Managing risks to support sustainability: experiences from creating the new Australian Garden in Melbourne

Grant Cameron

Royal Botanic Gardens Melbourne, Australia

Abstract

The paper presents the model used to identify and manage risks during the planning and construction of the new Australian Garden in Melbourne, Australia. Extracts from the project risk assessment are included in the paper. These are be used to demonstrate how individual risks are identified and how active management of individual risks can aid in the delivery of complex projects. Reference is made to the inter-relationship between project risk assessment and technical risk assessment, such as that used to evaluate the weediness of plants within the garden.

Introduction

The Royal Botanic Gardens (RBG) Board manages RBG Melbourne, located close to the centre of Melbourne in the State of Victoria and RBG Cranbourne, located 45 km to the south-east of the centre of Melbourne.

Opened to the public in 1989, RBG Cranbourne comprises 363 hectares of some of the State of Victoria's most precious areas of native bushland and is home to an amazing range of plant and animal life, including several rare and endangered species.

It has been a long-held aspiration of the RBG to construct a large-scale garden at RBG Cranbourne that displays and celebrates the beauty and diversity of Australian flora. In 1994, the RBG began the planning for an Australian Garden in the northwest corner of RBG Cranbourne, on a 26-hectare area that was used until the 1960s for sand mining. Funding for the first 11 hectares (Stage 1) of the 26-hectare garden was received in 2002. Stage 1 was constructed over the following four years at a cost of A$15 million and opened to the public on 28 May 2006.

Australian Garden description

The Australian Garden, designed by Taylor Cullity Lethlean with Paul Thompson, is an abstraction of the Australian landscape. It provides the visitor with a metaphorical journey from the vast and awe-inspiring deserts of central Australia to the lush green coastal fringes. The design expresses the tension between reverence and sense of awe for the natural landscape, and the innate impulse to change it, to make it into a humanly contrived form, beautiful, yet our own work.

The western side of the Garden including the Eucalypt Walk, Sand Garden and Dry River Bed takes its cues from the natural world.

The eastern side of the Garden is inspired from more human ideas and images. The Central Promenade of the Australian Garden incorporates the Rockpool Walk, Rockpool Waterway, Escarpment Wall and Exhibition Gardens.

Water is the mediating element between these naturally and humanly derived gardens.

What is risk assessment and what is risk management?

Risk assessment is a method of identifying and understanding what things may happen to a project or an organisation that will affect its objectives. Risk management is an integrated process that is based on risk assessment, but also considers the environment in which the organisation or project operates and how risks, once assessed, can be managed and communicated to stakeholders.

Risk assessment is usually defined as an assessment of the possibility of an event occurring and the likely consequences of that event. As the consequences may include financial loss, personal injury, organisational or political embarrassment, operation disruption, legal action, and so on, it is important that management policies, procedures and practices are put in place to match the organisation's risk appetite to the risk associated with the project.

Risk assessment process for the Australian Garden project

Risk is inherent in large projects and, due to the complexity and unique nature of the Australian Garden project, risk was recognised as a vital element to be understood and managed.

The Australian Garden risk management process was based on the Australian Standard for Risk Management (Standards Australia /Standards New Zealand 2004). This standard adopts a holistic and systematic approach to risk management that can be applied to an organisation or to a specific project. The process is outlined in Figure 1.

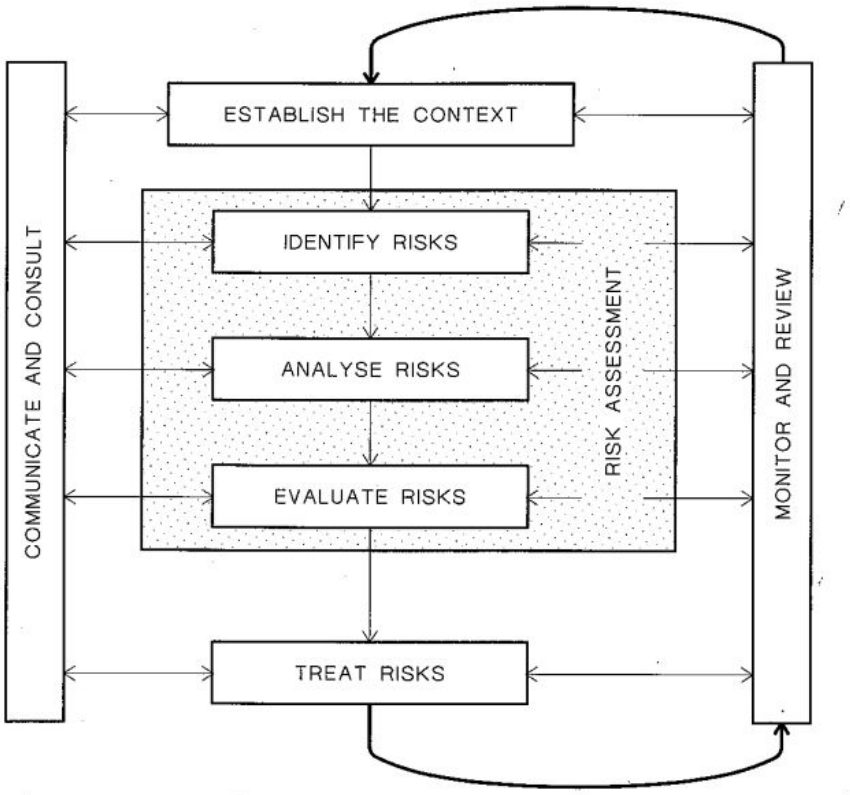

Figure 1: Risk Management Process – Overview (based on the Australian Standard for Risk Management (Standards Australia /Standards New Zealand, 2004).

Establishing the context

Prior to the risk assessment process being carried out, it was necessary to understand the context in which the project was to operate. The goals for the Australian Garden project were defined and agreed with the management team, the scope of the risk assessment was carefully defined and the internal and external stakeholders were identified.

For a complex project such as the Australian Garden there is a range of diverse risks. In the early stages of a design and construction project, there may be a tendency to focus on construction-type risks, such as will the project run over budget?; will it take too long to build?; what if there is a design error? However, the reality is that there are numerous different risks associated with the project as-a-whole once you look beyond the construction process, such as will people come to the garden?; will they feel safe?; what happens if there is adverse media coverage? Working with the management group, the phases of the project were identified and the sources of risk documented (Table 1).

Project Phase	*Source of Risk*
Corporate management Planning Design Construction Operation	Commercial / legal Economic Human behaviour Natural events Political Technology / technical Management activities Individual activities Other

Table 1: Project phase and source of risk

Identifying risks

In order to stimulate discussion and aid in the identification of risks, a workshop was undertaken that was attended by employees responsible for the management, planning and operation of the garden.

The workshop proceeded systematically through the phases of the project and examined whether each of the sources of risk could eventuate within each phase of the project. The facilitated workshop was free-flowing and undertaken in a way that encouraged all participants to contribute and engage with the process.

The workshop identified a total of 41 risks that were considered significant enough to affect the objectives of the project. Once each risk was identified and agreed, it was captured in a database and analysed using a spreadsheet. The range of risks was quite diverse, and included risks such as herbivore attack on plant material, financial failure of the café, vandalism and nutrient pollution of water bodies.

Analysis of risks

The importance of a risk depends both on the likelihood of it occurring and the consequences if it does occur. In a normal project, there are numerous risks that are certain to occur; however, if these are of minor consequence, then senior management effort may be better focused elsewhere. Conversely, if there is a less likely event that has wide-ranging and significant effects it would be prudent to apply management effort and resources to the management of that risk.

During the workshop, participants were asked to agree how likely was the event to occur and what would the consequences be if it did occur. The classification scales used to determine likelihood and consequence are shown in Tables 2 and 3.

A risk such as herbivore attack was considered to be likely (the event will probably occur once per year) and of minor consequence (cost to rectify A$10,000 to A$50,000 and transient “environmental” harm). On this basis, the risk of herbivore attack was rated “moderate”. In the case of nutrient pollution of water bodies, the likelihood was judged as moderate and the consequences as major (based on the environmental harm), thus the risk was rated as “high”.

Rating	*Description*	*Likelihood of Occurrence (Construction)*	*Likelihood of Occurrence (Operation)*
5	Almost certain	Expected to occur several times in a project.	The event may occur regularly
4	Likely	Usually occurs once in a project life	The event will probably occur once per year
3	Possible	Considered unusual when event occurs, but occurs on some projects.	The event may occur every 3 years
2	Unlikely	Event considered surprising, would only occur on 1 in 10 projects	Event may occur once every 10 years
1	Rare	Event virtually unheard of	Event may occur once in a working life

Table 2: Likelihood ranking

Rating	*Description*	*Financial*	*Human*	*Business Interruption*	*Environmental*	*Reputation and Image*
5	Catastrophic	Above A$5m	Multiple deaths	Service loss over 1 year. Project delay over 2 years.	Long term harm. Extent outside RBG.	Public inquiry
4	Major	A$2-5m	Single death	Service loss up to 6 months. Project delay over 1 year.	Significant harm. Extent Australian Garden and RBG.	Embarrassment for Government
3	Moderate	A$0.5-2m	Injury / hospital	Service not back in service at agreed time. Project delay over 6 months.	Moderate harm. Extent Australian Garden.	Embarrassment for RBG
2	Minor	A$0.01-0.5m	Injury / treatment	Local only. Service loss minimum period. Project delay over 3 months.	Transient harm.	Senior management involvement
1	Insignificant	Less than A$0.01m	First Aid	Negligible impact, brief loss of service. Project delay 1 month.	Brief harm.	Resolved in day-to-day management

Table 3: Consequence ranking

Analysis and comparison based on the relative likelihood and consequence scales was then undertaken. Table 4 and Figure 2 show a representative sample of the risks identified for the Australian Garden project and their relative rankings. Figure 2 also indicates the relative risk categorisations from low to high.

Item	Event	Likelihood	Consequence		Risk
			Rank	Area	
1	Projected visitation rates not achieved	3	4	Financial	High
2	Tree growth inhibited due to groundwater conditions	4	3	Environmental	High
3	Significant malicious damage or vandalism	3	4	Business	High
4	Pathogens/pests/weeds (eg phytophthora) present	3	4	Environmental	High
5	Nutrient pollution of ground or surface water	3	4	Environmental	High
6	Adverse Media treatment	4	3	Reputation	High
7	Maintenance costs exceed financial model	4	3	Financial	High
8	Snakes within operating Australian Garden	3	4	Human	High
9	Wild fire destroys assets	3	4	Business	High
10	Interpretive information is inadvertently inappropriate or offensive	2	3	Reputation	Moderate
11	Significant claim / industrial action by contractor	2	4	Financial	Moderate
12	Delay in project puts advanced tree stock at risk	4	2	Environmental	Moderate
13	Café fails financially	3	3	Reputation	Moderate
14	Herbivore attack on plants	4	2	Environmental	Moderate

Table 4: Representative sample of risk items

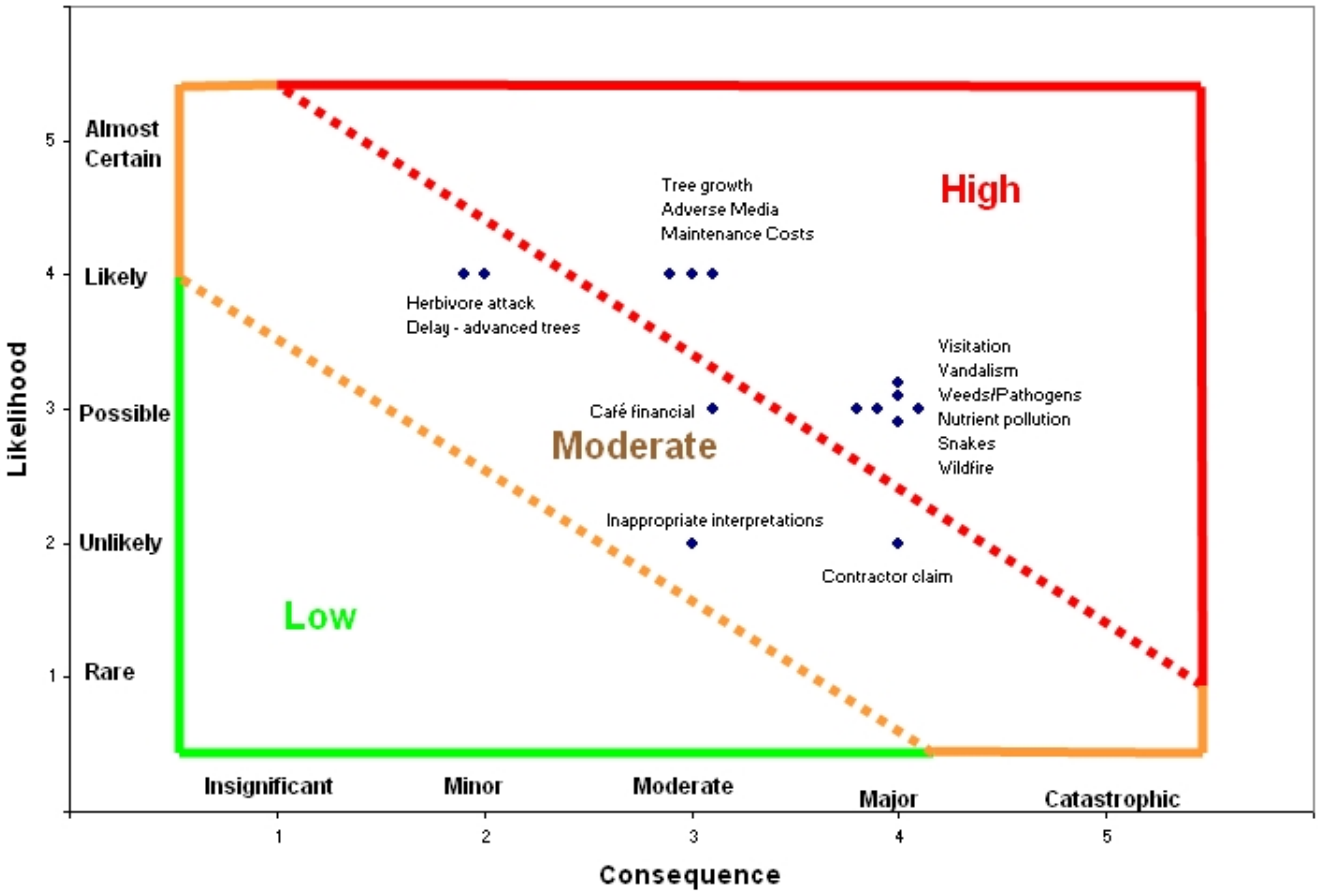

Figure 2: Plot of sample risk items

Risk treatment

For each of the high-risk items, a risk treatment plan was developed and an employee appointed as the "owner" of the risk. The degree of management effort and treatment was also informed by the degree of control that the RBG exerted over each risk. This process, not examined in this paper, classified risks as varying between uncontrolled and highly-controlled and required varying degrees of effort, ranging from active management to operational or day-to-day management control.

An example of a risk treatment plan to mitigate the risk of nutrient pollution to surface and groundwater bodies was to commission a significant study that modeled soil type, nutrient addition rates (fertilizer and bird guano), soil attenuation and surface/groundwater conditions. This study found that the potential for adverse effects on the local surface and groundwater due to nutrient addition was low, and this risk was then downgraded to “low”.

The “moderate” risk of herbivore attack and the “high” risk of snakes within the operating Australian Garden were managed by the installation of a snake/vermin-proof fence around the garden and to agree, document and train staff in site appropriate operational procedures.

Other risks required considerably more effort. For example, the risk of weedy plants "escaping" from the Australian Garden into the adjacent bushland or affecting the genetic pool of the local indigenous species was highlighted in the project risk assessment. This risk was managed by an independent technical risk assessment undertaken by RBG botanists and horticultural staff with input from external experts. Each of the prospective 950 taxa to be planted in the Australian Garden was assessed to ascertain if it breached stringent selection criteria. Taxa were rejected if known to be a weed elsewhere in Australia under similar conditions, if they could cause gene pool contamination, if the seeds were easily distributed (by birds, wind, animals or water), or if the seeds germinated readily in the site conditions. Approximately 10% of the taxa assessed were rejected through the weed risk assessment process.

Benefits and conclusions

The risk management process undertaken as part of the Australian Garden project used a systematic method to identify risks that had the potential to affect project outcomes.

The risk identification and analysis process was quite resource intensive at the beginning of the project, requiring considerable input from both management and operational staff. The benefit to the project was that it achieved a consistent identification and classification of a large variety of risks. It allowed employees to gain a greater appreciation of how the project would proceed, and an understanding of specialty areas other than their own.

In addition, the process allowed senior management to identify and focus upon an appropriate number of higher-risk issues.

The cost of treating the risks, and in particular the high-risk items was quite varied. In some cases low-cost solutions could be implemented, such as modifying construction processes or documenting operational procedures. In other cases, considerable investment in additional studies or infrastructure was required to manage the high-risk item.

In all cases, the investment in identifying, analysing and treating the risk was considered to provide an benefit to the project. The overall risk profile was reduced and better outcomes resulted.

The challenge for the risk management program was to invest sufficient on-going time during the project to ensure the updating of the risk management plan kept pace with the busy design and construction process.

References

Standards Australia/Standards New Zealand, 2004. Risk Management AS/NZS 4360, Standards Australia Limited, Sydney, Australia.