Adaptive management

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Melbourne Water uses adaptive management to ensure that decision making is based on sound and current knowledge. This increases our ability to carry out activities that will result in the greatest gains for waterway health. Adaptive management relies on focused monitoring, investigations and research to build our knowledge of waterways and understand changing environmental conditions, outcomes of management approaches and the effect of external drivers such as climate change. We evaluate these programs to inform our planning and implementation and report outcomes to ensure knowledge is shared.

Adaptive management is a systematic process for improving the effectiveness of natural resource management by learning from experience and utilising current knowledge to inform decision making. For example, we monitor the implementation of on-ground works and their impacts on key values and waterway condition. This informs our next stage of planning, including target setting and prioritisation of works.

This approach is critical because the natural environment is complex, with many factors influencing the relationships between waterway condition and the values that waterways support. These factors may be inside or outside our control, have varying levels of predictability and the effects may occur on a small or large scale, with flow-on effects within and beyond a catchment. Adaptive management ensures we can continually learn and improve our management approaches.

Figure 6.1 shows Melbourne Water's adaptive management cycle which underpins Melbourne Water's investment in managing healthy waterways. It is based on the principle of continuous improvement and includes planning, implementation, monitoring, and evaluation and reporting. Coordination and collaboration are central to our approach, while knowledge and information management, particularly knowledge gained through our monitoring, investigations and research, informs every step.

This approach is consistent with the Department of Environment and Primary industries adaptive management cycle outlined in *Monitoring, Evaluation and Reporting Framework. Land, water and biodiversity, June 2012.*

Box 1.3 provides a case study of how adaptive management has been used by Melbourne Water in extreme events. The following section focuses on our monitoring, investigations and research programs and their role in adaptive management.

Monitoring, investigations and research

Monitoring

Monitoring is the systematic collection and analysis of data. It includes monitoring randomly selected sites to assess waterway or value condition and returning to selected sites at regular intervals to measure changes. Monitoring provides the data to measure the condition of waterways, the values they support, threats to waterways and values, and outcomes of our management actions.

Investigations

Investigations complement information obtained through monitoring by focusing on understanding key issues that may arise in a specific area. They use targeted data collection to understand an issue, such as the impacts of deer grazing on vegetation establishment, and help to identify management options for those issues.

Research

Research projects are usually experimental, longer-term studies (for example, three to five years) that seek to address critical knowledge gaps for strategic planning (strategy development, works prioritisation and planning, and asset management systems) or to improve the efficiency and effectiveness of on-ground activities.

The role of monitoring, investigations and research in adaptive management

In combination, monitoring, investigations and research helps us understand the relationships between waterway condition, values, threats, external drivers and management actions. A key tool for managing knowledge and using research to inform management is conceptual models. These models document relationships and the level of certainty in the strength of them. Monitoring, investigations and research help test and refine critical assumptions in these conceptual models.

In the implementation of the *Healthy Waterways Strategy,* monitoring, investigations and research will be targeted at increasing the confidence in particular assumptions within the conceptual models, for example to provide data on an issue or relationship that currently relies on expert opinion and anecdotal evidence. Continually strengthening our conceptual models is part of robust adaptive management and enables decision making that will result in the most beneficial outcomes for waterway health across the region.

Evaluating and reporting outcomes of monitoring, investigations and research to our partners and the community strengthens knowledge sharing and collaboration and effective collective action. It enables us to communicate information on the condition of waterways, the effectiveness of activities, investment outcomes and progress towards our vision.
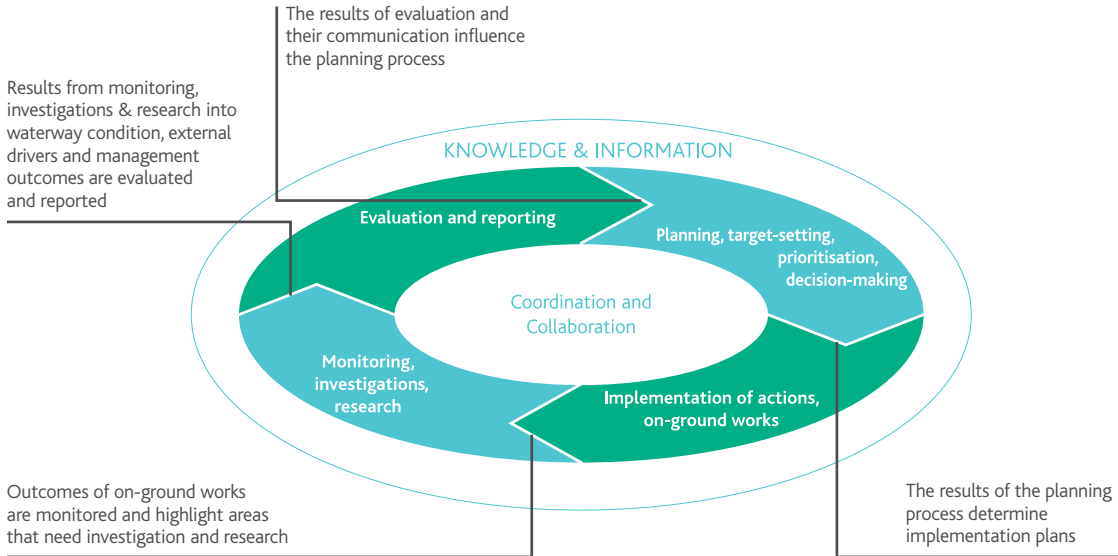

Figure 6.1: The adaptive management cycle and how it guides Melbourne Water's investment in managing for healthy waterways

We take a collaborative approach with our partners to further build our knowledge on managing waterways and their values. Our partners include the Victorian and Commonwealth governments, community partners such as Healthy Waterways Waterwatch, Frog Census and BirdLife Australia, universities and other research institutions.

Advantages of collaboration include obtaining access to a broad range of expertise and current thinking, increased knowledge sharing, undertaking a larger volume of research across a diverse range of themes, and opportunities to leverage investment.

Strategic directions and activities

Monitoring and investigations

Key monitoring and investigations activities that Melbourne Water will undertake in 2013–18 are:

Monitoring the condition of values that waterways support

> Working in partnership with the community and research organisations to monitor the condition of the key environmental values of vegetation, fish, macroinvertebrates, platypus, frogs and birds across the Port Phillip and Westernport region, for example through platypus surveys and frog census

> Monitoring community satisfaction with waterways to understand relationships between satisfaction and amenity

> Site-specific investigations for other environmental values of waterways as required, including geomorphic investigations, and focused biodiversity and threatened-species monitoring

> Monitoring the impacts of management actions on values.

Monitoring waterway condition

> Collecting data on condition and threats including for the statewide Index of Stream Condition, Index of Estuary Condition and Index of Wetland Condition. These indices integrate data on key components of rivers, estuaries and wetlands that are important from an ecological perspective, and are designed to understand broader patterns and trends in waterway condition. These indices are not designed to measure the local effects of management actions at specific sites in short timeframes, but components of the indices are important to understand changes across the state over time (such as stream form)

> Monitoring water quality at a broad range of fixed water quality stations throughout the Port Phillip and Westernport region, including estuaries, in order to report compliance against *State Environmental Protection Policy (Waters of Victoria)* objectives to EPA Victoria

> Identifying and monitoring critical drought refuge sites in partnership with Healthy Waterways Waterwatch

> Monitoring Sites of Biodiversity Significance and ensuring compliance with Ramsar obligations around protected habitat values at Western Treatment Plant and Edithvale-Seaford Wetlands

> Supporting community-based monitoring programs such as Healthy Waterways Waterwatch and EstuaryWatch, that contribute data and engage the community on waterway health issues

> Monitoring local condition as required including flows, water quality and vegetation

> Monitoring the impacts of management actions on waterway condition.

Monitoring influences on waterways

> Investigating causes of poor water quality at 'pollution hotspots'

> Monitoring and investigating key recreational waterway reaches for microbial quality and blue-green algae

> Supporting other agencies to investigate the suitability for consumption of fish from urban waterway reaches (see *Stormwater Strategy*).

Data management, evaluation and reporting

Data management

Good data management is vital to enable access to reliable information in a timely manner that satisfies the needs of planning, communicating and reporting on the effectiveness of on-ground works. Melbourne Water collects data from our monitoring, investigations and research programs, including data on waterway condition and values, results from our on-ground works, and factors affecting public health.

We are committed to improving our data management systems, undertaking shared reporting and improving the online accessibility of this information to our partners and the community. Our actions and collaborations include:

> Continuing to improve the systems by which we collect and store data, consistent with our strategic asset management approach. This involves managing data by asset type throughout the life cycle, including natural assets such as waterways

> Exploring ways of undertaking shared reporting to make better use of our data

> Aligning with the Department of Environment and Primary Industries' new Index of Stream Condition methodology.

Evaluation

It is important to interpret and evaluate monitoring and investigations data and research results at regular intervals to translate them into useful information. This allows us to evaluate the effectiveness and efficiency of our works programs and the impacts of threats and drivers.

This is critical under adaptive management in which we use new knowledge and key conclusions identified in the evaluation to update our conceptual models, refine our monitoring, investigations, research plans and waterway management actions and consideration of priority areas. For example, a new priority area may be identified as a result of the information we collect about the location or habitat requirements of values.

In 2013—18, we will focus on evaluating the influence of condition on key value populations through analysis of metrics. This will occur at a project scale before and after works, and more broadly at locations across the catchment. The success of the *Healthy Waterways Strategy* will be evaluated through an audit of achievement of implementation targets.

Reporting

Melbourne Water reports are the key mechanism for stakeholders to see our progress towards achieving our targets.

Formal reporting includes:

> Melbourne Water annual report – reviews our environmental, social and economic performance and progress towards our vision

> Annual report to the Essential Services Commission – reports on our progress against our implementation targets. This report is provided and audited via the *Waterways and Drainage Strategy* formally known as the *Waterways Operating Charter*

> Local government updates

> An annual report to the community that takes a scorecard approach (in development).

We are continuing to work with the Department of Environment and Primary Industries on state-of-the-waterway reporting through the Index of Stream Condition, Index of Estuary Condition and Index of Wetland Condition data.

We will continue to report and share information through targeted stakeholder and community workshops, presentations at conferences and industry events, technical reports and scientific publications and regular updates on our website.

TARGET

Revise the waterway health monitoring, investigations, evaluation and reporting program by July 2013 and implement the program by July 2018.

Research

The key research themes for 2013–18 are:

> Understanding impacts of urbanisation and climate variability on aquatic ecosystems to inform management approaches

> Understanding the management of threats to biodiversity and key waterway values

> Developing and evaluating the efficiency and effectiveness of waterway rehabilitation techniques such as vegetation establishment in waterways and wetlands and invasive species management

> Improving our ability to set environmental flow objectives for priority values and processes

> Understanding values, threats and processes important for the protection of estuaries

> Contributing to the continued development of strategic decision support tools such as the eWater modelling software

> Contributing to national research partnerships, such as the Cooperative Research Centre for Water Sensitive Cities, to explore emerging opportunities for waterway health

> Continuing to research attitudes, behaviours towards and perceptions of waterways and waterway management programs.

TARGET

Develop a research program to inform the management of waterways by July 2013 and implement the program by July 2018.