

2.5 Catchment planning practices

2.5.1 Risk assessments and environmental management systems

Description

Managing stormwater at the catchment or citywide scale is a challenging task, as there are typically many sources of pollution and limited resources to manage them. Each of these sources poses a different level of risk to the health of receiving waters. One way of identifying stormwater management risks, assessing them, prioritising them, and allocating resources to manage them is to use 'risk assessments' and associated 'environmental management systems'.

The Australian Standard for environmental risk management (Standards Australia, 1999, p. 14) defines risk as 'the chances of something happening that will have an impact on objectives. It is measured in terms of consequences and their likelihood'.

Risk assessment is defined as the process of risk analysis and risk evaluation, as illustrated in Figure 1:

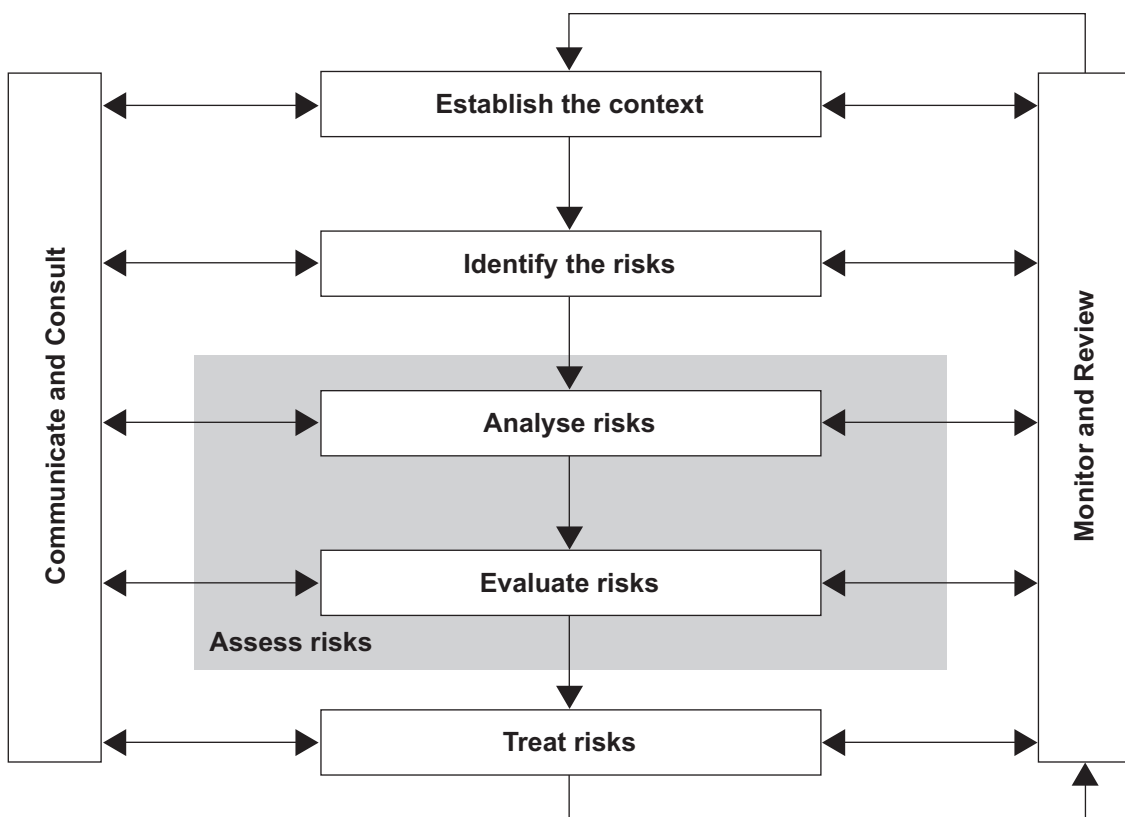


Figure 1. The process of risk assessment (Standards Australia, 1999)

An *environmental management system* (EMS) is defined as 'the part of the overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy' (Standards Australia, 1996, p. 2). Risk assessments are an important component of effective environmental management systems.

For stormwater management in Australia, these tools are commonly used in the following contexts:

- When a local authority is developing a stormwater management plan for a catchment or region, they may use a risk assessment process to help prioritise management actions.

- When a local authority, State government department or business is reviewing their own operations and premises to ensure all reasonable and practicable steps are being taken to prevent or minimise stormwater pollution, they may undertake a risk assessment (often within the framework provided by an environmental management system).
- A risk assessment process may be used during the identification of priority areas within a City or Shire that require:
 - strengthened town planning controls to ensure new development adopts a level of water sensitive urban design that matches the sensitivity of the environmental values of downstream water bodies; or
 - the application of structural stormwater management measures in developed areas (e.g. gross pollutant traps, Living Streams and constructed wetlands).
- An erosion hazard/risk assessment may be used on major construction sites to identify the need for erosion and sediment controls (see Section 2.1.1).

This guideline will focus on the first two of these applications.

Applicability

The use of risk assessments and environmental management systems as tools for managing stormwater is highly applicable to local government authorities, government departments, industry and business.

A risk assessment process is suggested as being essential to develop a focused and practical stormwater management plan for a local government area or catchment, given the multitude of sources of stormwater pollution and limited funds for management.

Environmental management systems are recommended as a highly valuable organisational tool to systematically identify, assess and manage stormwater, particularly for organisations that have many activities or premises that may pollute stormwater.

Both of these tools are applicable to any geographic region.

Recommended Practices

Risk assessment during the development of stormwater management plans

The Eastern Regional Metropolitan Council (EMRC, 2002) has developed *Stormwater Quality Management Plan Guidelines* which have been modified from Victorian guidelines and are currently being trialled in Perth. These guidelines incorporate a risk assessment process as part of the overall stormwater management planning process, to identify those activities that should be a priority to manage, due to the potential risk they pose to the environmental values of receiving waters. This process is summarised in Figure 2.

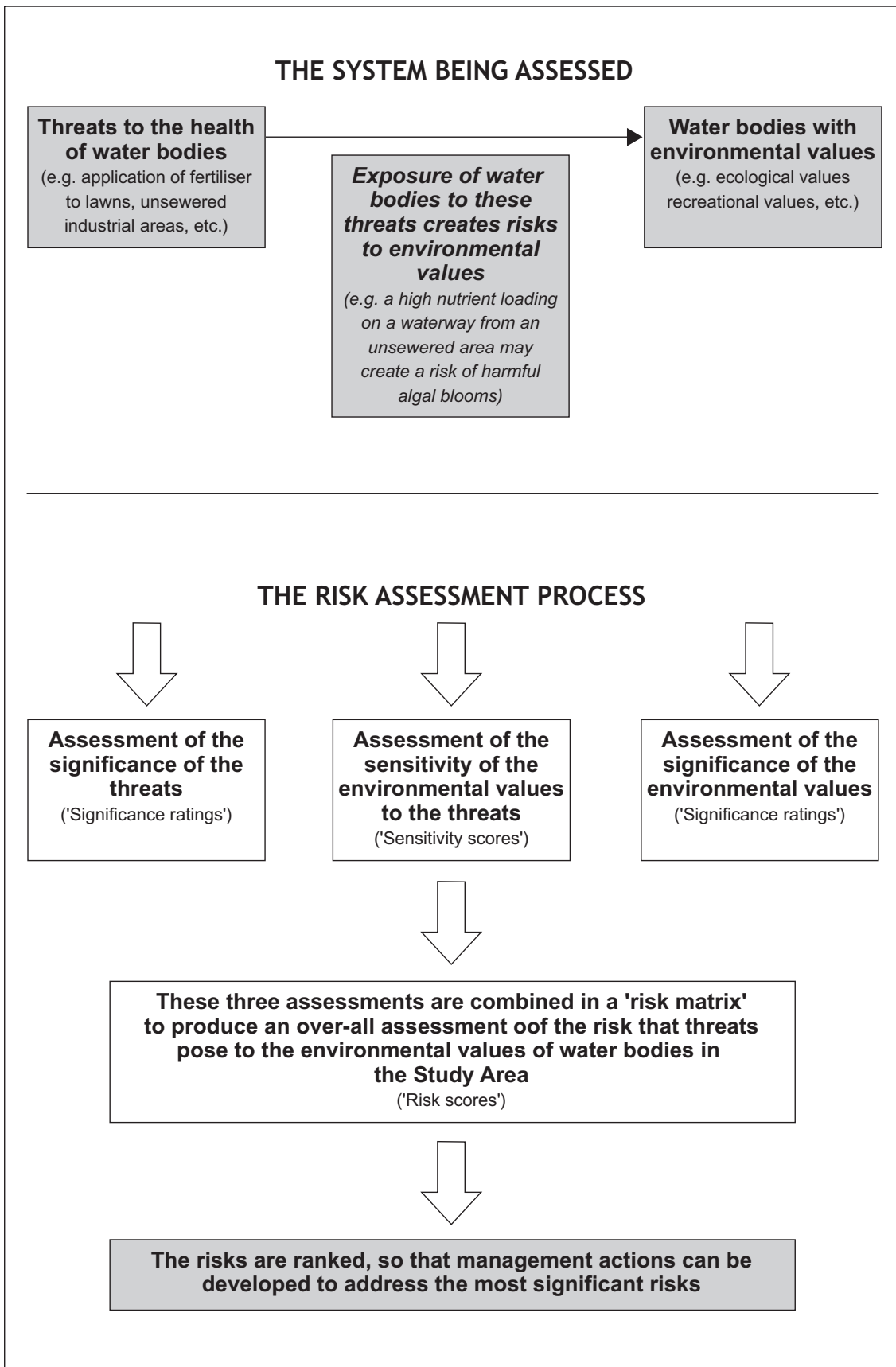


Figure 2. A risk assessment process used to develop a stormwater quality management plan (Parsons Brinckerhoff and Ecological Engineering, 2003)

Chapter 5 outlines the risk assessment process for the preparation of Stormwater Management Plans.

See the last paragraph under 'Risk assessments and EMSs to review an organisation's activities and premises' for information on checklists/methods for undertaking risk assessments.

Risk assessments and EMSs to review an organisation's activities and premises

Environmental management systems provide the framework within which an organisation can systematically develop its environmental policy, identify and assess its environmental risks (including risks to stormwater quality and water body health), develop measures to manage these risks (e.g. new procedures, equipment and training), monitor the success of these measures, report on its environmental performance, and revise its environmental programs where necessary.

The Australian Standard for environmental management systems (AS/NZS ISO 14001:1996) provides guidance on how to establish an EMS, drawing upon well-established principles that have been widely used for quality systems (see Australian Standard AS/NZS ISO 9001).

Some organisations develop integrated management systems that address quality, health and safety, risk and environmental management. Some organisations also obtain independent certification of these systems, usually to demonstrate to senior management and stakeholders that the system is sound, and the organisation's responsibilities are being diligently exercised.

The development of an EMS has five principal steps, which are repeated to promote continuous improvement over time. These steps are:

1. Develop environmental policy (e.g. an environmental policy that includes stormwater management).
2. Develop programs and frameworks to assess environmental risks (e.g. undertake risk assessments of all work processes and premises).
3. Implement measures to manage environmental risks (e.g. implement environmental programs/plans, procedures, guidelines, manuals, training, reporting systems, install environmental management equipment or change practices).
4. Monitor, audit and assess environmental outcomes (e.g. undertake regular audits of activities and water body health monitoring).
5. Report (internally and externally) and revise programs where necessary (e.g. undertake incident and complaint reporting and regular environmental performance reporting).

The risk assessments step in this process (no. 2 above) is a critical one. A sound methodology needs to be developed (e.g. using the environmental risk management process outlined in Standards Australia, 1999) and the risk assessor needs to be suitably experienced and qualified. Checklists are often used to prompt the risk assessor to examine particular aspects of stormwater management. Basic checklists are provided in VSC (1999) and NSW EPA (1998). The Victorian *Urban Stormwater Best Practice Environmental Management Guidelines* (VSC, 1999) provides checklists for assessing basic stormwater management practices on construction sites and in relation to businesses, and for operations typically undertaken by local government. Another approach is to identify guidelines for the activity being assessed (e.g. erosion and sediment control guidelines), and simply convert these guidelines into a checklist to help identify threats/hazards during the risk assessment process.

Benefits and Effectiveness

The primary benefit of undertaking risk assessments is to prioritise the allocation of limited resources to maximise the outcomes to the community and environment. The process of undertaking risk assessment may also identify serious breaches of environmental legislation, activities that are having significant impacts on the health of water bodies, and legal risks to the organisation (and individuals), and may help educate staff about best practice stormwater management.

Benefits of implementing an environmental management system include:

- It provides a systematic framework for rigorously identifying, assessing and managing risks, minimising the chance that the organisation's activities will adversely affect water body health.
- It potentially provides a 'due diligence defence' to environmental prosecutions (i.e. providing protection to staff and the organisation).
- It provides a 'paper trail', that minimises the loss of corporate knowledge when key staff leave the organisation.
- It can identify savings to the organisation (e.g. waste recycling opportunities, water minimisation and reuse initiatives).
- It provides senior management and stakeholders (e.g. community groups, shareholders) with a mechanism to quickly identify whether environmental management is being adequately undertaken within the organisation (particularly if the system has independent certification).

In terms of the effectiveness of these tools, the methodology is widely used, well accepted and has been documented as Australian Standards (e.g. AS/NZS 4360:1999 and AS/NZS ISO 14001:1996). However, no system is perfect. A well-designed and maintained environmental management system should minimise the risk of stormwater-related environmental impacts.

Challenges

The following challenges may need to be addressed to improve implementation:

- Their effectiveness primarily depends upon the skills of those people implementing various elements (e.g. risk assessments, audits, developing policy). This is particularly the case during the risk assessment stage, when hazards/threats are easily missed and when there is often a subjective element to the assessment that relies heavily on expertise.
- Some risk assessment processes and environmental management systems can be cumbersome to run (e.g. risk assessments that incorporate a quantitative assessment or environmental management systems with frequent auditing and reporting requirements). These tools should be based on the financial and human resources of an organisation. A trial project or period is highly recommended to ensure this occurs. In the case of environmental management systems, it is also recommended that a paper-based system be successfully implemented for at least 12 months before moving to an electronic system (e.g. where all of the EMS's documentation is on-line).

Cost

The cost of running these processes and systems will vary greatly depending upon their design and context.

As a general guideline, a medium-sized local government authority (say with 50,000 people) would require one full-time environmental engineer/scientist (say at a salary of \$50,000 p.a. and on-costs) to

coordinate the development and maintenance of an environmental management system. This person would also need:

- input from operational staff during risk assessments, procedure development, audits and reporting; and
- an expenses budget (say \$50,000 in the first year and then \$20,000 p.a. thereafter) to acquire specific expertise (e.g. specialist auditors, environmental monitoring specialists, trainers and analysis of samples).

Additional Information

Potential synergies emerge when an organisation combines environmental management systems with equivalent systems for managing health and safety, quality, and other forms of risk (e.g. legal, political). The philosophy and steps in these systems are similar. Some organisations reduce costs by combining several staff roles. For example, a medium-sized business may hire one professional who is trained in environmental management and health and safety, to operate an integrated environmental, health and safety management system.

There are a number of Australian and international standards that relate to environmental management systems, risk assessment and auditing. The two *primary* Australian Standards that are relevant to this guideline are listed in the reference section below. Additional references can be obtained from these standards.

Examples / Case Studies

Stormwater self management system - City of Greater Shepparton, Victoria

In 2003, the City of Greater Shepparton developed a simple form of environmental management system that focused on stormwater quality (Clearwater, 2003). The stormwater self-management system (SMS) was developed to achieve successful and sustainable implementation of stormwater best practice with respect to local government activities (e.g. street sweeping and construction). It is an interactive tool involving input from all departments within the organisation to monitor compliance with best practice standards. The system has also been developed as a software package.

The SMS process is as follows:

- Stormwater management tasks are assigned to Council personnel (i.e. these are management actions to address previously identified risks to stormwater quality).
- Audits are carried out using a checklist.
- Findings from the audits are entered into a database (i.e. necessary actions).
- Necessary actions are electronically sent to the responsible department.
- Actions that are delegated or completed are electronically entered back into the database.
- Regular checks are undertaken of compliance.

The SMS's checklist was obtained from the Victorian *Urban Stormwater Best Practice Environmental Management Guidelines* (VSC, 1999).

References and Further Information

- Clearwater 2003, *Stormwater Information Exchange Kit*, Clearwater Program, Melbourne, Victoria. Contains case study information on Victorian stormwater projects, June 2003. See <clearwater.asn.au>.
- Eastern Metropolitan Regional Council (EMRC) 2002, *Stormwater Quality Management Plan Guidelines*, Draft guidelines, Eastern Metropolitan Regional Council, Perth, Western Australia.
- New South Wales Environmental Protection Authority (NSW EPA) 1998, *Managing Urban Stormwater: Source Control*, Draft guidelines, New South Wales Environmental Protection Authority, Sydney, New South Wales.
- Parsons Brinckerhoff and Ecological Engineering 2003, *Canning Plain Catchment Management Plan - Working Paper No 2 - Threats, Values and Risks*, Ecological Engineering, Perth, Western Australia.
- Standards Australia 1996, *Environmental Management Systems - Specification with Guidance for Use*, AS/NZS 14001:1996, Standards Australia, Sydney, New South Wales. Available at: <www.standards.com.au>.
- Standards Australia 1999, *Environmental Risk Management - Principles and Process*, HB 203:2000, based on AS/NZS 4360:1999, Risk Management, Standards Australia, Sydney, New South Wales. Available at: <www.standards.com.au>.
- Victorian Stormwater Committee (VSC) 1999, *Urban Stormwater - Best Practice Environmental Management Guidelines*, CSIRO Publishing, Melbourne, Victoria.

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