

# **The truth is out there! Knowledge sharing in Victoria's Catchment Management Framework**

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## **Introduction**

Healthy catchments provide both urban and rural Australians with a wide range of services necessary to sustain life; water quality and quantity, salinity mitigation, carbon sequestration and food are just a few. But, across the country, our natural resources are under extreme pressure and efforts to protect and sustainably manage our natural capital are struggling to keep pace with the breadth of degradation. One of the key issues, and the subject of this paper, is the 'system' of knowledge that underpins natural resource decisions. The way in which we support learning, innovation and knowledge sharing is proving fundamental to the more sustainable management of our catchments.

## **Integrated catchment management**

Integrated catchment management (ICM) forms the basis for sustainable land and water management in Australia. State and territory governments have moved to create regional (and often catchment-based) frameworks for land management planning and resource conservation. Where ICM most differs between the States is in the administrative structures and in the nature of specific legislative support.

Coupled with this shift is the realisation that to make ICM work, a major community role is essential. This follows from the Landcare initiative and ICM statements, which speak of 'partnerships in action' and of the government and community 'working together'. Implementation of ICM is based on the establishment of community-led committees whose major role is to provide a forum for community input and discussion, to prioritise the issues and to develop and promote the adoption of catchment management strategies. Regional ICM strategies, developed with community input, form the basis of partnership agreements between federal, state and local governments and the community.

The planning task is complex; it must attend not only to the natural linkages among the biophysical resources of the catchment, but also to the diverse interests, values and experiences of those who depend on it. Likewise, research and development (R&D) activity relevant to catchment management needs to address a wide range of issues and attend to biological, physical, economic, social and institutional concerns. In ICM it is possible to conceive of three 'solitudes' or 'communities' which need to be united if we are to move toward more sustainable use of catchments; one includes science and scholarship, another includes business and policy and the third includes community and citizen action (Holling, 1998).

One of the difficulties that surfaces in these interactions between different 'solitudes', is the dilemma of knowledge sharing; put simply, how best to ensure that knowledge moves between them. An effective knowledge system will recognise the diverse ways in which knowledge is constructed and interpreted.

## **The knowledge 'problem'**

The distillation of knowledge from information and the focusing of knowledge generation into areas of need have been identified as key challenges for effective ICM in Australia. In a recent review, Campbell (2006:7) concludes that whilst much of our effort towards more sustainable use of our land and water resources is leading edge, our knowledge management system is wanting:

It is too hard for people in any part of the system to find out what is happening and what is being learned elsewhere - or has been learned already. Consequently, decisions may not always be based on the best available information, past mistakes may be being repeated and we are probably not getting the best possible return on investment for public and private funds and effort.

A particular issue is the extent to which the knowledge needs of regional ICM bodies are being met. Typically, information and knowledge relevant to a particular planning context is scattered across a wide range of institutions and agencies. Catchment planners have neither the time nor resources to access, use and share knowledge that is relevant. Where opportunities exist for catchment planners and managers to hear first hand about current R&D activity, the costs are often prohibitive. Sometimes, it is simply a case of R&D groups not being able to meet the demand.

A number of projects are investigating ways of supporting learning and knowledge in the regions; a Victorian example is the subject of this paper. 'Knowledge Brokering for Regional NRM' is a major Land and Water Australia (LWA) project, which is investigating ways to improve knowledge connections between regions and national research and information providers (LWA, 2006). Examples include a research database built by the Corangamite Catchment Management Authority ([www.ccma.vic.gov.au](http://www.ccma.vic.gov.au)); a traditional knowledge recording project with Traditional Owner groups in Cape York ([www.balkanu.com.au](http://www.balkanu.com.au)); a website in the dry tropics that provides for community feedback on a regional NRM plan ([www.burdekindrytropics.org.au](http://www.burdekindrytropics.org.au)); and a biodiversity project, driven by a knowledge broker working across four catchment management authorities in northern Victoria ([www.nccma.vic.gov.au](http://www.nccma.vic.gov.au)).

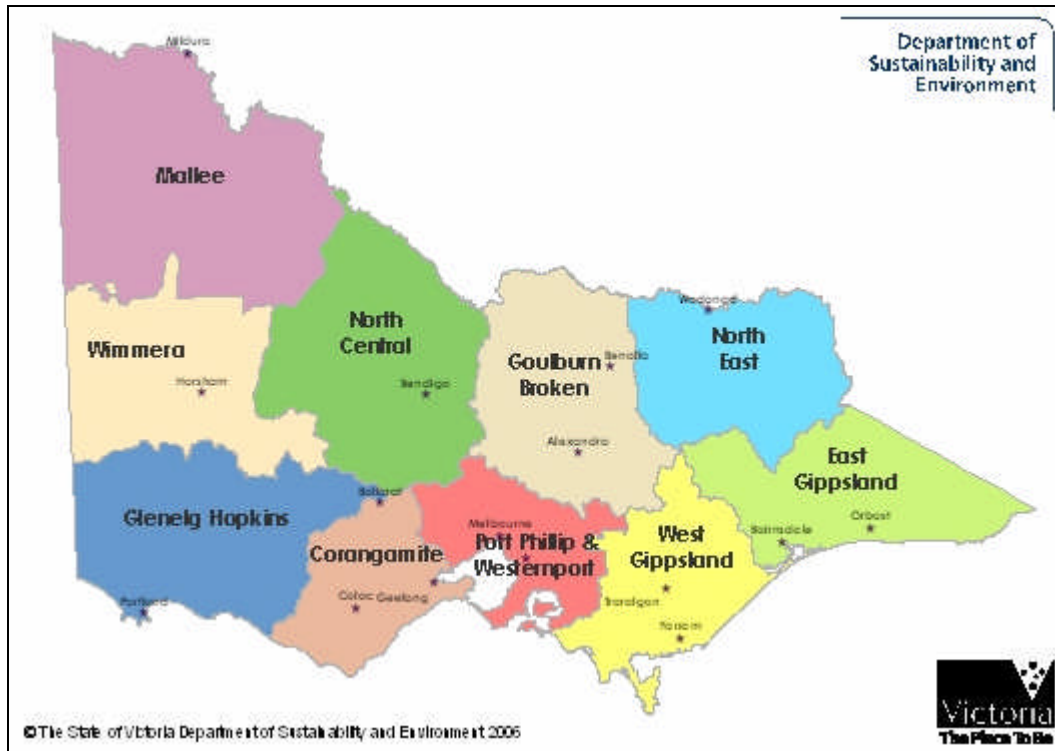
### **Adaptive management**

Before considering the detail of the Victorian case, it is important to touch briefly on the concept of adaptive management. Walters (1997) uses this term to refer to a structured process of 'learning by doing'. The first step of the process is to bring together current understandings of the workings of a system. Second is the design and implementation of management 'experiments' and third, the design of monitoring programs to measure system responses to those experiments. Finally, monitoring outcomes assist in the further refinement or modification of management actions, and so the process continues. Knowledge management is, therefore, an intrinsic part of the adaptive management cycle. Many of the ICM bodies around the country rely on an adaptive approach to their task; regional catchment strategies are considered not just static prescriptions but rather as 'living' frameworks to be built upon as system understanding grows. In Victoria, for example, each catchment management authority develops a regional strategy, to be reviewed and renewed every five years.

### **Victoria's catchment management framework**

In 1997, Victoria ushered in a new system of catchment management. This system, known as the 'catchment management framework' (CMF) was derived from regional community land management activity – predominantly Landcare and the catchment-based waterway management authorities. The framework recognises that over two thirds of Victoria's landscape remains privately owned and community participation is required to address NRM and sustainability issues. The CMF encompasses ten Catchment Management Authorities (CMAs), covering ten catchment regions (Figure 1); the Victorian Catchment Management Council; and relevant government agencies, principally the Department of Sustainability and Environment (DSE) and the Department of Primary Industries (DPI).

Figure 1: Victoria's Catchment Management Authorities



The Victorian Catchment Management Council (VCMC) was appointed in 1997 to facilitate integrated and coordinated catchment management through the CMF. The VCMC is the State Government's peak advisory body on catchment management. The Council is uniquely placed, independent of government agencies, CMAs and nongovernmental organisations, to take a long-term view and influence change in working towards its vision of 'healthy rivers flowing through ecologically sustainable and productive catchments'.

### **Catchment condition reporting**

Every five years the VCMC is required by the *Catchment and Land Protection Act 1994* to report to Parliament, through the Minister responsible for the Act, on the condition and management of Victoria's land and water resources.

The first report, *Know your Catchments* (VCMC, 1997), stimulated a major project to establish a suite of indicators for reporting, not only on land and water resources but also the related social and economic base of the State's catchments. In the Council's second report, titled *The Health of Our Catchments: A Victorian Report Card* (VCMC, 2002), 32 indicators were used to make these assessments at both regional catchment scales and at a statewide level. The report reviewed the ability of the ten regions to continue to provide life-sustaining services to a growing and increasingly urbanised population.

One of the critical issues raised in *The Health of Our Catchments* related to knowledge management. Victoria is information-rich; there has been long-term investment in the development of knowledge assets in the forms of reports, unpublished material, spatial and non-spatial datasets, libraries, information systems, models and applications. Added to this is a wealth of tacit knowledge held by individuals and communities. Nevertheless, continued gaps in understanding brought about by lack of information, poor communication and sporadic processing of existing information were identified as fundamental constraints to

more effective natural resource management.

In 2003, in response to these findings, a joint VCMC/CMA R&D Committee undertook a more detailed review of knowledge needs identified in the Regional Catchment Strategies and the Regional Catchment Investment Plans. Subsequently, the Committee broadened its subject brief to encompass knowledge management and expanded its membership base to enable this to happen. The Committee is now known as the Natural Resources Knowledge Management Committee (NRKMC) and includes representatives from VCMC, DSE, DPI, CMAs and LWA.

Thereafter, VCMC coordinated an evaluation of the ways in which the catchment community is currently generating, managing and using knowledge. The project also explored, specifically, the potential role of knowledge brokers within the CMF. A set of recommendations outlining characteristics of a preferred business model were developed for the NRKMC and it was agreed that 'knowledge brokering' was fundamental to a new model.

The VCMC was later successful in obtaining funding, from the National Action Plan for Salinity and Water Quality, to develop a knowledge management business plan for the CMF and to undertake a brokering trial. This project, known as the 'Catchment Knowledge Exchange', commenced in October 2005. Briefly, it will:

- (i) complete a business case for a Victorian NRM knowledge brokering initiative;
- (ii) develop a paper on options, roles and responsibilities for knowledge brokers in Victoria; and
- (iii) implement and evaluate a soil health knowledge broker trial (12 months).

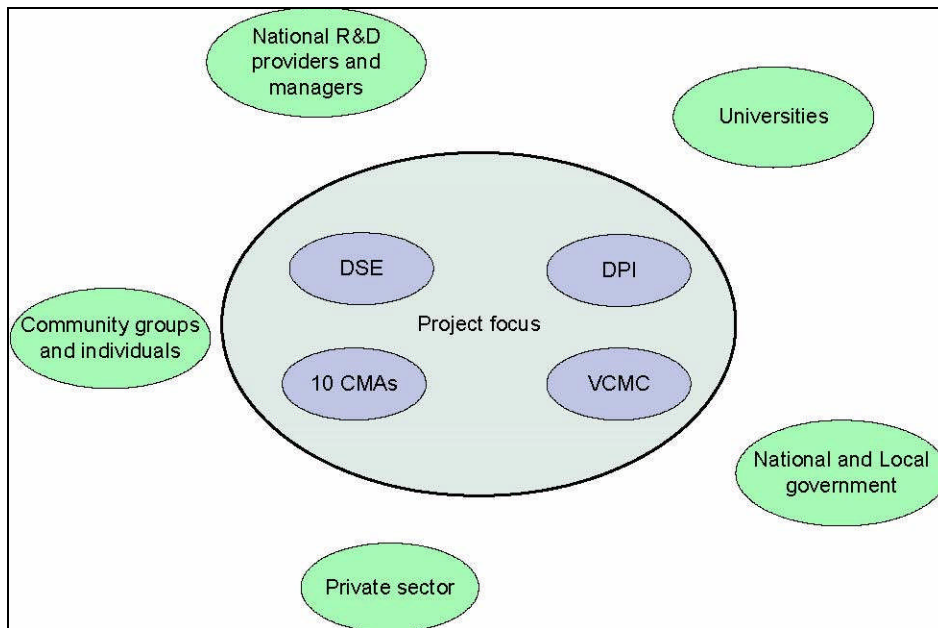
### **The Catchment Knowledge Exchange (CKE)**

Knowledge brokering is gaining interest and acceptance across Australia. In addition to LWA's work described earlier, a number of organisations such as Cooperative Research Centres and catchment management authorities have appointed knowledge brokers. In this project, the objective is to test the case that a purposeful knowledge brokering service will improve the availability and accessibility of knowledge for decision making across Victoria's CMF.

From the point of view of the VCMC, the development of a business case will be a fundamental outcome of the project. One of the present difficulties in Australia is the extent to which investment in NRM is characterised by short-term contracts and project-based funding (Campbell, 2006). Thousands of individual projects are being funded; however, with few systemic attempts to have their findings widely accessible, there is a serious risk of 'reinventing the wheel' or having projects serve no purpose in the sense of adaptive management. It is important that this project has a legacy within the CMF and for this to happen, the imperative for a knowledge brokering service needs to be well established.

Another outcome of the project will be an 'operational plan' (Figure 2). Using the experience of the soil health trial, the plan will outline a process to implement a knowledge brokering service, including activities, protocols and procedures. Experience suggests that there is no single job description for a knowledge broker and the plan will be mindful of this. It is understood, however, that a role common to all knowledge brokers is to act as a go-between to link sources of knowledge and users of knowledge, with the core function being to connect people to share and exchange knowledge (CHSRF, 2005). It is particularly useful for mediating between the different knowledge domains or 'solitudes' described earlier. The term knowledge brokering 'service' is used here to refer to instances which involve more than an individual broker, with either a team of brokers or a knowledge broker and other individuals or services, such as web support and research input.

Figure 2: Institutional focus of the CKE and the knowledge broker operational plan



### **The Knowledge 'System'**

As Campbell (2006) has observed at the national scale, one of the challenges in Victoria is to get the best performance from what might now only loosely be called a knowledge 'system'. The CKE project has proposed eleven essential components or 'elements' of a robust knowledge system, adapting the work of the Cochrane and Campbell Collaborations ([www.cochrane.org](http://www.cochrane.org); [www.campbellcollaboration.org](http://www.campbellcollaboration.org)) (Table 1). These 11 elements are not necessarily sequential, but they do represent a broader understanding of the entire knowledge management system within which a broker might operate. As a first step in trying to 'bound' a soil health knowledge system, it has been a helpful process to use this framework to help map where current activity resides in the 'system' and where more effort might be needed. The project itself does not have the scope to address all of these components – for example, it is not envisaged that the knowledge brokering service will be directly involved in knowledge generation (item 10). However, it will be active in knowledge synthesis (3), reporting (5), evaluation and learning (7), knowledge gaps (8), the development of collaborations (9) and facilitation (11).

Table 1 Working towards a soil health knowledge system (working draft)

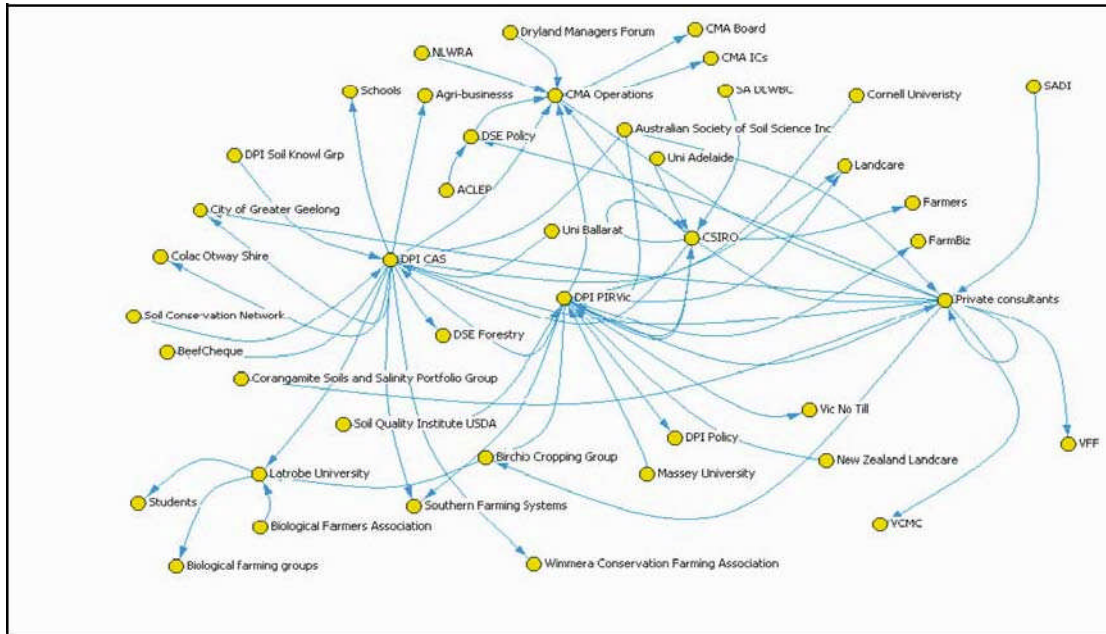
	Elements	Example
1	Identification of business need	Policy (a request from the NRM ministerial council), or management (needs arising from the increased interest in raised bed cropping)
2	Quality assurance	Peer review
3	Knowledge synthesis	State of knowledge reports Synthesis of special editions of a journal Tracking of journal papers
4	Consolidations of datasets and specialist knowledge	Victorian Water Resources Data Warehouse
5	Reporting and dissemination	Web products Grains Research and Development Corporation seminars Newsletters
6a	Practice Change through evidence to practice-management, paddock level	DPI Extension services Birchip Cropping Group Pivot agronomists Dairy industry extension
6b	Practice Change through evidence to policy and strategy	Adaptive Management Modelling and mapping to support priority setting
7	Learning and evaluation	LWA Research return on investment
8	Identification of knowledge gaps	Victorian Water Trust Assessment of Knowledge Gaps
9	Development of knowledge collaborations	Land Technology Alliance Water Research Cluster (The University of Adelaide)
10	Knowledge generation, through R&D, monitoring and evaluation, and contributions from practitioners	'Our Rural Landscapes' LWA Healthy Soils Initiative Tertiary Sector
11	Knowledge 'system' facilitation	Oversee functioning of the system and the interactions between the elements

### Soil health knowledge broker trial

Another key feature of the CKE project is the soil health knowledge broker trial. Ideally, a knowledge system should be able to manage NRM knowledge in an integrated way, rather than considering a single component, such as soils. However, for the purpose of the trial, the focus is on a single issue in an area where existing knowledge is not used effectively and there remain critical gaps in understanding.

Preparatory work for the trial has included a social network analysis (SNA) which was used (i) to benchmark the current form of the soil health knowledge network relevant for Victoria and (ii) to identify opportunities and weaknesses in communication across that network. This work provided both visual and statistical interpretations of the way in which individuals, groups and organisations, across Victoria, access and share information about soil health. For example, Figure 3 shows a network map for organisations identified by respondents in the SNA; that is, organisations from which soil health knowledge is sought, or to which soil health knowledge is provided. Maps like these help identify key nodes of activity, the nature of links across the network, how newcomers might be introduced to the network and how knowledge flows might be improved. The SNA will be repeated in late 2007, to determine differences in the network and to evaluate the merits of SNA as a tool in the design and operation of a brokering service.

Figure 3: Soil health organisational social network map (March, 2006)



Another early task was the preparation of a soil health ‘statement’, offering a snapshot of current understanding on soil health, future needs and directions in Victoria. The statement is a working draft and is intended to stimulate thinking and discussion. A soil health reference group provides specialist input into the statement and will assist the knowledge broker through the trial.

The knowledge broker trial was launched mid-2006 at an open forum on soil health, jointly funded through the North Central CMA, the VCMC, LWA and the CKE, with support from DPI. One purpose of the forum was to share knowledge needs and help identify some critical questions that might be tested through the trial. Common questions were on issues such as land capability, the impacts of climate change and how to quantify the ecosystem services derived from soils.

Until mid 2007, the trial service will seek to meet the needs of CMAs and others with an interest and responsibility for soil health in Victoria. Activities are likely to include the bringing together of people to share ideas and questions, promoting communication across the networks, synthesising knowledge, and helping to shape research questions. An interactive web application will support the work of the broker.

### Where to from here?

It must be stressed that what is described in this paper is thinking that has emerged from a project that is still in its early stages. The CKE project is very much about trialling a *process* and testing various tools and ideas along the way (such as SNA, the idea of a theme ‘statement’, the forum and a monitoring evaluation and learning plan). In the final event, experience generated throughout the project, will help articulate the strategic need for improved knowledge management and a plan for operational knowledge brokering in the CMF.

To keep abreast of the CKE project and the soil health trial, or to become involved in the project, visit the VCMC website: [www.vcmc.vic.gov.au](http://www.vcmc.vic.gov.au). The VCMC would very much welcome comment or feedback on the project. The project work is being undertaken by EWR ([www.ewr.net.au](http://www.ewr.net.au)).

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