework for Australian Fisheries.

1. Operational objective
2. Indicator
3. Performance measure
4. Data requirements and data availability
5. Evaluation (values of indicator and performance measure over time)
6. Robustness
7. Management Response
   - Current
   - Future
   - Actions to be taken if outside range acceptable performance
8. Comments and action
9. External drivers

Table 2. OECD Agri-Environmental Indicators (OECD 2001)

Indicators are shown in italics.

I. Agriculture in the broader economic, social and environmental context

1. Contextual information and indicators

Agricultural GDP
Agricultural output
Farm employment
Farmer age/gender distribution
Farmer education
Number of farms
Agricultural support
Land use
Stock of agricultural land
Change in agricultural land use
Agricultural land use

2. Farm financial resources

Farm income
Agri-environmental expenditure
Public and private agri-environmental expenditure
Expenditure on agri-environmental research

II. Farm management and the environment

1. Farm management

Whole farm management
Environmental whole farm management plans
Organic farming
Nutrient management
Nutrient management plans
Soil tests
Pest management
Use of non-chemical pest control methods
Use of integrated pest management
Soil and land management
Soil cover
Land management practices
Irrigation and water management
Irrigation technology

III. Use of farm inputs and natural resources

1. Nutrient use

Nutrient balance
Nitrogen efficiency

2. Pesticide use and risks

Pesticide use indicator
Pesticide risk indicators

3. Water use

Water use intensity
Water use efficiency
Water use technical efficiency
Water use economic efficiency
Water stress

IV. Environmental impacts of agriculture

1. **Soil quality**
   - *Risk of soil erosion by water*
   - *Risk of soil erosion by wind*
2. **Water quality**
   - *Water quality risk indicator*
   - *Water quality state indicator*
3. **Land conservation**
   - *Water retaining capacity*
   - *Off-farm sediment flow*
4. **Greenhouse gases**
   - *Gross agricultural greenhouse gas emissions*
5. **Biodiversity**
   - *Genetic diversity*
   - Species diversity
     - *Wild species*
     - *Non-native species*
   - *Ecosystem diversity*
6. **Wildlife habitats**
   - *Intensively farmed agricultural habitats*
   - *Semi-natural agricultural habitats*
   - *Uncultivated natural habitats*
   - *Habitat matrix*
7. **Landscape**
   - The structure of landscape
     - *Environmental features and land use patterns*
     - *Man-made objects*
   - *Landscape management*
   - *Landscape costs and benefits*