Submission to:

House of Representatives
Standing Committee on
Environment and Heritage

Inquiry into Catchment Management

Prepared by:

The River Basin Management Society

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SUMMARY

History of Catchment Management in Australia

- The development of integrated catchment management in Australia has been primarily conducted at the State level.
- It has been done mainly through the devolution of responsibility to lower organisational levels (through some form of catchment management board, authority or committee with community input).
- The Federal input, coordination and responsibility for this has been minimal.
- Integrated catchment management has mainly been focussed on rural areas, with urban communities slower to adopt the ideas.

Value of a catchment approach

- The value of a catchment approach to management lies in an understanding of the interaction between all different components of the environment.
- A catchment approach to management provides a logical spatial basis for integrating the ideas, objectives, problems and solutions of different stakeholders into a single management framework. This results in more efficient planning and implementation, where conflicts are resolved early in the process, and problems with similar solutions are tackled without duplication of effort.
- Resources expended on integrated catchment management are a significant investment in the future of Australia. The future health and wealth of the nation depend on sustainable productivity, good water quality and biodiversity conservation, and integrated catchment management is the most effective way to deliver these outcomes.

Best Practice Methods

- Numerous documents outline various best practice methods at the technical level.
- There are no standard accepted best practices for managing the process of achieving integrated catchment management.
- Many successful cases have the similarity that they mesh both the “top down” (direction from above) and the “bottom up” (decision by the stakeholders) approaches.
- Effective communication between stakeholders is one of the most essential components in successful integrated catchment management.
- Numerous examples of good communication processes are available.

Role of different levels

- The Federal government should be responsible for setting strategic directions and standards in catchment management, facilitating cooperation and information exchange between the States, providing financial assistance and auditing performance.
- The State government should be responsible for developing the appropriate institutional arrangements for the delivery of catchment management, educating and fostering support from different stakeholders, objectively identifying and supporting priority geographical areas, and establishing and monitoring standards for on-ground works.

- Local government, Catchment Management Authorities (or equivalent local State-based group), the Private Sector and the Community should all be involved in the development and implementation of local management plans, and collecting and reporting data on progress.

Planning, Resourcing, Implementation, Coordination and Cooperation

- Better and more effective catchment management administration should have the goal of securing more resources being available for on-ground works.
- More resources are required in priority catchment management areas, not less.
- Frequent changes in the direction and structure in catchment management bodies potentially places stress on the planning and management framework, and attention needs to be focussed on catchment management outcomes.
- Rationalising different river-related management programs from different Departments may not be the solution to better integrating those programs. This may unintentionally cause similar problems with the integration of river management programs with land management programs.
- A process solution (rather than a structural solution) needs to be found to coordination funding, approaches and information flow between various river-related programs.
- A better solution may be to establish a body such as a "Catchment Coordinating Commission" to oversee the coordination and integration of programs. The Murray-Darling Basin Commission Ministerial Council could be used as a model for this group.

Mechanisms for Monitoring, Evaluating and Reporting

- Monitoring and reporting is a vital aspect of catchment management and should be given a high priority.
- The timely analysis of reporting is essential for adaptive management.
- Monitoring indicators for catchment management fall into one of three different types – program activity (effectiveness of the process), output (a measure of activity) and outcome (measures of goal attainment) indicators.
- All three measures are important in evaluating catchment management in Australia.
- There are still a number of gaps in monitoring and reporting. The reasons for this are complex, but mainly involve difficulties in scale, time, design and inadequate objective setting.
- Monitoring needs to be supported by research that investigate the ability of management mechanisms to solve particular problems.
- Numerous States are developing monitoring programs, including the Index of Stream Condition and Catchment Management Indicators in Victoria.
- The challenge for national State of the Environment Reporting is to develop indicators that can draw data from the variety of State-based reporting systems without the need for duplication of effort.
- Possibly a greater challenge is the development of storage and retrieval systems that can link results to determine and recommend the best approaches that delivers the greatest outcome in the most effective and efficient manner.

Term of reference 1

The Development of Catchment Management in Australia

> *Integrated catchment management has two popular connotations: the older concept is basically concerned with water management and is the integration of the management of water supplies and water uses from various structures within a catchment …. The more commonly accepted connotation today however, is the integration of water and land management activities and of government agencies involved in these activities within a catchment*[1]

1.1 In general, the development of catchment management in Australia has reflected the change from a view of the catchment as a water source or drainage system (with other land activities, such as agriculture, seen as separate activities) to one recognising the close interconnections between land and water management.

1.2 This change has been gradually implemented in an institutional sense at the State level throughout Australia. Almost invariably, the development of catchment management has been through a process moving from a disparate group of government agencies, all with different responsibilities (water, forest, land) and functions (regulation, planning) to a more integrated framework. This has been achieved through different methods in different states (see Attachment 1), but has seen the gradual amalgamation of agencies with catchment responsibilities. For example, over the last 15 years in Victoria, the Fisheries and Wildlife Department merged with the Soil Conservation Authority, was then joined with the Forest Department, and then amalgamated with the Minerals, Energy and Agriculture Departments to form the current Department of Natural Resources and Environment. Most States now have departments where the functions of land and water resource management are amalgamated.

1.3 At the same time, the roles of local authorities were also changing, beginning with water authorities responsible for supply and separate river authorities responsible for flood control and stabilisation works, with regional State department centres responsible for on-ground service delivery. Integration at the regional level has not so much been through amalgamation, but through the development of new bodies to oversee catchment management. Examples of these are the Catchment Management Committees in NSW, the Catchment and Water Management Boards in SA, and the Catchment Management Authorities in Victoria. While the composition and specific responsibilities of these may differ between states, the overall aim is the same – to produce regional plans that integrate catchment management activities at the local level.

1.4 Hence, over time, more and more of the responsibility for catchment management has been devolved to the catchment level.

[1] Laut, P. and Taplin, B.J. (undated) Catchment Management in Australia in the 1980's. CSIRO Division of Water Resources. p. 8.

1.5 The devolution of planning to a regional scale has mainly been concentrated in rural areas. It was recognised fairly early that rural livelihoods depended on the successful integration of catchment management. Hence, rural communities are generally better versed in the need for integrated catchment management (although this is not universal throughout Australia). Urban centres, often removed from the sites where catchment management is important (e.g. water supply catchments, sources of fresh produce) have been slower to take up the idea. Not so long ago, it was standard practice for local councils to wash street debris into storm water drains, flushing litter and pollution into the local rivers and streams. Such practices are becoming less prevalent, but there is still a long way to go in urban areas. Education and changes in public and institutional attitudes are still required.

1.6 Throughout this process, coordination and planning at the Federal level seems to have lagged behind progress at the State and local level. There has been, in the main, a lack of coordination between agencies at the national level, and a lack of direction given to lower government and community levels to ensure a consistent and effective approach to catchment management. The different approaches adopted by different states can be seen as an indication of the lack of direction from the Federal level.

1.7 There have been some attempts at the Federal level to provide guidance in integrated catchment management. The National Conservation Strategy of Australia sought "an integrated whole of catchment approach to the management of water and related land resources"[2], echoed in the National Strategy for the Conservation of Australia's Biological Diversity[3], and the COAG water reform agenda clearly ties environmental values to the provision of water resources[4].

1.8 However, the Intergovernmental Agreement on the Environment clearly indicates that "Each State has responsibility for the policy, legislative and administrative framework within which living and non-living resources are managed within the State"[5], whereas the Commonwealth has only responsibilities for its own land, foreign policy, ensuring state-based policies and practices do not adversely affect other states, and facilitating the development of national standards. Such agreements do not appear to facilitate or encourage cooperation and integration or a coordination role at the Federal level.

[2] Cited in Carbon, B. (1988) Integrated Catchment Management – The Challenge Begins. Working Papers for the National Workshop on Integrated Catchment Management. Held at the University of Melbourne, 17-19 May 1988. p. 22.

[3] Commonwealth of Australia (1996) The National Strategy for the Conservation of Australia's Biological Diversity. Department of Environment, Sport and Territories, Canberra.

[4] ARMCANZ and ANZECC (1996) National principles for the Provision of Water for Ecosystems. *Occasional Paper SWR No. 3.* Sustainable Land and Water Resources Management Committee.

[5] Intergovernmental Agreement on the Environment (1992) Section 2.3.2. p. 7.

Term of reference 2

The Value of a Catchment Approach to the Management of the Environment

There is an inevitable interaction between land, land-based resources and their surrounding environment which provides the rationale for an integrated approach to catchment management[6]

2.1 The value of a catchment approach to environmental management is that it is based on an understanding of the importance of interactions between natural resources, the land on or under which they occur and the surrounding environment.

2.2 Significant environmental and economic issues include erosion, soil salinisation, pest plants and animals, declining water quality, and the loss of biodiversity. In many instances in the past, these have been dealt with as individual issues, with planning and management targeted only at the particular issue. This was reinforced by the large number of agencies responsible for different aspects of catchment management and a lack of coordination between them. Added to this, there was often limited technical understanding of the cause and effect relationship between natural resource development and the environment.

2.3 However, these are not separate issues, but are intimately connected. Most problems within a catchment that have an effect on a number of different environmental or economic values have a number of causes. For example, the blue-green algal bloom that affected almost 1000km of the Barwon-Darling River in 1991 was attributed to very low flow conditions, high total phosphorous concentrations, warm water temperatures, elevated pH and reduced turbidity. These were attributed to many causes, including high levels of water diversion, catchment farming practices, even excretion by high carp populations[7]. The interaction between low populations of native fish and zooplankton (which may eat blue-green algae) may also be involved. Hence, the issue of blue-green algae blooms can be more effectively dealt with by a single integrated program including water resource, agriculture, fisheries and conservation agencies.

2.4 Additionally, the activities of one agency could inadvertently counteract or create problems that would need to be addressed by other agencies. For example, construction of a dam (water agency) can cause passage problems for endangered migratory fish species (conservation agency). There are numerous

[6] Burton, J.R. (1988) The Environmental Rationale for Integrated Catchment Management. Working Papers for the National Workshop on Integrated Catchment Management. Held at the University of Melbourne, 17-19 May 1988. p. 40.

[7] From Boulton, A.J. and Brock, M.A. (1999) Australian Freshwater Ecology: Processes and Management. Gleneagles Publishing, South Australia.

past examples where resource development has continued without the full examination on other values.

2.5 Today, it is commonly accepted that catchment management should be a holistic activity, that is, it should involve consideration of all aspects of the physical and socio-economic environments which impinge on the catchment and its use[8].

2.6 Hence, rather than a series of management bodies attempting to achieve a series of different, and perhaps conflicting, objectives, integrated catchment management attempts to synthesise all the ideas and solutions into a single management framework. This results in more efficient planning and implementation, where conflicts are resolved early in the process, and problems with similar solutions are tackled without duplication of effort.

[8] Laut, P. and Taplin, B.J. (undated) Catchment Management in Australia in the 1980's. CSIRO Division of Water Resources.

Term of reference 3

Best Practice Methods of Preventing, Halting and Reversing Environmental Degradation in Catchments, and Achieving Environmental Sustainability

> *It* … [integrated catchment management] … *must also be recognised as a cooperative activity depending upon the coordinated participation of a variety of government agencies, all levels of government, and the willing involvement of both public and private landholders*[9]

3.1 It is not possible in a submission of this kind to detail "best practice" methods at a technical level for integrated catchment management. There are numerous technical documents outlining the various types of catchment management activities used to address environmental degradation in catchments. These range from manuals on river stabilisation works, to rehabilitation of riparian vegetation techniques, through to farming practices[10].

3.2 Rather, a number of cases where the management of the process of catchment management has been successful at a range of geographic scales are outlined below. In general, these all have the characteristic that they mesh both the "top down" (direction from above) and the "bottom up" (decision by the stakeholders) approach to integrated catchment management. These are by no means the only successful models for integrating catchment management, but all display examples of the level of integration appropriate for the scale of the issues.

3.3 At the national scale, The *Murray-Darling Basin Commission* integrates and coordinates actions across a number of States over a catchment area covering more than a million square kilometres. This is achieved at a high level through the Murray-Darling Ministerial Council which includes land, water and environment ministers from the various governments in the basin. A Community Advisory Committee provides a channel for communication between the Council and the community. The main integrated management program is the Murray-Darling Basin Initiative, integrating the Natural Resources Management Strategy, the Salinity and Drainage Strategy and the Algal Management Strategy. At a lower level, a Riverine Issues Working Group (composed of State and Commonwealth officers) reviews the operation of the Murray-Darling 2001 program (see section 5.6) to ensure integration between different programs.

3.4 At a large catchment scale, the *Hawkesbury-Nepean Catchment Management Trust* facilitates a coordinated approach to planning throughout the Hawkesbury-Nepean catchment. The Hawkesbury-Nepean and its tributaries flow through a variety of landscapes. Each area has particular resource

[9] Burton, J.R. (1988) *op. cit.* p. 45.
[10] The RBMS can supply a list of appropriate guidelines and practices to the committee if required.

management issues, reflecting the geography, ecology and human activities in the area. Nine Catchment Management Committees (CMC's – see Attachment 1) have been established by the Trust to address these issues effectively at a local level. The Trust works in partnership with individuals and organisations across the catchment including councils, residents, farmers, tourism operators, industry, community groups, State and Federal Government authorities, environment groups and sporting clubs. The Trust also employs a specialist team to provide assistance to community based groups, including local government, and to work closely with government agencies and businesses who directly or indirectly affect the health of the river system and its catchment[11].

3.5 At a smaller catchment scale, the *Lake Macquarie Catchment Management Committee* integrates actions associated with Lake Macquarie. The committee consists of community representatives, Lake Macquarie City councillors and representatives of the Hunter Water Corporation, the NSW Environment Protection Authority, the State Department of Urban Affairs and Planning and Wyong Shire. Issues relating to the management of natural resources in the Lake Macquarie catchment are investigated through specialist Task Groups in five broad areas of concern (Erosion and Sediment Control, Ecosystems and Biodiversity, Waterways, Landuse Planning and Development and Community Awareness and Education). Annual grants are made available for small environmental improvement projects and the Committee supports NHT bids[12].

3.6 Issues within an urban catchment can also be integrated. Responsibility for urban drainage in Melbourne is shared between local government and Melbourne Water Corporation with municipalities responsible for local drainage systems and Melbourne Water responsible for main drains and waterways. A partnership between EPA, Melbourne Water and local government has developed the *Melbourne Water Stormwater Management Agreement* to improve the environmental management of stormwater. It establishes agreed goals for stormwater management and defines the roles and responsibilities of the parties in working towards those goals. Best Practice Environmental Management Guidelines (BPEMG) including performance objectives have been published and the framework includes financial incentives for improved performance[13].

3.7 All of these examples have their roots in effective communication between the various stakeholders. We believe that communication is one of the most essential components in successful integrated catchment management. This is not only important during the development of any particular catchment management plan, but also across the wider field. There are many examples of good communication processes that have, or are being conducted:

- Conferences that combine research and management themes such as the Second Integrated Catchment Management Conference (Canberra,

[11] From web site http://www.hncmt.nsw.gov.au/main.html accessed 29 July 1999.
[12] From web site http://www.users.hunterlink.net.au/ accessed 29 July 1999.
[13] Information from Chris Chesterfield, Waterways and Drainage, Melbourne Water Corporation.

October 1997)[14] and the Second Australian Stream Management Conference (Adelaide, February 1999);

- Forums for industry groups, like those conducted by the Cooperative Research Centre for Catchment Hydrology;
- Demonstration sites where local landholders can see on-ground works and results of river management;
- Professional societies like the River Basin Management Society are in a unique position to link members from different management and science backgrounds in a single forum. Regular conferences and seminars are conducted where information can flow between members;
- Web pages and Discussion groups facilitate rapid dissemination of information. E-mail discussion groups such as ICM-L (icm-l@vicnet.net.au) have provided one conduit for information exchange across the world. Specifically targeted at integrated catchment management issues, ICM-L has members from 20 countries with about 40% of members from Australia. The list is managed by the River Basin Management Society;
- Education that is targeted at the appropriate level for the audience. Communication must be in the appropriate language to be understood. There are many examples of field days or training courses being conducted that address specific issues with groups of land managers on site. This would seem to be preferable to widely distributed leaflets and pamphlets often written in terms incomprehensible to a majority of the target audience.

[14] A copy of these proceedings on CD-ROM is available from the River Basin Management Society.

Term of reference 4

The Role of Different Levels of Government, the Private Sector and the Community in the Management of Catchment Areas

> Integrated catchment management … *may be applied to different levels of analysis: normative, strategic and operational. At the normative level, attention is directed to decisions as to what ought to be done. At the strategic level, interest shifts to what can be done, whereas at the operational level the concern is with what will be done*[15]

4.1 There is no simple model that can clearly delineate the roles of various levels within a Catchment Management framework. As the main intent is an integrated approach to planning and management, there must be, at least in part, an integration between the roles at various levels.

4.2 However, there are fairly clear indications as to where different levels operate best within the normative, strategic and operational catchment management framework. These are based on the likely location of the various planning, technical and operational skills. To achieve the most efficient and effective management framework, different levels should be concentrating on the tasks that they do best, or are best equipped and resourced to do.

4.3 **Federal Government**. At a national level, the ability of Federal Government agencies to plan catchment management at the strategic and operational scale across a diverse landscape is limited. Hence, the main role of the Federal Government should in the normative area, deciding "what ought to be done". Hence, the main Federal roles should be concentrating on:

- establishing strategic direction for catchment management (as in the LWRRDC and MDBC research priorities);
- setting appropriate standards and performance measures for catchment management activities;
- fostering cooperation between states and facilitate the information flow between states (as a central database or information dissemination agency);
- coordinating research and investigations into new tools in ICM;
- continue to provide a major source of financial resources tied to catchment management activities;
- produce educational material on approaches and processes;
- audit performance of lower levels.

4.4 Institutional arrangements to achieve these roles can be difficult to establish. While a single Federal body with the scope to cover all catchment management issues could be efficient, there is a risk of isolation from other areas of

[15] Mitchell, B. (1990) Integrated Water Management. In: Mitchell, B. (Ed.) *Integrated Water Management*. Belhaven Press, London p. 2.

government and activities. Policy and planning expertise in the many fields involved in catchment management will lie in different parts of a central government and the challenge is for a central coordination agency to integrate these different sources.

4.5 An rather apt analogy of the role of the Federal Government is that of a superannuation fund manager. While there is a single source of funds, the fund manager distributes it among a number of different "investment" sources (States, private sector, community etc). Each source has different degrees of risk associated with it (the chance of a high return) and a different time scale associated with it. Some investments are for the long-term, only showing good results after a considerable lag period, other investments can show rapid results, and can be used to quickly demonstrate the effectiveness of the investment. It is up to the funds manager to decide where the funds are invested, but the actual returns are generated by activities of the institutions that receive the investment (i.e. the on-ground catchment management)

4.6 **State Government**. Only at the State level is it possible to get a reasonable overview of the catchment issues at that scale. The States should therefore be setting the key strategies ("what can be done") and priorities for that state ("where it should be done"), based on objectively identified needs of catchment management. It is here that the majority of technical expertise to deal with catchment management issues resides, so the role of the State is to:

- develop appropriate institutional arrangements to deliver integrated catchment management (tested against the national standards);
- educate and foster support of local government, the private sector and the community in the importance of integrated catchment management;
- select geographical areas for priority attention;
- distribute funding according to priorities;
- establish and audit standards and performance criteria for on-ground works.

4.7 **Local Government**. The main catchment management responsibilities of Local Government lies in their land use planning and drainage management roles. While these are important to overall catchment management, the boundaries of local councils often do not correspond to catchment areas, so planning is not necessarily integrated or consistent over the catchment. Additionally, councils are concerned with many other activities not related to catchment management, so it is often not seen as a priority area. Hence, the main role of local government should be to integrate their catchment management functions with a local catchment management authority.

4.8 **Catchment Management Authorities**. The majority of states have bodies that oversee or coordinate activities and planning within a catchment (see Attachment 1). This is the area where the operational skills lie ("what will be done"). Hence, they have the role to:

- develop local management plans including specific on-ground works (tested against state-based standards). This must be in coordination and cooperation with local government, the private sector and local community;
- implement (with local government, the private sector and the community) management plans;
- collect monitoring and reporting data.

4.9 **Private Sector and the Community**. Above almost all, the community and the private sector have a key role to play in catchment management in a number of areas. In particular, local landholders and users are the ultimate catchment managers. These groups must be fully informed about the impact of their catchment activities on the wider ecosystem, and see themselves as part of a catchment, rather than a single entity within it. Armed with such knowledge, they then have a key role in the development of local management plans with the appropriate catchment management authority and have a key role in the implementation of the plan.

Term of reference 5

Planning, Resourcing, Implementation, Coordination and Cooperation in Catchment Management

> *A comprehensive resource management policy would be concerned with using the land in the system within its capability, with maintaining environmental quality and preserving significant environmental values, and with maintaining the overall productivity of the natural resources within the system at an optimal level and on a sustained-yield, long term basis*[16]

5.1 The Federal Government should recognise that resources expended on integrated catchment management are a significant investment in the future of Australia. Both the future health and wealth of the nation depend on sustainable productivity, good water quality and biodiversity conservation. Integrated catchment management is the most effective way to deliver these outcomes.

5.2 More efficient catchment management administration should have the goal of securing more resources for on-ground works. It should not be seen as a way simply to reduce overall government expenditure. More resources are required in priority catchment management areas, not less. Any change to the current structure of planning, resourcing, implementation, coordination and cooperation in catchment management should be adopted with this goal in mind.

5.3 The devolution of significant areas of responsibility from central government to local catchment management bodies and the community means that planning at the government level needs to be well thought out. There are no simple answers to how this can be achieved. Unfortunately, political standpoints and directions regularly go through rapid change, often leading to dismantling of prior structures to be replaced by a perceived "better way". Recent changes, such as corporatisation and privatisation, potentially place great stress on the planning and management framework, and attention needs to be given to the overall outcome of the change.

5.4 One of the Recommendations of the Committee's review of the Department of Environment's annual report (1997-1998) was that a review of programs addressing inland rivers and waterways be undertaken to consider "rationalisation of current rivers and waterway programs into a single river health strategy."[17]. While much of this submission deals with general issues associated with integrated catchment management, we would like to comment on this issue specifically.

5.5 The Committee's recommendation would seem to arise from the observation that "At the public hearing, the committee sought to understand how the various

[16] Burton, J.R. (1988) *op. cit.* p. 45.
[17] Review of the Department of the Environment Annual Report for 1997-1998. p. xi.

river programs, and other programs such as those run by the Murray-Darling Basin Commission, are integrated. However, the committee was not provided with a clear answer."[18]. It is not sure whether the lack of a clear answer to the question means that the programs are not actually well integrated, or whether the lack of integration is just perceived. The review does not identify specific deficiencies with the coordination between the individual components of various programs.

5.6 It is difficult to see where the boundaries of the various programs could be drawn to establish a single river health strategy. A number of programs outside the direct control of the Department of the Environment and Heritage appear to be aimed specifically at river health.

- The Sustainable Management of Rivers and Water Resources Program is run by the Land and Water Research and Development Corporation (LWRRDC) within the Department of Primary Industries and Energy (DPIE). However, sub-components of this include the Sustainable Use of Groundwater Program and the Sustainable Irrigation Program which presumably would not automatically be included in a rationalised River Health Strategy. The Minimising the Riverine Environmental Impact of Pesticides program would seem to be a contender for inclusion, but would mean moving a program co-supported by the Cotton Industry Research and Development Corporation.
- LWRRDC also has a Sustaining Vegetation in the Landscape Program which includes a Riparian Lands Program. While not obviously river based, it is a key program that impacts on river health and would be seen as a river health issue, but shifting the program would divorce it from other important vegetation initiatives.
- Within the Department of Agriculture, Fisheries and Forestry, the Murray-Darling 2001 program has a number of components related to river health, but many that would not be suitable to rationalise into a single River Health Program. It is interesting to note that the MD2001 program is ".. administered by Agriculture, Fisheries and Forestry – Australia (AFFA) as part of the National Heritage Trust"[19], and the web-site for the NHT states that "The NHT is jointly administered by Environment Australia and Agriculture, Fisheries and Forestry Australia"[20], suggesting a large degree of coordination and cooperation already exists.

5.7 The problem of a lack of integration (real or perceived) is never generally solved through restructure and reorganisation. It is quite likely that if a single River Health program were created, a review of the annual report the following year would highlight the lack of integration (real or perceived) between that program and other programs dealing with land use operated by other departments. There is no single structural model that will effectively integrate programs across a wide range of responsibilities. What is really needed is an

[18] Review of the Department of the Environment Annual Report for 1997-1998. Section 2.16, p. 8.
[19] From web-site http://www.affa.gov.au/dpie/nht/mdb-summary.html accessed 22 July 1999.
[20] From web-site http://www.nht.gov.au/index.html accessed 22 July 1999.

effective process for integration, where there is a free flow of information, ideas and resources targeted at the highest priority areas. This would mean a process-based solution rather than a structure-based solution should be the subject of any inquiry.

5.8 A process-based alternative is to establish a body such as a "Catchment Coordinating Commission" or "Ministerial Council" with government, industry, authority and academic membership, with the role to oversee coordination of funding, approaches and information flow. The role of the MDBC Ministerial Council could be used as a model for this group.

5.9 Numerous problems exist at the level of implementation, cooperation and coordination, where ultimately the success or failure of integrated catchment management will lie. An analysis of integrated catchment management in Australia and Canada suggests that the requirements for ICM "must be based on a careful analysis of the need and scope for integration in a given context, the significance of leadership, information access, and the links with other planning and management activities."[21]. Again, there is probably no single solution to these problems. While appropriate standards and performance measures for catchment management activities should be developed, the attainment of those standards may be through many different means. The answer lies within the workings of the particular process adopted in each individual case.

[21] Taken from a paper to be published in September in the *Journal of Environmental Planning and Management* by Bruce Hooper and Geoffry McDonald of the University of Queensland, and Bruce Mitchell of the University of Waterloo in Canada. The Committee is strongly encouraged to obtain a copy of the paper (available from Bruce Hooper at e-mail: B.Hooper@mailbox.uq.edu.au) for a detailed analysis of this topic.

Term of reference 6

Mechanisms for Monitoring, Evaluating and Reporting on Catchment Management Programs, Including the Use of these Reports for State of the Environment Reporting, and Opportunities for Review and Improvement

6.1 Monitoring and reporting is a vital aspect of catchment management and should be given a high priority. It is required to report on the condition of the environment, to highlight issues that require management, to assist in determining priority areas for action, and to evaluate management programs. In order for management to be adaptive, there is a fundamental need to gather information on past programs.

6.2 "Adaptive management" is where continual improvements in performance are based on the success or failure of approaches tried in previous efforts. Without information on the outcomes of a number of catchment management projects, it is hard to identify improved management activities based on previous experience. This inevitably leads to the same mistakes being repeated.

6.3 Monitoring indicators for catchment management fall into one of three different types – Program Activity, Output and Outcome indicators.

6.4 Program Activity indicators are those that measure the effectiveness of the processes and plans to meet objectives. For example, a plan to reduce turbidity in a rural catchment can have indicators such as participation (number of people or groups involved), numbers of meetings with full attendance, financial audits, and management effort[22]. These indicators are probably the most poorly developed in catchment management, as many intangible factors often lead to the efficient running of a project (e.g. the quality of the leader chosen for the project, the enthusiasm of the stakeholders, level of commitment).

6.5 Output indicators are those that measure the results of the activity, but do not measure the achievement of the ultimate project goals. For example, the number of kilometres, or the proportion of stream length fenced and revegetated is one suitable output measure of the plan to reduced water turbidity in a rural catchment. However, it does not measure the actual change in turbidity. Output indicators are the most easily measured indicator as they represent the immediate visible change of management and can be directly linked to the works program.

6.6 Outcome indicators are those that actually measure the end-point goals of catchment management and are determined by the specific program. This includes the physical, chemical and biological condition of the river being

[22] Management Effort is a composite of management indicators suggested in Fairweather, P. and Napier, G. (1998) *Environmental Indicators for National State of the Environment Reporting – Inland Waters*. Department of the Environment, Canberra. Indicator 7.2, p. 55.

managed. In the rural catchment turbidity example, the key outcome indicator would be the reduction in turbidity in the water. These can be very difficult to determine (see Section 6.8 below)

6.7 All three measures are important in evaluating catchment management in Australia. They allow comparisons between projects with the same goals so that the most effective processes and methods can be refined in future projects.

6.8 However, there are still a number of gaps in devising and implementing mechanisms for monitoring and reporting. The reasons for this are complex, but mainly involve:

- Scale: Management operates on a number of scales, with different purposes. Large scale condition monitoring (e.g. Statewide) do not provide managers with all the necessary information when planning and evaluating management programs.
- Time: Assessing the effectiveness of catchment activities is a difficult task. There is a view that the effectiveness of catchment strategies can be assessed by analysing temporal trends through time series analysis. For example, a significant decline in the median phosphorus concentration over several years may be viewed as a sign of successful catchment management. The existence of a trend actually provides little information to managers on the effectiveness of catchment management unless the cause of the trend can be identified. Observing changes that have taken place will only enable inferences to be made.
- Design: Designing a monitoring program to adequately assess the effectiveness of catchment activities (such as a BACI[23] design) are difficult to apply to large scales over which many catchment plans operate.
- Objectives: Management outcome objectives are often vague and poorly expressed ("we want the condition to be better"). Without clear monitoring objectives and targets selected prior to the collection of data, it is difficult to design efficient monitoring and reporting programs.

6.9 There is a need to complement the monitoring of plans with research type projects that investigate the ability of management mechanisms to solve particular problems (e.g. the ability of buffer strips to reduce nutrient loads, improvements in river health due to rehabilitation of the riparian zone).

6.10 Given that the States have responsibility for the "policy, legislative and administrative framework within which living and non-living resources are managed within the State"[24], it seems logical that the States have responsibility for developing monitoring and reporting frameworks for those policies. Numerous States are developing monitoring programs. Examples from Victoria are given below.

[23] BACI refers to Before-After-Impact-Control where monitoring also occurs prior to management intervention, and at places where intervention does not take place for comparison. It is the vest scientific way to detect trends.

[24] Intergovernmental Agreement on the Environment (1992) Section 2.3.2. p. 7.

6.11 Current monitoring within Victoria is undertaken by a number of organisations and involves a number of approaches. Historically, it was not uncommon to find several organisations involved in monitoring in isolation, with little integration, communication, data dissemination and data sharing. In some instances two organisations could be found monitoring the same site, sometimes for the same parameter! However, this appears to be changing through the development of regional monitoring programs, and the integration of physico-chemical and biological monitoring and aquatic and terrestrial monitoring.

6.12 This improvement has been due to a number of initiatives, including the Index of Stream Condition, and the proposed *Catchment Indicators for Victoria: A Framework* (see Attachment 2).

6.13 At a broad scale, the Index of Stream Condition has been developed for use by Catchment Management Authorities to report on the condition of catchments over a long-term period[25]. The Index provides a summary of the extent of change to hydrology, physical form, the streamside zone, water quality and aquatic life. These are evaluated every 5 years on reaches typically tens of kilometres long. It is not designed as an indicator program for specific management programs. Currently, the first round of measurements to benchmark condition are being collected.

6.14 The development of Catchment Indicators for Victoria will allow more fine scale resolution of catchment management, with indicators designed to measure the effectiveness of management programs.

6.15 The challenge for national State of the Environment Reporting is to develop indicators that can draw data from the variety of State-based reporting systems without the need for duplication of effort. While some indicators may be needed specifically for a national system, minimising additional work can provide efficiency gains that can be redirected into on-ground works.

6.16 Possibly a greater challenge is the development of storage and retrieval systems that can link results of the different monitoring indicators from specific projects. With this in place, it should be possible to determine the best approaches that deliver the best outcome in the most effective and efficient manner. Across Australia, this type of information would be invaluable to all levels of involvement in integrated catchment management. If the Federal Government is to achieve its role of setting standards, fostering cooperation and facilitating information flow (see Section 4.3 above), it will need a set of indicators that are applicable across the nation, in a form transferable between States and between catchments. Equally as important are the links between indicators made in any national database. With these types of links, groups in other parts of the country may not have to "re-invent the wheel" working out how to achieve their goals every time a new catchment management program is started.

[25] Centre for Environmental Applied Hydrology and ID&A Pty Ltd (1997) *An Index of Stream Condition: Reference Manual*. Waterway and Floodplain Unit, Department of Natural Resources and Environment, Melbourne. p. iii.

Attachment 1

State by State Summary of catchment management[26]

New South Wales[27]

Total Catchment Management (TCM) is about coordinating community and government efforts within a catchment. The aim is to ensure we have productive land, clean water, and a diversity of vegetation and wildlife.

The Department of Land and Water Conservation is the NSW Government agency with the lead role in TCM as well as a number of other community partnerships. In addition to TCM, community involvement such as Landcare, Rivercare, Streamwatch are all aimed at solving natural resource problems.

All catchments in NSW have a Catchment Management Committee or a Catchment Management Trust. These are composed of local people and include representatives from the department and other local and State agencies. They prepare regional strategies which coordinate community and government action on resource management. The department's staff, along with other government agency staff and local government, are working with communities to implement these strategies.

The benefits of a catchment approach to management are achieved through cooperation and the increased effectiveness of the government and community working together.

When a community identifies its issues and develops a cooperative plan to address them, then it is a powerful force in attracting support from government agencies, industries, education institutions and other communities with similar issues.

South Australia[28]

South Australia has established six Catchment Water Management Boards (CWMBs), with community Board members appointed by the State Government. They are appointed from the relevant catchments (on the basis of skills, not representation) by the Minister for Environment, Heritage and Aboriginal Affairs, whose Department of Environment, Heritage and Aboriginal Affairs (DEHAA) has responsibility for water resources. The six Boards are: the Torrens, Patawalonga, Murray River, North Adelaide-Barossa, Onkaparinga, and South-East CWMBs. A seventh board (the Arid Areas Groundwater and Catchment Water Management Board - covering most of the

[26] At the time of writing, no detailed information was available from Northern Territory, ACT or Western Australia. If required, such information can be provided later.
[27] Information from New South Wales State Government web site at: http://www.nsw.gov.au/, 15 July 1999.
[28] Derived from information supplied by David Mussared, Editor of Land and Water News, PO Box 212, Aldgate, SA 5154. Any errors are those of the author, not of Mr. Mussared.

land area of SA) is due in the 1999/00 financial year, and an eighth Board (covering the Eyre Peninsula) has been flagged for the future, but there are no details so far.

The six existing Boards all have levy raising powers, which is earmarked for works to improve the catchment, according to catchment plans, which each is legally obliged to develop and implement.

There is also a second regional structure which in part, overlaps the role of the CWMBs, best exemplified by the long-standing Mt Lofty Ranges Catchment Management Program (MLRCMP), established under the aegis of the SA Department of Primary Industries and Resources. The MLRCMP is aimed at Integrated natural resource management across the Mt Lofty Ranges catchments, and - among other things - it offers 'devolved' grants (sourced from the NHT) for on-ground works. Its boundaries overlap, at least in part, those of most of the CWMBs.

Both CWMBs and the MLRCMP work closely with local governments, and with the various other players and agencies (soil boards, industry etc. etc.), and in some cases, operate joint community grant schemes.

Queensland[29]

In 1991, the Queensland Government introduced an Integrated Catchment Management (ICM) Strategy, focussing on a community-based approach to the development of strategies to achieve integrated management of natural resources within a river catchment. It reflected the general trend at the time towards a voluntary approach, strengthening community consultation and involvement processes. Although identified in the Strategy as a future consideration, currently a legislative base does not support ICM groups in Queensland. A number of Integrated Catchment Management groups were formed (see below).

In 1996, DNR reviewed the arrangements for Landcare and ICM in Queensland. As a result, the former Queensland Landcare Council and the Catchment Management Coordinating Committee merged to form the Landcare and Catchment Management Council (LCMC). Reflecting community wishes, individual Landcare and Integrated Catchment Management groups retained separate identities as community-driven approaches to planning and on-ground action.

The LCMC comprises representatives from landcare and catchment management groups, industry, conservation organisations, local government and key State Government departments. It provides strategic advice to the Minister for Natural Resources on landcare and catchment management, and direction for the administration, management, operation, monitoring and evaluation of the NHT program in this State.

Integrated Catchment Management (ICM) groups

[29] Information supplied by Donald Begbie of the Department of Natural Resources, Queensland. Any errors are those of the author, not of Mr. Begbie.

Catchment Coordinating Committees (CCCs) take an integrated approach to water, soil and vegetation management within specific river catchments. These groups provide planning, coordination and advisory functions, and a focus for community involvement and the implementation of strategies. Currently, there are 25 formally endorsed CCCs in Queensland, one regional committee in the Murray-Darling Basin and six Steering Committees (not yet at endorsement stage). Committee membership is representative of local community interests. Endorsement tends to be reserved for groups undertaking community-based ICM across a major river basin. Seven CCC have fully endorsed catchment strategies, there are another eight interim catchment strategies and many in an advanced draft stage of preparation.

Catchment strategies provide the strategic natural resource management directions for incorporation into local government planning schemes, Regional Natural Resource Management Strategies and Regional Planning Studies for growth management (such as SEQ 2001 etc).

Last financial year, catchment management grants totalling $893K were made by DNR towards the implementation of 17 projects across seven catchments, and to support 23 catchment committees, including the employment of coordinators. For specific projects, the CCCs rely on State and NHT funding. Local governments also contribute limited funding or in-kind support to groups.

Catchment Care Groups and Landcare groups operate at a more local level.

There are currently 4 Catchment Care Groups in Queensland. They focus on actions that undertake ICM-type activities at a sub-catchment or local level. These are less formal groups, and are not endorsed catchment coordinating committees.

In Queensland, about 270 groups are involved in landcare. Of these, 187 meet specific requirements for endorsement by DNR and receive a small annual grant from DNR to help meet administrative costs, and insurance to protect members undertaking group activities. Landcare in Queensland is a community-based approach to the management of natural resources. Landcare encourages community interest and participation through the formation of landcare groups to assess local problems, determine priorities and take on-ground action in their local areas. Landcare groups are usually represented on catchment committees. They are developing action plans to implement on-ground actions in accordance with priorities identified in catchment strategies.

Other assistance available to landcare groups includes facilitation and coordination support from Regional Landcare Coordinators, and Commonwealth and State funding for specific projects (for example, NHT grants and New Initiative program funding). Commercial sponsorships and grant programs are another potential source of funding.

Victoria[30]

Following a review in 1997[31], 9 Catchment Management Authorities (CMAs) were established in the major river basins in Victoria. These relaced Catchment and Land Protection Boards which were essentially advisory bodies that developed regional Catchment management strategies but had no role in implementation, and incorporated River Management Authorities, Salinity implementation groups, Water quality groups, and Sustainable regional development committees.

The CMAs have the responsibilities to:

- Implement Regional Catchment Strategies;
- Develop and review the strategies;
- Identify priority activities and programs to implement the strategies;
- Provide advice to the government on resourcing policies;
- Provide services related to integrated waterway and floodplain management, including:
    - Waterway management
    - Coordination/management of water quality
    - Coordination/management of floodplains
    - Coordination/management of rural drainage
    - Management of Crown Frontages
    - Management of Heritage Rivers
- Monitoring of land and water resources
- Reporting

The CMAs are controlled by a Board consisting of nine ministerially appointed members plus one or two non-voting representatives appointed from DNRE. Boards have experience and knowledge of primary industry, land protection, water resource management, waterway and floodplain management, environmental conservation, local government, food industry and business/financial management. They have recently been given the power to raise revenue through a catchment levy on all households in the region.

The CMAs appoint 'implementation committees' which will be responsible for developing detailed works programs for on-ground program delivery. Implementation committees encourage community participation and include previously existing community-based implementation committees (such as salinity plan implementation groups and sustainable regional development committees), and any new committees which the Board considers necessary to deal with resource management gaps, specific issues or sub-catchments.

[30] Information derived from a presentation by Jane Doolan, Manager of Waterways, Department of Natural Resources and Environment to the River Basin Management Society Riparian Management Conference, held at Seymour TAFE, 21 July 1999, and from web-site http://www.nre.vic.gov.au/catchmnt accessed 22 July 1999.

[31] Catchment Management Structures Working Party (1997) Review of Catchment Management Structures in Victoria. Report to the Minister for Agriculture and Resources and the Minister for Conservation and Land Management.

Tasmania[32]

Integrated catchment management (ICM) is a concept that has become increasingly widely known in Australia over the past decade, with significant help from the Landcare movement.

The Tasmanian Land and Water Management Council has had a Catchment Management Working Group for over two years, and it has recently produced a very useful publication called Integrated Catchment Management. What it is and how to do it. Designed as a guide for catchment management groups, it contains practical advice on how to approach the development of a plan for any catchment.

The working group comprises representatives of a wide range of industry, Government and community organisations: the Department of Environment and Land Management; the DPIWE; Forestry Tasmania; the Tasmanian Farmers and Graziers Association; the Hydro-Electric Corporation; the Local Government Association of Tasmania; the Tasmanian Conservation Trust; Tasmania Development and Resources; Landcare Tasmania; Resource Management Industries; and the Tasmanian Minerals Council.

An important aspect of the way ICM is intended to happen in Tasmania is the emphasis on voluntary action, cooperation and consultation. It is not to be driven by Government, or to involve new layers of administration and legislation.

Each catchment will have different problems and potential solutions, but identifying the problems is a critical step. For instance, the Meander Catchment Coordinating Group identified four leading issues that became its main focus: water quality, water quantity, streambank erosion and invasive weeds. Responses involved local government, the DPIWE, Forestry Tasmania and of course local landowners and land managers.

[32] From web site http://www.dpif.tas.gov.au/domino/DPIF/LandAndWater.nsf accessed 22 July 1999.

Attachment 2

Proposed Catchment Indicators of Victoria[33].

In October 1996, the Victorian Government made a firm commitment to a strategy for the integrated monitoring and assessment on the State's natural resources. A key step in this strategy is the finalisation of agreed indicators for reporting on the condition and management of land and water resources in Victoria.

The development of these indicators will meet the legislative requirement of the Victorian Catchment Management Council, but will also provide information required for the management of Victoria's natural resources.

This project aimed to develop a recommended suite of indicators that:

- describe the status of catchment conditions;
- provide a means for program effectiveness evaluation;
- are integrated;
- are scientifically creditable;
- are cost effective; and
- agreed upon by major stakeholders.

Essentially two uses of measurement were identified:

- Indicators that identify previously unknown issues that require management (proactive monitoring).
- Indicators that evaluate existing management programs for addressing known issues (reactive monitoring)

A suite of indicators has been developed. Catchment condition indices are to be used for the purpose of evaluating whether existing catchment management programs have adequate scope. The best way to measure condition was considered to be an index that is made up of the key component which, when combined, give a broad view of the healthiness or condition that exists. Possible catchment condition (Health indicators) include:

- Soil condition index
- Stream Condition index
- Vegetation Condition index
- Fauna condition index
- Economic condition index
- Social condition index

[33] Further information can be obtained from Peter Forbes, Key Project Leader, Catchment Information, Department of Natural Resources and Environment, Victoria.