FINAL Report

Healthy Rivers for Tomorrow

November 2003

Preface

The Healthy Rivers Commission has completed investigations of the coastal catchments of rivers and lakes as referred to it by the NSW Government since 1995. Lessons learnt from those Inquiries have led the Commission to establish a number of key principles and strategies, which it believes are essential to achieving healthy rivers, lakes and catchments.

This document advances a vision for healthy rivers, which the Commission hopes will be embraced by all those with an interest in our rivers and lakes. Information has been distilled from the Commission's eleven published Final Reports, including *Securing Healthy Coastal Rivers: a strategic perspective* (2000), to create what the Commission hopes will prove to be a useful reference and guide to Catchment Management Authorities (CMAs) and all involved in river and catchment management.

I thank all those citizens, councils and agencies that have contributed to the work of the Healthy Rivers Commission over the last eight years, especially those who made detailed submissions to its Inquiries. All contributions were highly valued and reflected what I believe is a real commitment to improving the health of our rivers for this generation as well as our children and grandchildren.

I continue to wish you well in those endeavours.

Peter J Crawford
Commissioner

Contents

Preface 2

Contents 4

About this report 2

Principle 1: Rivers as assets 3

- Identifying river values 3
- Protection versus repair 4
- Sustainable land management 4
- Intergenerational equity 5

Principle 2: Whole-System management 6

- Cumulative impacts 7
- River capabilities and limits 8
- Delineating system boundaries 8
- Integrated water cycle management 9

Principle 3: A whole-of-government approach 10

- Integrated decision making framework 11

Principle 4: Accountability for actions 12

- Audit processes 13
- Other accountability mechanisms 13

Principle 5: Effective planning and management 14

- Conservation, sustainable use and repair 14
- Coastal Lakes Strategy 15
- Setting catchment priorities 15

Principle 6 - Adaptive management 17

- Feedback systems 17
- Targeted monitoring 18

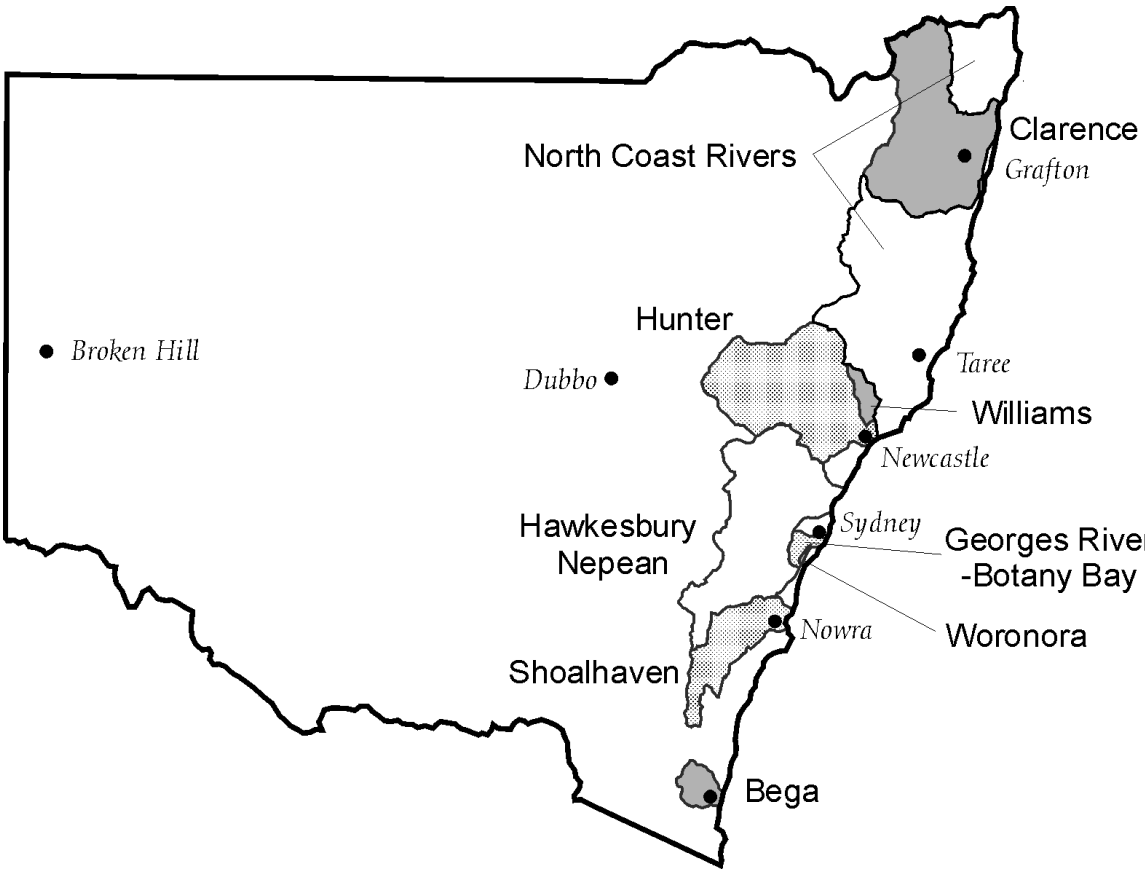
Principle 7- Government-community partnerships 19

- Incentive-based change 20
- Partnership agreements 20

Conclusion 22

References 24

Catchments* where HRC Inquiries have been conducted.



* As well as the nine river catchment Inquiries shown above, the HRC has conducted an Inquiry into management of the State's 92 coastal lakes, and undertaken a review of the relationship between healthy oysters and healthy rivers.

About this report

Landholders, environmental and industry interest groups, the scientific community, councils and government agencies have contributed to the Healthy Rivers Commission's (HRC) public Inquiries into river and lake health in coastal New South Wales over the last eight years.[1] Through those Inquiries, the HRC has come to realise that the greatest challenge in achieving healthy rivers is not a lack of will, nor a lack of science, but rather a lack of *integrated* effort by agencies and councils and the many other stakeholders involved in river management.

Many of the concerns expressed by citizens reflect the fact that institutional arrangements have been fragmented to an extent that seriously limits the effectiveness of management efforts. River problems have rarely been treated in terms of the needs of the river *system*. Instead, problems have usually been treated as isolated issues, and the river system has not been thought of holistically. The result has been that the significant efforts devoted to the parts have often overlooked the needs of the whole. If we continue to overlook the *interrelationships* between riverside vegetation, the instream channel, the habitat it provides to fish and other aquatic life, the water quality and river flows, all of which make up the natural river *system*, we will *always* be hard-pressed to achieve and maintain healthy rivers.

The HRC was establishment in 1995 under section 23 of the *Pollution Control Act,* 1970, in recognition of the very real need for an *independent* body to advise Government on the many contentious issues related to river health, *and* to provide a forum where the often divergent views put forward by various sectors of the community could be considered.

In establishing the HRC and its Inquiry processes, the Government made a high commitment to the community to improve river health. Government has reviewed the findings and recommendations of each Inquiry and issued its decisions in the form of Statements of Intent (SOIs) that guide agencies and councils in implementation and require agencies and authorities to meet specified requirements in efforts to secure whole-of-government outcomes. Public accountability has been further strengthened by Government assigning to the HRC responsibility for independent audit of SOI implementation.

The highly public and transparent processes followed by the HRC in all stages of its Inquiries, together with the public accountability of the SOI mechanism, have proven to be a unique experiment in public sector management in NSW.

[1] Under its terms of reference, HRC has conducted Inquiries into various river systems, and made recommendations to Government on suitable river health objectives and the strategies and changes in management practices needed to secure them. The HRC has explored community concerns and priorities, key ecological and economic pressure points, and the interrelationships between competing interests. Typically, the HRC approach has been to identify and focus on those issues or problems that are having the most serious impact on river health and to identify where the biggest potential gains can be achieved. All Inquiry reports are available from the internet www.hrc.nsw.gov.au .

The success of the experiment has been recognised by the Australian Node of two United Nations organisations[2]. The importance of such an independent process cannot be overstated. The community is increasingly calling for similar processes to resolve issues that involve a degree of conflicting aspirations and objectives, including in vegetation management. The creation of a Natural Resources Commission, which builds on the capabilities and experience of the HRC reflects a key response by the NSW Government to such calls.

HRC recommendations have focused on a number of fundamental principles for integrated and accountable river and catchment management.[3] The aim of this paper is to capture the essence of those principles, in user-friendly form, with the use of examples from specific Inquiries. The paper aims to assist those concerned with river health in particular, and with environmental and natural resource management in general. The principles relate to effective river and water management but are also widely applicable to the management of natural systems and natural resources, such as vegetation communities and specific ecosystems. They are consistent with similar principles advocated by a number of other reviewers and expert commentators.[4] The way they should be applied will depend on the goals set and the priorities chosen for each system being managed. The principles are:

1. Rivers as productive assets
2. Whole-system management
3. Whole-of-government approach
4. Accountability for actions
5. Effective river health planning
6. Adaptive management
7. Government-community partnerships

Where the principles are used for river and catchment management, they should be applied in the context of the broad view of river health that the HRC has used throughout its Inquiries. That is:

> *"a healthy river is one the conditions of which, as indicated by a range of environmental,[5] social and economic characteristics, enables it to support the riverine ecosystems, commercial activities and social amenity desired by the community."*

The following sections discuss these guiding principles in turn, illustrating them with examples from various HRC Inquiries. The examples used in this paper draw on those areas of reports where Government has endorsed HRC recommendations, unless otherwise specified.

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[2] The World Commission on the Ethics of Scientific Knowledge (COMEST) and the United Nations Educational Scientific and Cultural Organisation (UNESCO). Those organisations nominated the HRC for UN recognition and endorsement of its work, indicating that the HRC has:*"…recommended policy changes and institutional reform that were unpopular with government, their agencies and industries. The inclusive approach used … the way it has synthesised often diametrically opposed views, its balancing of social, economic and environmental issues, … and timely presentation of results have been exemplary. … It has … identified generic issues that need urgent attention. The Commission's approach could be used as a model elsewhere.*"

[3] In its report *Securing Healthy Coastal Rivers: a Strategic Perspective* (2000) the HRC discussed seven such principles in detail. Insights gained from later Inquiries has since led to further principles.

[4] See for example, Oliver (1997) and Harris (1999).

[5] Environmental elements of river health include riverside vegetation, instream habitat, the channel form, sediment load, water flows and quality.

Principle 1: Rivers as assets

Rivers sustain lifestyles and patterns of work and meet many other needs. They hold intrinsic spiritual, recreational, aesthetic and environmental values for all communities, whether urban, rural or indigenous. They provide natural connections for people's activities across the landscape. They are highly productive assets that deserve to be protected, sustained or, if vastly modified, to be repaired in a targeted way. That requires recognising and accommodating the limited capacity of rivers to sustain all of the many uses to which they are subjected.

Throughout history, human civilisation has centred on rivers and depended on the many resources and services they provide. Rivers have been abused as well as used and often treated as the drains of society. More recently, citizens have better recognised the many values of rivers and have become increasingly concerned about their condition. National and State governments have responded strongly through a set of wide ranging reforms in water management. Establishment of the HRC was a specific element of the NSW response.

In rural areas management reforms have focussed on improving the quality of agricultural runoff, containing the impact of stock on riverbanks, enhancing vegetation and restoring environmental flows. In urban areas, rivers are slowly receiving stronger attention in strategies to manage new developments and re-development, as people in populated areas have recognised the value of the riverine environment as a centrepiece for recreational, cultural and commercial opportunities.[6]

Identifying river values

HRC Inquiries and recommendations have highlighted the need to protect the different values provided by rivers in different parts of their respective catchments. Protection of rivers should begin with government and community nominating broad goals for the major parts of a river system, having regard to the river's current condition, its current and preferred future uses, and the realistic opportunities for improvement. Typical goals may be: 'conservation', 'sustainable use' or 'targeted repair'. Such an approach recognises that many highly-modified rivers can never be returned to a pristine condition. It reflects the HRC concept of a healthy river that is able to support riverine ecosystems, commercial activities and the social amenity desired by the community.

If that approach were used, rivers in the upper, largely pristine parts of north coast catchments could be managed 'for conservation' in ways that would preserve their ecosystem values.[7] Such critical conservation values could include preservation of threatened species, protection of Aboriginal cultural sites, provision of safe drinking water, or preservation of areas of significant natural beauty.

[6] For example the 2003 Brisbane *Riversymposium* was dedicated to urban rivers and show-cased redevelopment projects in many urban areas such as Singapore, Brisbane and Thuringowa, which centred on the local river.

[7] Bennett et al (2002) provides useful and definitive information on approaches to undertake this assessment.

On the other hand, neither conservation nor wide-ranging restoration is practicable in highly modified rivers, such as the Cooks or the Hunter or the Murray. Instead, in those rivers selected elements of the natural system can be effectively targeted for repair, leading to some specific, long-standing problems being addressed without adverse impact on the social and economic uses of the river.

Somewhere in between the above two extremes, are locations where land and rivers may have both productive value and some modified or reduced ecological values. Such rivers require both sets of values to be recognised by management leading to the need to balance ecological and socioeconomic goals carefully. Here the aim will be to preserve healthy, though modified, ecosystems by minimising the potential for degradation caused by human activity.

Reports of the HRC's Inquiries into the Shoalhaven, Bega, Georges River – Botany Bay, Hunter and North Coast Rivers indicate how such goals may be determined for specific river reaches, and how the goals, once established, should guide management actions. The report of the HRC's Inquiry into the state's 92 coastal lakes and their catchments[8] further illustrates the approach.

Protection versus repair

HRC Inquiries have also shown that it is less costly and thus often more realistic, to focus on protecting the *remaining* natural parts of rivers than to attempt full rehabilitation *after* they have been significantly affected by clearing, dredging, erosion or by concrete lining or other forms of channelisation. This reality is the basis for the HRC's recommendations, advanced in its Hawkesbury-Nepean and Georges River – Botany Bay Inquiries, that a State Riverine Corridor Policy be developed, explicitly aimed at providing protection for both rural and urban rivers.

Sustainable land management

Efforts to enhance and sustain rivers depend heavily on sustainable *land management* which, in turn, requires careful evaluation of a river's limited capability to sustain various types of development and land use.

For example, in its Coastal Lakes Inquiry, the HRC recommended that 'sustainability assessments' be carried out for different categories of coastal lakes, to reveal what types and locations of development would be compatible with the goals established for each category of lake. The assessments also provide guidance on what, if any, further development is sustainable for any given lake under review.

In its *Review of the Relationship Between Healthy Oysters and Healthy Rivers,* the HRC linked the strong interrelationship between landuse and river health in determining preferred oyster growing areas. For areas where oyster growing is accorded high importance from a state-wide perspective, HRC recommendations would see that goal explicitly designated as a priority *outcome* to which the State is committed. That, in turn, would require that state, regional and local planning and management processes be explicitly directed towards achievement of that outcome[9]. Decisions concerning various other land and water uses

[8] The HRC's *Final Report on its Independent Inquiry into Coastal Lakes* (2002)

[9] The HRC's *Final Report on its Review of the Relationship Between Healthy Oysters and Healthy Rivers* (2003) provides details.

would then be subordinated to the goal of producing oysters for human consumption in those areas - the priority objective to which all would be committed.

The HRC's Inquiry into oyster growing catchments provides a useful illustration of some of the issues involved in determining cost-sharing arrangements where there are conflicting objectives. This often occurs where oyster cultivation is a continuing priority in locations which are also subject to pressure for residential developments. In such cases, there are obligations on all parties. Land users have an obvious 'duty of care', and oyster growers, like all producers, need to meet their share of the costs of producing healthy oysters. In addition, the public good associated with protecting river health means the wider community should also contribute.

In such cases, innovative ways of sharing costs, that broadly recognise obligations and associated costs must be found. The HRC has concluded that the most successful approaches are likely to be based on the establishment of explicit partnerships and contractual arrangements through transparent negotiations.

Intergenerational equity

If rivers are to be sustained for future generations, much more sustainable patterns of land use must become the norm. That requires farmers, agencies, councils and communities to learn from effective case studies that show good results for sustainable farming and to share information and effort. Beyond that, it requires that key operational agencies and councils make sustainable agriculture an explicit shared goal for which they join forces to ensure that property planning, regulation, extension services and incentive arrangements are well integrated and focused on this objective. The HRC's North Coast Rivers Inquiry addresses this critical need in some detail, with special reference to those catchments, but the recommended approaches discussed there are equally applicable to all catchments.

The HRC's Inquiries have highlighted the need for rivers, as assets of high significance and value to the community, to receive a level of attention to 'asset management' comparable to that which is accorded to physical infrastructure and financial assets. That is, their capacity limits must be understood and accommodated, their depreciation must be recognised, there must be provisions for their maintenance and rehabilitation, and, ultimately, their managers must be held accountable for their ongoing performance and condition.

Principle 2: Whole system management

A river catchment is an easily identified landscape unit, the key elements and processes of which are interconnected to form one natural *system*. Attempts to resolve local problems or manage a specific element of the system will generally fail to improve the health of the river *as a whole.* For long-term and sustainable results, river management must focus on the needs of the whole system even when specific issues are the subject of review or action. This thinking underpins concepts such as 'catchment management' and 'integrated river management,' which highlight the need to secure *system-wide* goals.

Many of our institutions, policies and legislation for managing rivers, catchments and lakes are based on what we *thought* we knew about natural systems years ago, but in many respects that is very different from what we *actually* know today. That creates a challenge because it is now clear that the properties of *natural* systems, along with a lot of human and social systems, are different from the sum of the properties of their constituent parts. For example, the properties of a river are not the sum of the properties of water, sand, fish and vegetation. A river *system* responds and adapts to external stimuli and pressures differently from its constituent parts, and must be managed as a whole system.[8]

There is ample evidence that attempts to manage the whole by managing each part in isolation are almost certainly to fail. For example, in a river that has been converted into a channel and used as a drain, it is quite possible to improve water quality but ecosystems cannot be sustained in the absence of adequate habitat. In the HRC's very first Inquiry into the Williams River, the HRC found that a major focus on removing nutrients from the effluent of one STP was neither dealing with the needs of that catchment overall nor looking at the river's whole nutrient problem. For much of the time, the STP contributed only 4% of the nutrient problem. The significant available public funds could have been spent on other priorities, including addressing the other 96% of the nutrients from diffuse sources.

There is a tendency to focus on what is manageable and to deal with the small problems and issues, which a small group of people can manage. That creates a difficulty because, when separate actions designed to resolve the small problems and issues are examined in total, the result is seldom improved catchment or river health. For example, the Upper Nepean River, near Camden, some 100km south west of Sydney, has nine weirs- essentially creating nine lakes. Because these weirs have been in place for a long time, the whole ecology in each weir impoundment has changed. There are problems caused by stratification, riverbank erosion (largely caused by past dredging), changes in ecologies and so on.

If these problems are assessed in isolation, the solution may be to build fish ladders up the weirs, or to generate artificial flows. However, that may not improve river health as a whole because the root of the *system* problem lies in the decision to build and maintain the nine weirs. If environmental releases are to be made from the upstream dams, the impact of these weirs must be understood. In fact, the additional flows are likely to entrench still water

[8] For example, In purely physical terms, Schumm (1969) describes a river flowing through alluvium as having 'six degrees of freedom', in which it can adjust its slope, width, depth, sinuosity, velocity and meander wavelength, in response to changes in water and sediment discharge.

conditions that favour carp and algae. The flows will fill the weir pools but the riparian users are likely to abstract the water, so the needs of the whole river system to be free flowing will not have been met. To achieve real improvements in river health, most weirs should be removed, the river banks restored and the landholders provided with alternative water sources - *then* create the additional flows.

The systemic nature of rivers has become better understood in the past couple of decades. Many experts, inside and outside government, have concluded that natural systems need to be managed as whole entities.[10] Yet prevailing institutional arrangements have continued to encourage a compartmentalised approach. As a consequence, there is often a failure to perceive that the whole river *system* may be deteriorating, even though a selected part might be showing some improvement. Such 'improvements' are often subsequently proven to have been temporary or illusory.

Causal relationships

The HRC's recommendations have been based on the notion that effective management of river health cannot simply target symptoms, but must focus on the causal relationships, which are invariably embedded in the workings of the broader system. That requires a good understanding of each river, its degree of modification and how it currently operates and the *causes* of the main river problems. Analysis of each river must not be fettered by existing commitments or programs, nor influenced by a particular operational or technical bias. Success or failure should then be measured in terms of system outcomes, including the securing of critical values, and not just the results of implementing narrowly defined strategies to deal with local symptoms.

Rapid assessments

Yet, it is not always possible or practicable to make comprehensive evaluations. Equally, the impacts of a proposed activity on the environment may need to be assessed immediately, or a decision may be required before detailed scientific and/or social impact conclusions can be drawn. In those circumstances, experts may need to provide advice based on rapid assessments sufficient to assist a decision being made. It is therefore imperative that managers and experts join forces to plan, identify existing data and further knowledge needs so that analysis, review and decision making can be well related to the available timeframe and known pressures. Such circumstances also benefit from the prior setting of broad management goals based on the identification of river values in different parts of the catchment as described under Principle 1.

Cumulative impacts

Where integrated or system management does not occur, the *cumulative impacts* of actions are seldom assessed or acknowledged to the detriment of the river. In its Shoalhaven Inquiry for example, the HRC found that in the Kangaroo Valley the *cumulative* impacts of the current level of development were receiving inadequate consideration, and that they were, in total, taking an unacceptable toll on the riverine environment. The HRC recommended that, as a matter of urgency, the overall *system* impacts of activities within the catchment, and consequent river management requirements should be addressed by a comprehensive Water and Wastewater Management Plan.

[10] See for example Codd (1997), Oliver (1997), McClellan (1998) Suzuki (1990).

River capabilities and limits

The longer-term protection of river health requires that land use planning consider not only land capability but also the *capability of the river to withstand the impacts of inappropriately developed or poorly managed land*. A focus on managing rivers as whole *systems* forces recognition of those elements within a system that are most stressed and/or those which are least capable of withstanding further pressures and change. Given the need to establish *system* capabilities, system based approaches can assist the community to recognise and accept the very real limits to which both land and rivers can be pushed.

In the case of Kangaroo Valley, it was apparent that a mechanism was needed to allow for more effective consideration of the impact that development would have on the land and, in turn, on the local rivers. Rural residential developments were of particular concern. The HRC recommended that a model Development Control Plan be developed as part of a Sydney Catchments REP. The intention was that such a plan would give guidance on rural residential development, in terms of water extraction, on-site sewage management, vegetation clearing and, more generally but equally importantly, on those actions by landowners needed to assure the area's long-term sustainability.

Similarly, in its Hawkesbury-Nepean Inquiry, the HRC recommended that a whole of catchment management strategy be implemented to combat fragmented planning and to improve resource allocation and management. The aim was to manage *existing* uses better with the aim of improving the health of the river system, by complementing the statutory Hawkesbury REP 20, which relates only to *future* uses.

Delineating system boundaries

For effective integrated management, it is important that the most appropriate 'system boundary' is identified for the particular issue under investigation.

For example, the HRC's Georges River – Botany Bay Inquiry recognised that Botany Bay needed to be managed as a discrete biophysical entity. Equally, the Inquiry recognised that the metropolitan water supply, sewerage and stormwater systems effectively linked the Georges River - Botany Bay catchment with the Hawkesbury Nepean, Shoalhaven and Parramatta river catchments into one interrelated physical system that needed to be managed as such.

In this latter case, the HRC recommended that environmental flows within the individual rivers should be established in ways that would optimise river health benefits *across* the contributing catchments. At the same time, complementary demand management measures, including the use of appropriately treated effluent and stormwater/rainwater, should be strengthened to maintain the balance between adequate and secure metropolitan water supplies and river health.

To optimise river health across the Sydney metropolitan area, those key elements, of the water cycle, namely healthy river flows, well-managed demand for water and effective land-based and instream use of so-called wastewater, *must* be managed in an integrated way and *across* all the contributing and receiving catchments and subcatchments.

Integrated water cycle management

Integrated water cycle management also comprised a key element of the HRC's Clarence River Inquiry. That Inquiry highlighted the critically important inter-relationships between the Nymboida and Orara rivers, which necessitated integrated management of river flows and the provision of water and sewerage services to maintain the health of that important subsystem.

The approach recognised the limits of the river system's ability to service both water extractions and ecosystem requirements; established a common set of objectives to guide the many players responsible for various activities likely to affect the river; and specified the entitlements of water users, within a system context, in ways that clarified their rights and obligations and provided some security.

The HRC's North Coast Rivers Inquiry provided details of the financial, as well as the environmental, benefits of integrated water management to both service providers and consumers.

Principle 3: A whole-of-government approach

A whole-of-government effort is fundamental to effective river management. The management efforts of all relevant state agencies and authorities and local government councils must be concerted towards securing whole system goals through common and complementary strategies.

Whilst some compartmentalisation of government activity is necessary for pragmatic reasons, that very need makes it all the more important to ensure that there are effective mechanisms to ensure that *system* priorities dominate and that institutional differences do not become barriers to securing the best outcomes. That requires the introduction of government machinery and processes that will ensure public funding is applied in an integrated manner. It requires that the exercise of regulatory and other management powers by its various agencies and authorities be fully integrated. Policy development, the design of legislation, budget allocation, and performance assessment and reporting all have important roles to play in that integrated management.

Such pre-conditions for genuine integration of river management have been noted and advocated by the HRC from its first report, on the Williams River, and all subsequent reports. Institutional impediments to river health were particularly addressed in the HRC's Hawkesbury Nepean Inquiry, where long-standing problems remained unresolved, largely because there was no entity responsible for considering the overall needs of the river. This observation led to the recommendation that a "river manager" be established to act on behalf of the river and to be accountable for its health. The Government acted on the recommendations of the HRC and the McClellan Inquiry by creating the Sydney Catchment Authority, and by determining that all relevant agencies be held jointly accountable for the implementation of a Statement of Joint Intent that encompassed Government decisions on the HRC's Hawkesbury- Nepean Inquiry.

In that Inquiry, the HRC also noted that local government councils, though increasingly finding themselves responsible for natural resource management, were struggling to deal effectively with the needs of the environment in the exercise of their various powers and responsibilities.

Most councils required greater resources and capacity, as well as a change of 'institutional mindset', inside and outside council, if they were to realise their potential as managers of environmental domains and to play a key part of the resource management jigsaw.

Accordingly, the HRC recommended that local councils be required to develop an environmental management plan as a specific component of the Council Management Plan. That component would be a rolling plan and would integrate all of the existing environmental and natural resource responsibilities of councils thus allowing priorities to be set and resources, in terms of funds and staff, to be allocated in a highly public way. The plan would influence council budgets and line management and would encourage more effective state of environment reporting. The Government held that state agencies must assist councils to develop these environmental management plans.

Integrated decision making framework

In the case of Botany Bay, the overlapping interests of national, state and local governments make management decisions even more complex. Accordingly, in its Georges River – Botany Bay Inquiry, the HRC recommended an integrated decision making framework to provide the context against which the three levels of governments could make decisions informed by independent science and in consultation with industry, commercial and environmental interests and the broader community. This framework, endorsed by Government and required through its SOI, sets the stage against which debates on future conservation, social change and new port and transport developments must be carried out by Government agencies and authorities.

In the same Inquiry, more strategically and clearly defined institutional arrangements were recommended to integrate key elements of water cycle management (stormwater, sewerage and water supply services) across the metropolitan area.

The *institutional* arrangements were to provide for:

- explicit accountability for outcomes across the city *and* across programs;
- improved capacity to use more of the 'waste water' for supply options;
- sustainable and better integrated long-term funding;
- enhanced partnership arrangements between councils; and
- audit of stormwater management and local government agreements.

Throughout its Inquiries the HRC has heard from citizens examples of where powers, effort, and funds could be better concerted in what should be a common cause. The accuracy of those community perceptions have generally been confirmed by the HRC's investigations, supported in many cases by independent expert advice.

Thus, in each of its Inquiries, the HRC has pointed both to the implications of non- integrated management approaches and to the the opportunities to achieve improved river health through stronger integration of land and water management and improved local and regional planning. More recent changes to portfolio arrangements, including the establishment of the Department of Infrastructure Planning and Natural Resources, and the proposed Natural Resources Commission, will provide the opportunity to improve such integration of government effort.

Principle 4: Accountability for actions

Where public bodies have key roles in natural resource management, it is essential that clear accountabilities be set - and met - if the results are to be satisfactory. Direction and progress in implementing strategic directions must be reviewed, with managers held answerable for outcomes. Independent and public auditing is a critical element in securing healthier rivers.

One of the most critical findings emanating from HRC Inquiries is the need to ensure implementation of Government decisions. Citizens submitted that many recommendations of various independent processes in the past had just become *"glossy reports gathering dust on shelves"*. In response to this finding, the Government has issued Statements of Intent (SOIs) that incorporate its decisions on Inquiry reports for various river systems and coastal lakes. The SOIs have proven to be important tools for public accountability in that they clearly signal Government decisions, the responses Government requires of its agencies, and Government commitment to determining the level of compliance with its decisions through independent and public audits. This auditing responsibility was assigned to the HRC and will be transferred to the new Natural Resources Commission as an important ongoing role.

The process has demonstrated considerable benefits, including:

- a clear statement and public record of the Government's commitment to reform;
- the mandating of 'whole-of-government' responses to significant catchment and river-based issues;
- a focus on planning for and managing whole river systems and the concerting of powers and efforts in a timely way to implement decisions;
- guidance to agencies and authorities in relation to strategic directions which, in turn, influence their wider planning, programs and operating activities;
- development of a culture that focuses on continuous improvement;
- clear and enhanced accountabilities, individually and collectively, for agencies and government in securing catchment goals; and
- public reporting of actual outcomes.

Specific accountability mechanisms

In one of the early SOIs for the Hawkesbury-Nepean decisions, accountability for implementation was assigned to nominated lead and support agencies, including performance monitoring requirements and performance indicators. Specific instruments were also created in the form of a Hawkesbury-Nepean River Management Forum to implement the recommended program of trial environmental flows, and an expert Environmental Panel to provide independent guidance in that process. Such instruments can and have helped establish cost-effective ways of pursuing river health goals, and

resolving conflicts in equitable ways and of assisting both government and community in decision making.

Audit processes

An audit of the Hawkesbury Nepean and Shoalhaven SOIs was completed in July 2003, and an audit of the Clarence is in progress. The results reveal too much focus by agencies, authorities and councils on existing activity and specific issues and too many plans, processes and committees. This can mask the 'big picture' and cause those involved to lose sight of the major long-standing problems and the needs of the river system. Nonetheless, the audits reveal encouraging progress in creating a culture of collaboration in achieving continuous improvement.

On-going responsibility for audit of SOIs is being assigned to the new Natural Resources Commission, which expands on the role of the HRC. This is even more encouraging, because it is already clear that such audit processes represent important catalytic and accountability mechanisms in efforts to secure improved health for the state's catchments, rivers and lakes.

Other accountability mechanisms

In a further attempt to strengthen mechanisms designed to improve accountability the HRC, in its North Coast Rivers Inquiry Report, recommended that the NSW Treasury convene a committee of relevant CEOs to ensure that agency resources are redirected to implement Government decisions, reflected in the SOIs. That will ensure that individual agencies adjust internal priorities and programs, rather than automatically seeking new funding and that existing funds are more effectively harnessed.

Other accountability mechanisms include for example, as recommended in the HRC's Shoalhaven Inquiry, the creation of a *Drought Management Plan.* This plan specifies protocols for water sharing under low-flow conditions amongst Sydney Water, water users in Nowra and the environment.

Sydney Water is required to exercise more stringent demand management in the Hawkesbury-Nepean and Woronora systems, to avoid any undue call on the Shoalhaven River. In this case, accountability for management of river flows had to span the three catchments as established in the HRC's Inquiry into the Georges River – Botany Bay system. The Government has endorsed this comprehensive accountability mechanism that is designed to make water sharing more transparent and equitable, to manage flows more effectively and to develop a sharing regime in advance of critical times such as droughts.

Principle 5: Effective planning and management

Regional and/or catchment planning must identify realistic goals that balance environmental, social and economic aspirations in the region, in the context of state and national objectives and policies. Regional priorities for action must reflect the determining influences on river and catchment health at a whole-system scale, and plans must clearly assign resources and responsibility for implementation in terms of the unique demands of each catchment.

River catchments and their natural resources simply cannot meet all of the demands placed on them. Similarly, communities and their governments cannot address and fully resolve all of the river health problems that typically prevail within catchments.

In light of the management challenges that usually arise from the sheer scale of the river health problems to be confronted, it is critically important that the application of existing funds and management instruments concentrates effort on the *determining* influences on river and catchment health. That requires a determined and continued focus on the main game and a deliberate avoidance of the temptation to spread resources and effort too thinly. It is not possible to address every problem everywhere nor to be active on all fronts, nor to meet all local interests, nor to fulfil demands for small projects to be mounted in many electorates. The focus must remain on the whole system, the long-standing major problems, the critical success factors, and the agreed priorities.

HRC Inquiries clearly demonstrate that doing 'small things' in many places will not resolve big problems. While beneficial in terms of their generation of community awareness, and understanding of the need for reforms, voluntary participation in simple programs that involve relatively minor changes in resource management and resource use practices is not sufficient. They may even be counter-productive through creating an unwarranted sense of security and a degree of complacency. In short, regional and catchment planning and management must address the *scale* of the problems faced by rivers and other natural systems and their resources and develop strategic, significant and well-targeted responses.

Conservation, sustainable use and repair

Because it is *not* possible to 'preserve and protect everything, everywhere,' the HRC urges new Catchment Management Authorities to categorise areas in their regions in terms of their relative importance to conserve, sustain or repair, and opportunities to do so. That categorisation should then be the basis for a management framework within which conflicts between environmental, social and economic goals are recognized and the options for resolving them are understood. Only then can informed decisions be made, trade-offs agreed, and major goals defined, so that appropriate strategies for achieving them can be formulated.

Integrating existing plans

The task ahead of Catchment Management Authorities is further complicated by their need to address, and build upon, the many existing natural resource plans and regional landuse

planning instruments developed over recent years by many committees and council processes.

An illustration of how successive phases of planning may build upon earlier stages is contained in the HRC's report of its Hunter River Inquiry. There, the HRC recommended that a community agreed vision for the Hunter Valley catchment area should be pursued as a strategy (with priorities defined as in Principle 1), with explicit interrelationships between that regional strategy and other economic and resource-specific plans for the region. The HRC emphasises the need for the various plans, including land use plans, to be truly integrated rather than simply collated, in recognition of the fact that each plan can influence the opportunities and constraints of the other.

Coastal Lakes Strategy

Similarly, the Government-endorsed Coastal Lakes Strategy, recommended by the HRC, aims to create a system of land use decision making that recognises and addresses the limitations of coastal lakes and their catchments to sustain development and use.

The Coastal Lakes Strategy categorises lakes as an initial step followed by the preparation of Sustainability Assessment and Management Plans (SAMPs) for those lakes where there is an urgent need to determine limitations to future development and to apply the right mix of management tools in meeting assigned responsibilities. Key factors to be addressed in these assessments are:

- significant ecosystem processes and thresholds;
- significant catchment processes and characteristics;
- the values citizens place on the environment, resource management and use and amenity as well as Aboriginal values;
- public health implications of lake conditions; and
- the best instruments to secure the desired results.

Similar assessments, using comparable methodology, are needed to evaluate the limitations and capacities of rivers to sustain development within their catchments. The SAMPS aim to inform catchment strategies so that impacts are addressed *before* land use decisions are made.

Setting catchment priorities

While it is important that there be state-wide standards and processes for making natural resource management decisions, HRC Inquiries have also shown that local communities are capable of developing approaches particularly tailored to the needs of their region. Imposition of too strict a regime can stifle local initiative and prevent the most suitable approach. The challenge in developing state and national policy and associated legislation is to provide adequately for both consistency and flexibility. Correspondingly, the challenge for Catchment Management Authorities is to define regional goals and management strategies that reflect local and regional opportunities, constraints and priorities while remaining within the boundaries set by state-wide standards, processes and guidelines. The HRC's Inquiries have suggested that, to date, those challenges have been neither fully recognised nor overcome.

As well as consistency with state and national objectives, effective catchment management requires environmental and socioeconomic goals for each catchment to be considered together, and priorities set which are appropriate to both types of goals. There will often be some conflict between the different goals, but, where possible, strategies that produce both environmental and socioeconomic outcomes should be sought.

Sustainable farming

Such strategies are particularly applicable to the farming sector. For example, there is growing evidence that some agricultural practices, which improve the local environment, can also lead to increased farm productivity. The degree to which that approach can be applied will vary from one area to another as, while in some areas farming enterprises are highly profitable, in other areas they can be marginal. Effective management of rural catchments will therefore require incentives and structural adjustment programs to be carefully targeted to achieve greater levels of both environmental sustainability and enterprise profitability. For example, farmers could be assisted to retire unsuitable land or practices, change enterprises or move to more sustainable and profitable practices, as appropriate.

The HRC's North Coast Rivers Inquiry report explains the HRC's advocacy of incentive-based approaches (rather than approaches that rely too heavily on regulation) to achieve improved environmental outcomes from agricultural land uses. It discusses also how properly structured incentive programs should be used to facilitate an *integrated* approach focused on ecosystem services rather than 'single issue' environmental services.

Understanding natural processes

The HRC's Bega Inquiry highlighted the importance of also understanding the natural riverine processes prevailing in a particular part of the catchment *before* setting catchment priorities. For example, the prevailing geomorphic instability of the Bega River had to be recognised and accommodated in any plans for its rehabilitation. Without consideration of such factors, it was likely that management efforts to restore banks, reduce sedimentation and control willow infestations could be made redundant by natural processes of riverine adjustment that were predicted to continue for some time into the future.

Principle 6: Adaptive management

Incomplete information, or lack of scientific certainty regarding natural processes is no excuse for delaying decisions and actions now. In such circumstances, plans based on the best available information should be developed, and action taken. Outcomes should then be regularly monitored and strategies reviewed in light of the feedback. This approach is known as adaptive management.

A management process that provides for some adaptation in the light of experience and results is imperative, not only because of uncertainty in the way natural systems will respond to further interventions, but to allow for the evolution in knowledge and management practice.

Each cycle of adaptive management is equivalent to a strategic 'experiment', where action is based on best available information and results reviewed over time to confirm or amend continuing action in light of the additional knowledge gained. Such an approach is essentially a risk management strategy – it represents an attempt to contain the risks associated with the need to take action under conditions of uncertainty. In this way, environmental and/or socio-economic decline can be addressed before irreversible change occurs.

Like any risk management process, this involves balancing at least two areas of concern. One is the need to act before damage becomes so great as to be irretrievable. The other is the need to provide a measure of predictability for resource users. While that is often reflected in calls for long-term agreements and fixed approaches, an adaptive regime, mutually understood from the start, guarantees that new rules will not be *arbitrarily* imposed as new information comes to hand or as results fail to meet expectations.

Adaptive management is still not commonplace. More often, politicians, landowners and developers, businesses, councils and even environmentalists, seek legal certainty in dealing with, for example, resource security, property rights, landuse and zoning. Certainty can be provided in legislation, regulation and plans that deal with specified physical property. But if *natural* systems are to be managed effectively, *new* adaptive frameworks need to be developed and built in, and existing mindsets and pervasive legal and administrative traditions must be challenged. In particular, on the part of the holders of resource entitlements, 'resource security' must come to be recognised as providing for change within specified parameters and under specified conditions rather than precluding *any* change. For their part, resource managers, must accept that resource security *limits* their opportunity to make ad hoc amendments to entitlements, notwithstanding any scientific or political pressures to do so.

Feedback systems

To address this issue of 'security' in the face of uncertainty, strategies must specify stages of implementation. Each subsequent stage should be based on the feedback available about the degree of success that has been achieved. For that reason, river health monitoring programs must be strategically designed to provide the necessary feedback and to improve

the overall information base progressively. Nevertheless, inscribing adaptive management into our policy frameworks and legislative instruments presents a suite of new challenges, particularly in the area of landuse planning, where accountability for remedial action is often poorly defined after approval is given.

However, if the need for adaptive responses is recognised from the outset, appropriate management instruments can be considered and incorporated at the planning stage. For example, if the risks of on-site sewage disposal in rural residential subdivisions are acknowledged, instruments, such as 'community title' can be used to create both management obligations and adjustable contracts with groups of owners. In other cases, such as mining and aquaculture development, the HRC has recommended that operators post financial bonds commensurate with the potential risks to river health. This approach is likely to encourage a rapid response by the operator to negative feedback.

In yet other cases, there is the opportunity to utilise existing instruments such as those governing the collective responsibilities of the owners of properties within canal estates to maintain navigation or drainage in the canals. For example, in its Clarence River Inquiry, the HRC recommended that such property owners be required to take on the additional responsibility of mitigating the discharge of acid from soils disturbed by such developments.

Targeted monitoring

In its Bega Inquiry, the HRC approach to adaptive management requires targeted monitoring to be undertaken to allow the effectiveness of management programs to be assessed and adjusted as necessary. This included monitoring of the quality and quantity of water, the condition of biota, riparian vegetation and the condition of stream channels, including rehabilitation of gross channel form and improvements to instream habitat. The HRC introduced a targeted program tied to those management strategies needed to secure critical objectives, having drawn on the wide-ranging skills of an independent expert panel.

Principle 7: Government-community partnerships

Governments and communities should meet their obligations for river and other natural resource management within explicit 'partnership' arrangements, based on unambiguous statements of their respective roles and responsibilities. The rights and interests of traditional owners should be recognised and included in such partnerships

Both governments and communities have responsibilities for the state of our natural systems and the way natural resources are used or conserved. Communities must be empowered to participate in decision-making at all stages, but they must be able to rely on governments, acting through their agencies or local councils, to make decisions on matters affecting the public interest that are the proper province of government. It is important for all concerned to make explicit just how such interaction is to occur, how conflict is to be resolved, how governments are to undertake credible assessments (in order to make their decisions) and how governments and community are to share accountability for outcomes, as demonstrated by independent assessments and audits.

For example, it its Georges River - Botany Bay Inquiry, the HRC recommended, and the Government endorsed in its SOI, a new participative and integrated management framework for Botany Bay. The framework recognises the need:

- for greater partnership between the three levels of government with responsibility for activities which impact on the bay;
- for greater stakeholder involvement and community participation and for planning and management to be better informed by independent science;
- to promote integration in management and planning by recognising the bay as one, interrelated biophysical system;
- to facilitate a more strategic approach to management and planning through early development of common goals for the bay and progressive development of a set of strategies to achieve them; and
- to provide for conflict resolution, collaborative efforts between agencies and councils, good predictive models and strong accountability and partnership models.

The need for government-community partnerships is nowhere more evident than in the area of funding the better management of river and other natural resources. Recent planning by Catchment Management Boards throughout the state clearly demonstrate the level of funding required to meet the cost of addressing *critical* ecosystem and natural resource degradation. The level of funding identified in these processes is unlikely ever to be met completely by the public purse.

Of course, given the nation's dependence on healthy rivers and on the use of their natural resources, the cost of failure to shift to a sustainable basis is even higher.

Incentive-based change

It becomes imperative therefore to find new and carefully targeted approaches that will stimulate appropriate private sector responses, by farmers, other landholders, businesses and citizens. Such approaches must clearly reject the notion that farmers represent a primary threat to the health of rivers. After years of public Inquiries, the HRC is convinced that farmers have the potential to act as genuine custodians of land and rivers and as effective agents for their rehabilitation, and that resource management effort must be directed towards realising that potential.

That does not mean that the HRC or community should condone inappropriate past practices, nor that legitimate and effective regulation should be foregone. Rather, policy frameworks and legal instruments must be created that embody a mixture of incentives and sanctions that will encourage 'river friendly' practices and the delivery of environmental goods and services, while discouraging and/or penalising harmful practices.

Current efforts to develop market based instruments and 'green-offsets' represent important steps towards a new approach for managing natural resource systems. Much remains to be done in this regard. There are many difficulties—such as those associated with defining property rights, and the risk that measures generating gains on any one resource front may simply be offset by intolerable losses on other fronts. However, given that traditional approaches have clearly not been successful, innovative mechanisms must now be developed, tested and evaluated.

Partnership agreements

For example, in its Clarence Inquiry, the HRC recommended a Floodplain Partnership Agreement be developed as an effective framework for managing coastal floodplains and their interfaces with estuaries. Such an approach is to include:

- a plan that is both strategic and detailed with clear obligations for all parties;
- cost sharing arrangements determined prior to plan finalisation with costs divided between landholders, local, state and federal Government;
- clear audit, accountability and review requirements, including licences and contracts, binding landholders and other stakeholders to their obligations;
- rigorous measures to protect the environment;
- a high degree of self determination by landholders; and
- third party comment and involvement.

Such partnership agreements can and should be established to help manage many natural resource issues across the State.

Advancing indigenous interests in healthy rivers

In establishing partnerships and the mutual confidence surrounding them, it is critical that the rights and interests of Aboriginal people in relation to catchments, rivers and their resources receive priority attention. Just as irrigators point to intergenerational associations with rivers and water, even more can Aboriginal people point to past associations over some 40,000 years. The issue is more one of rights, interests and equity than one of legal positions and claims.

Attempts by the HRC and various State agencies to engage Aboriginal communities in identifying critical issues and rights have served to highlight the urgent need for a dedicated State strategy and protocol for on-going dialogue and negotiation about (land and) water management and allocation. Such a strategy needs to recognise that Aboriginal rights and interests in water and healthy rivers cannot be separated from their interests in land, economic self-determination, cultural heritage and spiritual traditions.[11]

This on-going challenge could appropriately be met by management arrangements, including in the exercise of powers by the Natural Resources Commission and Catchment Management Authorities.

[11] Behrendt & Thompson (2003) provides a detailed account of these issues.

Conclusion

The HRC was established in 1995 as a key element of a water reform program, which particularly responded to community concern about river health. For the first time, coastal communities were given the opportunity to present their views to an independent and public mediator on what they wanted for their river systems, and ways of achieving those goals. The authority or influence of the HRC in making recommendations to Government derived from its roots in the community and its recognition of the rights and interests of the many stakeholders.

For the first time, an Inquiry process has examined the needs of coastal rivers as whole ecological systems inextricably linked to their communities and the social and economic benefits that they provide. Rivers respond as whole systems, so effective management cannot be achieved by managing soils, flows and water quality in separate ways. Each river is more than a source of water, more than a drain and more than something of beauty on which to gaze.

Government decisions on HRC recommendations have been made public in comprehensive Statements of Intent (SOIs) that create, again for the first time, visible mechanisms by which the community itself can hold state agencies and authorities accountable for outcomes. The requirement for independent and public audit of the implementation of those SOIs, two years after their release, further strengthens that accountability.

The first of those audits, recently undertaken by the HRC in relation to the Hawkesbury Nepean and Shoalhaven River systems, suggests that some important gains have been made but that much more needs to be done to implement Government decisions and thereby advance river health in those systems. Much that has been learnt needs to be better applied. In fact, between 2001and 2003 separate agency programs continued to prevail over the whole of government priorities reflected in those SOIs.

The state now enters a new era, with a Minister and new department with a focus on natural resource management (Department of Infrastructure Planning and Natural Resources) and a Natural Resources Commission to provide independent and cohesive advice. This will help create a climate conducive to more integrated approaches to the management of our rivers and other natural systems and their resources. The public champion role of the HRC in speaking for the rivers of the State will be merged into the Natural Resources Commission. That Commission will have an audit role, so it will continue to undertake independent audits of the SOIs.

As this subsequent stage of the reform proceeds, informed among other things by the lessons learned from HRC Inquiries, many challenges for government and community remain. On the positive side, there are advances in scientific knowledge, in community awareness of the capacity limits of natural systems and in the sophistication of policy making processes. However, future managers, including government agencies, local councils and the new Catchment Management Authorities, must now meet the expectations of more informed and demanding communities, who are likely to look beyond verbal commitments to actual results.

All of the HRC's Reports detail the strategies and management approaches that it has concluded are essential if the government's commitment to satisfy citizens' reasonable expectations for healthier rivers are to be met. The key principles underlying those strategies and approaches are set out in this document as tools for the use of managers and community alike.

Each river and lake system is unique, requiring a degree of customised management. Despite this, for each system subject of a HRC Inquiry, the HRC has uncovered no instance of a river health problem the origin and persistence of which could not be attributed to a failure to apply one or more of the principles described in this document.

Therefore the HRC believes strongly that endeavours to deliver significant and timely advances in river health will be enhanced by further, and ongoing, consideration by all those who care about rivers and those who are involved with their management. In individual cases, there may be value in turning to the Commission's Inquiry reports, which deal with the local domain and provide the basis on which these principles have been built.

The community must also continue to play its role in demanding river health be kept at the forefront of government policy at the national, state and local level. Given the interactions the HRC has had with farmers, environmentalists, councils, scientists and committed agency officers through its eleven public Inquiries, it remains confident that catchment communities *will* continue to be ever vigilant - 'people power' *will* prevail.

The recent collaboration of the Australian Conservation Foundation and the National Farmers Federation clearly demonstrates that farmers and environmentalists can and will work together to secure *healthy rivers for tomorrow*. It is now time for all stakeholders in the State's catchments to play their part in securing their common future.

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