

## INTRODUCTION AND CONTEXT

The Great Barrier Reef Marine Park Authority (GBRMPA) uses risk assessment to evaluate the risks of a diversity of human activities, issues, projects and programs on components or all of the Great Barrier Reef Marine Park. The GBRMPA approach to risk and issues is based on relevant standards and public sector guidance.

Our primary interest in this document: Environmental Assessment and Management (EAM) Risk Management Framework is undertaking a risk assessment to make informed decisions about operational risks such as impacts of human activities on environmental components which may include species such as dugongs; habitats such as water, seagrass or coral; and/or areas such as bays, islands, reefs or bio-regions. We are also interested in non-environmental risks such as impacts on other human users and perception. In most cases we cannot realistically measure, understand and manage the complexity of the ecosystem so we undertake a risk assessment on one or several key indicators and use these as surrogates.

Environmental risk assessment and decision-making strategies have become increasingly more sophisticated, information-intensive, and complex; including such approaches as expert judgment, cost-benefit analysis, and toxicological risk assessment. Current environmental challenges involve analysis of tradeoffs among differing criteria, expectations, and levels of certainty.

Risk criteria may be specified on a case-by-case basis or may be standardised. GBRMPA have chosen standard criteria that can be widely used and allow comparison of risks between different activities to allow us to maximise strategic benefits and use of our resources.

## 1. WHAT IS RISK?

A risk is defined by the Australia/New Zealand Standard for Risk Management (AS/NZS 4360:2004) as "...the possibility of something happening that impacts on your objectives. It is the chance to either make a gain or a loss. It is measured in terms of likelihood and consequence."

## 2. RISK ASSESSMENT AND MANAGEMENT

Risk management is the systematic application of management policies, procedures and programs to identify, analyse, assess, treat and monitor risks. Risk management involves the acceptance of risks and taking actions to manage, reduce, transfer or eliminate them proportionate to the level of risk involved. Risk assessment and management are recognised as integral parts of good management practice.

## 3. OUTCOMES

Risk management principles are to be integrated into all business strategies, activities and management systems. This includes policy development, service delivery, project management and decision making (GBRMPA, 1999). The risk assessment process for EAM can be used to manage two different outcomes:

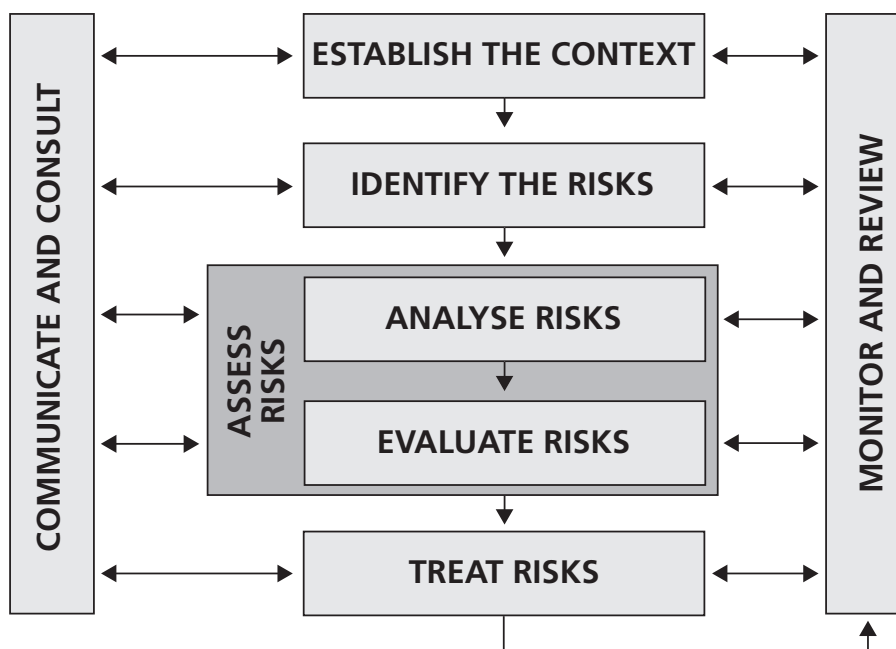
- (1) A risk assessment applied to individual project applications, which will focus on streamlining the environmental assessment process and highlight/identify key issues of the application (these may be environmental, perception or other issues).
- (2) A risk assessment process applied to an activity or class of activity can result in information that can be used as a basis for priority setting and strategic impact assessment. The results of this approach can be used for the GBRMPA Outlook report.



## 4. PROCESS

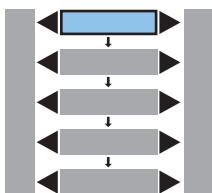
The standard process for risk management is illustrated in Figure 1 and described in more detail below, together with key questions for each of the six steps.

Figure 1. Risk Management Process



### Step 1

#### *Establish the Context*



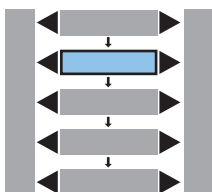
The political, social, economic, legal and physical environments are important in the day-to-day work of an agency's staff.

##### *Key questions in establishing the context*

- What is the project or activity?
- What are the major outcomes expected?
- What are the major strengths, weaknesses, opportunities and threats (SWOT)?
- Who are the stakeholders?
- What problems were identified in previous cases?
- What risk criteria should be established (ie no loss, limited impact)?

### Step 2

#### *Identify the Risks*



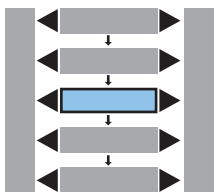
This step requires identification of risks from all aspects of the environment articulated in the previous step. Unidentified risks can pose a major threat to the organisation and it is important to ensure that the widest range of risks is identified. Good risk identification involves a group/team rather than an individual examining all sources of risk encompassing the perspective of all stakeholders, both internal and external.

##### *Key questions in identifying key issues and risks*

- When, where, why and how are the risks likely to occur, and who might be involved?
- What is the source of information for each risk?
- What are the consequences of each risk?
- What are the accountability mechanisms - both internal and external? (potential briefs to the Executive Management Group and Minister)
- What is the need for research into specific risks?
- What resources are needed to carry out the research?
- What is the reliability of the information?

### Step 3

### Analyse the Risks



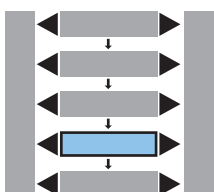
The level of risk is determined by the relationship between the likelihood (frequency or probability) and the consequences (impact or magnitude of the effect) if the risk occurs. The level of risk is analysed in relation to existing controls, if any.

#### *Key questions in analysing risks*

- What are the current controls or actions which may detect or prevent potential or undesirable risks/events?
- What is the potential likelihood of the risks happening?
- What are the potential consequences of the risks if they do occur?

### Step 4

### Evaluate and Prioritise the Risks



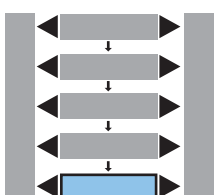
This step is about priorities and deciding whether risks are acceptable or unacceptable. This assessment should take account of the degree of control over each risk and the cost impact, benefits and opportunities presented by the risks. The risks borne by other stakeholders should also be considered.

#### *Key questions in assessing and ranking risk*

- What is the priority of the risks, from a management perspective (eg, extreme, high, medium, low)?

### Step 5

### Identify Management Actions to Treat the Risks



This step involves deciding what cost-effective countermeasures need to be in place to help minimise the identified risk(s) and/or their impact.

#### *Options for treating risks include the following:*

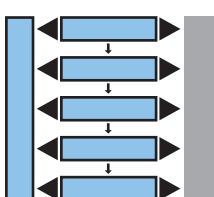
- avoid the risk;
- reduce the level of the risk by reducing the likelihood or the consequences, or both (impact mitigation);
- transfer the risk by shifting the responsibility for a risk to another party. Risks may be transferred by contract, insurance, legislation and administrative process;
- accept and retain the risk.

#### *Key questions in treating risks*

- What processes and controls exist, or are needed, to minimise the level of risk?
- What is the acceptable level of risk?
- Who has responsibility for implementing the plan for managing risks?
- What resources are needed (people, money, technical)?

### Step 6.

### Implement, Monitor and Review



The relevant manager is required to monitor the effectiveness of risk treatments and has the responsibility to identify new risks as they arise and treat them accordingly. Managers are also required to report on the progress of risk treatments at regular intervals. The person who has the responsibility for a risk treatment is expected to provide feedback on the progress of the 'project / initiative' as detailed in the 'monitoring' field of the treatment.

### Steps 1- 6.

### Communicate and Consult

The relevant manager is required to communicate and consult during all stages of the process.

## 5. ASSESSMENT OF THE RISK (STEPS 3 AND 4 AS DESCRIBED ABOVE)

The assessment of risk includes analysis of the likelihood and consequence of identified hazards being realised to obtain a Hazard Risk Grade (HRG). The HRG provides a measure of the level of risk, which in turn is used to decide upon the acceptability of that risk and to establish management priorities.

There are many methods of conducting this analysis. Precise and scientific measurement of the likelihood and consequence may be possible if data is available. Such quantitative risk analysis has obvious advantages, but is rarely applicable to day-to-day operations. Short term strategies to analyse risk usually involve qualitative data, and this process is normally quite acceptable for the conduct of operations.

It is essential that prior to calculating a HRG, the preceding risk management steps (establish the context, identify risks) have been completed and that risks are analysed in the context of existing controls.

### **Methodology**

The HRG is derived using the Hazard Risk Calculator, which is described below. For simplicity, this tool is two dimensional and contains qualitative scales of LIKELIHOOD and CONSEQUENCE. The focus in this framework is on managing environment consequences (Table 1) and environment perception consequences (Table 2) however other domains such as safety, cultural, socio-economic, business and reputation may also be considered by GBRMPA. Also, the current definitions are negative risks and an alternative approach is to also consider positive benefits.

Tables 1 to 5 are GBRMPA standards and changes to Table 1 in particular may be necessary for specific projects/biota/locations but changes must be agreed early by the team and signed off by the Director.

**1: Assessing consequence.** Having established the context, the first step is to assign an estimate of the consequence of the outcome, should the event being examined transpire. It is possible to have an event that, for example, would be catastrophic in its effect upon personnel but have a minimal impact upon the environment. For this reason, separate tables are used to define the consequences applicable to ENVIRONMENT (ECOSYSTEM) and ENVIRONMENTAL PERCEPTION, as described in Tables 1 and 2.

DESCRIPTION	DEFINITION
CATASTROPHIC	Impact is clearly affecting the nature of the ecosystem over a wide area OR impact is catastrophic and possibly irreversible over a small area or to a sensitive population or community Recovery periods of greater than 20 years likely OR condition of an affected part of the ecosystem irretrievably compromised.
MAJOR	Impact is significant at either a local or wider level or to a sensitive population or community. Recovery periods of 10 - 20 years are likely.
MODERATE	Impact is present at either a local or wider level. Recovery periods of 5 - 10 years anticipated.
MINOR	Impact is present but not to the extent that it would impair the overall condition of the ecosystem, sensitive population or community in the long term.
INSIGNIFICANT	No impact or, if impact is present, then not to an extent that would draw concern from a reasonable person. No impact on the overall condition of the ecosystem.

*Table 1: Consequence (Environment –Ecosystem level)*

DESCRIPTION	DEFINITION
CATASTROPHIC	Negative and extensive national media attention and national campaigns
MAJOR	Negative national media attention and national campaign
MODERATE	Negative regional media attention and regional group campaign
MINOR	Individual complaints
INSIGNIFICANT	No media attention

*Table 2: Consequence (Environmental Perception)*

**2: Assessing likelihood.** The second step in the hazard risk assessment process is to individually assess the likelihood of the consequences of an event occurring. There are five levels used in this step, as described in Table 3.

The frequency (recurring events) or probability may be changed for particular projects or issues, however there are also advantages for consistency for comparison and reporting (Outlook Report).

DESCRIPTION	FREQUENCY	PROBABILITY
Almost certain	Expected to occur more or less continuously throughout a year (e.g. more than 250 days per year)	95-100% chance of occurring
Likely	Expected to occur once or many times in a year (e.g. 1 to 250 days per year)	71-95% chance of occurring
Possible	Expected to occur once or more in the period of 1 to 10 years	31-70% chance of occurring
Unlikely	Expected to occur once or more in the period of 10 to 100 years	5-30% chance of occurring
Rare	Expected to occur once or more over a timeframe greater than 100 years	0-5% chance of occurring

*Table 3: Likelihood*

**3: Assessing risk level.**  $RISK = LIKELIHOOD \times CONSEQUENCE$ . Having determined the likelihood and consequence, Table 4 is used to determine the hazard risk grade. The HRG provides a uniform, single method of grading hazards against each other in order to determine a priority order for dealing with the risks identified and deciding what resources will be allocated to each hazard. It is important to note that these risk grades have no absolute value and so should not be used for strict ranking purposes across risk domains.

LIKELIHOOD	CONSEQUENCE RATING				
	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
ALMOST CERTAIN	M	M	H	E	E
LIKELY	M	M	H	H	E
POSSIBLE	L	M	H	H	E
UNLIKELY	L	L	M	M	H
RARE	L	L	M	M	M

*Table 4: Hazard Risk Grade*

**4: Assessing acceptability.** Once the severity of risk is determined the final step in the process is to determine the acceptability of the risk. Some levels of risk are so high that they are intolerable. Such risks require urgent and immediate attention, and cessation of the activity or process is warranted in all the most urgent situations. Decisions on the continuation of exposure to intolerable risk must be made at the highest levels of the organisation.

RECOMMENDED ACTIONS FOR GRADES OF NEGATIVE RISK ATTRIBUTED TO HUMAN IMPACTS	
GRADE	RISK MITIGATION ACTIONS
L	LOW: These risks should be recorded, monitored and controlled by the responsible manager. Activities with unmitigated Environment, Health and Safety risks that are graded above this level should be avoided.
M	MEDIUM: Mitigation actions to reduce the likelihood and consequences to be identified and appropriate actions (if possible) to be identified endorsed by Director \ Manager level.
H	HIGH: If uncontrolled, a risk event at this level may have a significant impact on the operation of a business unit or the GBRMPA as a whole. Mitigating actions need to be very reliable and should be approved and monitored in an ongoing manner by the General Manager.
E	EXTREME: Activities and projects with unmitigated risks at this level should be avoided or terminated. This is because risk events graded at this level have the potential to cause serious and ongoing damage to the organisation, the community or the environment. Reporting emerging or continuing risks exposures at this level to the General Manager. The Chairman should be advised of identified or emerging strategic risks which have been graded at this level.

*Table 5: Acceptability of Risk*

## 6. DOCUMENTATION FOR RISK MANAGEMENT

A sufficient level of documentation should be maintained for accountability and to show evidence of the major steps and activities leading to key risk management decisions. The degree of privacy or potential sensitivity of issues should be taken into consideration when deciding how to document the assumptions, methods, information sources and results. In many cases additional information on the medium and high risks will need to be provided.

Documentation is important in the management of risks to ensure that the process has been given due consideration. It also promotes effective review and monitoring of the process. An adequate level and standard of documentation therefore needs to be maintained as part of the process.

It is suggested that as a minimum the following Risk Profile (Attachment A) is used for documentation of risk management.

## 7. DEFINITIONS

Refer to Australian Standard HB203:2006

## Attachment A- Risk Profile

Project: \_\_\_\_\_

Project leader: \_\_\_\_\_

Project team: \_\_\_\_\_ Date: \_\_\_\_\_

Assumptions and/or Nominal Conditions:

Personnel	
Equipment	
Environment	
Information	
Time	

ACTIVITY OR ELEMENT	HAZARD	FACTORS	INITIAL RISK	PROPOSED TREATMENT/MANAGEMENT	POST MANAGEMENT RISK	AS LOW AS REASONABLY PRACTICAL	REVIEW- WAS TREATMENT EFFECTIVE?
Dredging	Damage to coral	Turbidity, Removal	Moderate x Likely = High	Permit- Designated areas for works and exclusion areas Monitoring- Limits of change (trigger values) and daily monitoring Audit- Compare modelling with monitoring Monthly meetings of all stakeholders Site Supervision	Minor x Likely = Medium	YES	