CHAPTER 24

MANAGING OPERATIONS AND ASSETS

Principal author:
Peter Jacobs

Supporting authors:
Graeme L. Worboys, Steve Mossfield and Tony Varcoe

CONTENTS

IUCN WCPA World Commission on Protected Areas
Convention on Biological Diversity

PRINCIPAL AUTHOR

PETER JACOBS is a retired Chief Ranger of the Victorian Alpine National Park with Parks Victoria, Australia, and is now a consultant to 'People in Nature'.

SUPPORTING AUTHORS

GRAEME L. WORBOYS is Co-Vice-Chair, Connectivity Conservation and Mountains, International Union for Conservation of Nature (IUCN) World Commission on Protected Areas (WCPA), and an Adjunct Fellow at the Fenner School, The Australian National University.

STEVE MOSSFIELD works for the NSW National Parks and Wildlife Service, Australia, and has contributed significantly to asset management and operations.

TONY VARCOE is the Manager of Science and Management Effectiveness for Parks Victoria, Australia, and has contributed significantly to decision-support tools.

ACKNOWLEDGMENTS

Appreciation is expressed to Patrizia Rossi, past director of Alpi Marittime Nature Park, Italy, and Peter Jenkins, the Sustainable Practices Coordinator with Parks Victoria, Australia, both of whom contributed to this chapter.

CITATION

Jacobs, P. J., Worboys, G. L., Mossfield, S. and Varcoe, T. (2015) 'Managing operations and assets', in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) *Protected Area Governance and Management*, pp. 751–788, ANU Press, Canberra.

TITLE PAGE PHOTO

Trailhead, Wallace Hut Heritage Trail, Alpine National Park, Victoria, Australia
Source: Anthony Thomas

Introduction

Setting aside areas for conservation is a great start for the protection of nature and culture and visitor enjoyment, but the land does not manage itself. Most protected areas require active management as they will most likely have experienced some human activity that impacts on natural processes; they will have an aim for visitors to experience and learn about the environment and will involve communities living in or around the area. Proactive and effective protected area management involves being responsive through carrying out a range of operational activities as appropriate to meet the objectives established for the area. Good stewardship of protected areas is achieved through the identification, planning and delivery of defined programs and projects. The effective implementation of an operational project involves converting management inputs and resources into positive protected area outputs and outcomes on the ground. This is the operations function of protected area management.

Importantly, on-ground operations in protected areas should only be carried out after a thorough and logical planning process, to ensure the works are the right response to an issue, impacts are considered and resources are used wisely.

This chapter presents the range of likely operations in protected areas and the four key steps in the pathway of operations for protected areas: programming operations, project planning, project delivery and review of effectiveness (Figure 24.1). It outlines the process of priority setting, detailed project planning steps to prepare for delivery and considerations for operational implementation and review. The chapter also considers the importance of built-asset management systems for protected areas. The management strategies outlined in this chapter have been developed over many years in Western economies and cultures such as Australia, New Zealand, North America and Europe; however, these approaches are likely to provide valuable guidance to managers everywhere.

Operations in protected areas

Operations in protected areas are the tactical implementation of projects associated with strategically focused programs (see Chapter 8). Projects can be expected to be principally associated with programs designed to meet the requirements of national and State legislation and the requirements of protected area management plans (see Chapter 13). Broadly, programs may include:

- managing threats to species, habitats and other environmental and cultural values
- presenting values and attributes of the protected area to visitors

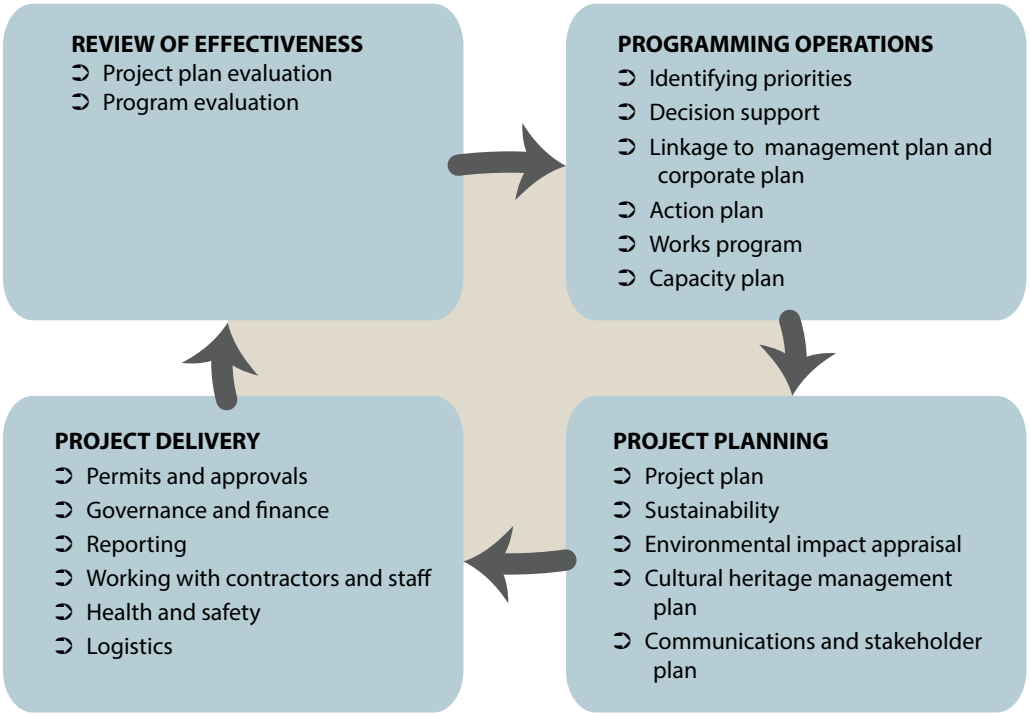

Figure 24.1 The operations cycle

- providing recreation and tourism visitor experiences
- engaging and working with the community, including traditional owners
- supporting sustainable livelihoods that lawfully depend on protected areas
- implementing economic partnerships
- working with neighbours.

Ideally, projects are identified through a logical process of considered thinking and planning and must have a clear line of sight to organisational and protected area strategic priorities (Figure 24.2). They must be operationally well planned for effective delivery and include a review of effectiveness. There are, however, sometimes outside influences that alter the priorities.

Types of operations

Operations in protected areas are many and varied and field operational staff are confronted with a huge range of projects to implement. They may be carried out in terrestrial areas, marine environments, on the tops of mountains, in deserts or in urban settings. Fundamentally, when well planned and executed, they will contribute to the environmental health of the protected area and the community. There are many examples of operational activities and projects that fall within broad program areas in protected areas and some of these are introduced here.

Environment, land and water programs

Introduced plant threats

Projects are undertaken to contain or reduce the impact of introduced plants on biodiversity values, prevent the introduction of new plants and, if possible, eradicate new and emerging introduced plants where they are threatening conservation outcomes. Introduced plants are often very common and widespread, with control or eradication not feasible, therefore resources are targeted to those of highest risk to the highest values (see Chapter 16).

Introduced animal threats

Projects are undertaken to control the impact of introduced animals where they are threatening conservation outcomes. This includes introduced predators threatening native wildlife and large hard-hoofed non-native animals impacting on sensitive environments.

Threatened species and communities

Projects to protect rare and/or endangered flora and fauna are implemented. This often targets the removal of threats such as visitor impacts, grazing, predators or introduced plants and may also include the reintroduction of species once found in the area or work that facilitates breeding programs.

Habitat restoration

Restoration works are completed for fragmented, damaged or altered environments. This work may include assisting nature with post-wildfire recovery through soil conservation works and reseeding; the protection of visitor-damaged coastal sand dunes; the rehabilitation of wetlands damaged by stock grazing; and the restoration of remnant biodiversity (see Chapter 21).

Native animal management

Overabundant native animal species may need to be controlled by actions such as translocation, fertility control and culling. Overpopulation of native species can occur due to the fenced isolation of a protected area, habitat fragmentation and reduction and/or loss of natural predators, which can lead to high impacts on plants and soils and population crashes.

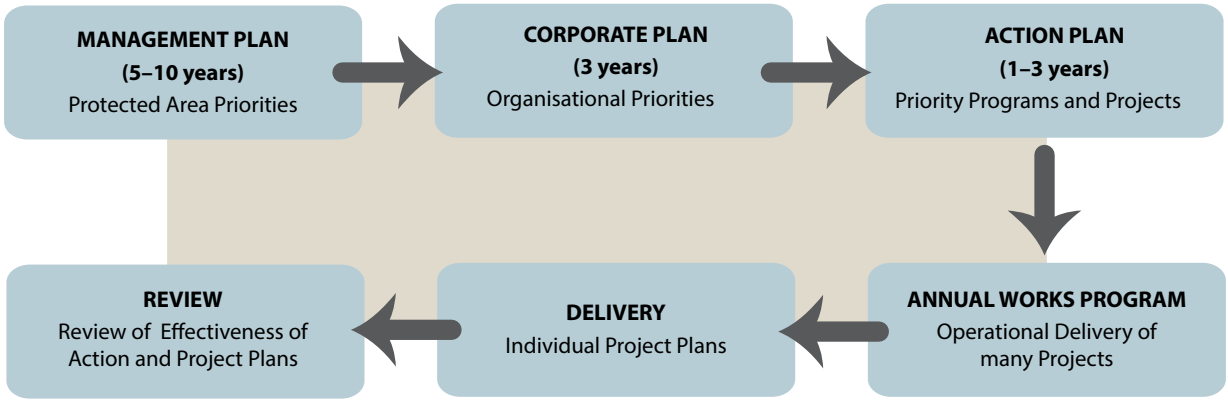

Figure 24.2 Corporate 'line of sight' to operations

This predator-proof fenced enclosure at Mulligans Flat Woodland Sanctuary in the Australian Capital Territory, Australia, is enabling managers to reintroduce endangered and lost species such as the eastern bettong (*Bettongia gaimardi*)

Source: Ian Pulsford

Catchment and water

Works are undertaken to restore altered hydrology and manage catchment soil and biodiversity conditions to help provide quality catchment health and water supplies. This may include peatland and wetland restoration and post-fire restoration of mechanical suppression disturbances. Healthy protected area catchments support many hydro-electricity, water supply and irrigation water storages around the world.

Ecological fire

Prescribed burning is undertaken in areas that require fire to sustain natural ecological processes, regeneration and health and that have artificially low fire frequency due to suppression of natural fire by fire authorities. This includes post-fire monitoring of flora and fauna conditions. The science-based reintroduction of managed fire into protected areas is becoming increasingly common in protected areas that have traditionally suppressed all fire, such as in Australia and North America.

Visitor experience programs

Asset creation, renewal and replacement

Capital improvement projects build and renew major assets associated with visitor facility structures, new roads and walking tracks and staff accommodation, offices and depots. They may include preservation or adaptive reuse of historic buildings. These projects often require specialist building and construction skills and are delivered as part of major works programs.

Asset maintenance

These projects involve the maintenance and repair of existing assets to meet design standards and serviceability condition requirements. They may include maintaining roads, walking tracks, bicycle trails, picnic areas, campsites, information signs, piers, jetties, staff offices and depots.

Asset servicing

Regular park cleaning and maintenance tasks, hygiene management and equipment servicing are key tasks. This is often carried out by contractors, and may include facility cleaning, grass cutting, gardening, general park presentation and amenity, and waste removal. For protected area administration, this includes office and depot cleaning, security and servicing of operational equipment such as vehicles, boats, chainsaws and tools of the trade.

Asset condition assessment

Administering an asset management system to monitor risk and compliance with regulatory standards and with regular asset inspections is a major on-ground and routine project.

Maintaining historic sites such as Cascades Hut, Kosciuszko National Park, New South Wales, Australia, requires ongoing investment and community involvement

Source: Ian Pulsford

Visitor safety

Projects are undertaken to ensure, as much as practical, that there is a low-risk environment for visitors within a protected area. Activities include ensuring facilities are in safe condition (relative to design standards), such as managing tree-limb fall risk around visitor sites, water safety and risks around cliff edges and snow avalanche areas.

Commercial operations

There are multiple projects that provide commercial services in protected areas to help achieve protected area organisation revenue targets in accordance with business plans for commercial sites (see 'Delivering operations' subsection below).

Tourism and visitor engagement and management

There are projects that provide support to visitors throughout their entire trip cycle and that aim to achieve high levels of visitor satisfaction. These include motivational marketing, provision of website content, supply of pre-visit and in-park information, organisation of information centre staffing and 'ranger' interpretation and education programs. This may also include the direct management of visitors for specific intense or higher-risk activities such as skiing, mountain biking, snow play, boating, climbing and abseiling and special event management. Successful delivery of these programs typically involves close collaboration with the tourism industry and tourism operators.

Cultural heritage programs

Indigenous and local community place management

This includes projects associated with the values and ongoing cultural connections to country of indigenous peoples with prior or current occupation of a protected area. This may include cultural conservation works to mitigate threats to indigenous cultural heritage sites and landscapes and intangible cultural heritage such as documenting and applying traditional knowledge.

Historic place management

Projects and programs are undertaken for heritage conservation that manages and mitigates threats to high-priority historic sites, collections, buildings and landscapes.

Fire and other incident management programs

Readiness

There are many projects associated with ensuring protected area staff are trained and prepared for fire and other incidents. This includes having a range of incident management plans in place and regularly tested such

Clearing fire trails of fallen timber—an essential management operation for maintaining visitor access, enabling fire management operations and other essential management activities, Kosciuszko National Park, New South Wales, Australia

Source: Ian Pulsford

Aerial water bomber spreading fire-retardant chemical (Phos-Chek) to control wildfire, Morton National Park, New South Wales, Australia

Source: Ross Constable

as for fire, severe storm events, earthquakes, tsunamis, avalanches, search and rescue, pollution events, cetacean stranding and other wildlife incidents (see Chapter 26).

Fire fuel reduction and community education

The implementation of risk-based fire fuel reduction programs in and near protected areas and the running of community education programs about the danger of fire ignition in severe fire weather are major projects.

Incident responses

The facilitation of effective responses to incidents is a major project. This can include evacuation of injured visitors, search and rescue, vehicle and aircraft accidents, fire, flood or avalanches, cetacean stranding responses and clean-up of oil spills (see Chapter 26).

Sustainable livelihoods

Many protected areas such as Category V and VI protected areas support the sustainable livelihoods of people living in and around the area by providing for ongoing traditional community use of resources. This may include ecologically sustainable use like stock grazing, cropping, sourcing materials for building and community-based ecotourism. Operational programs regulate and support these activities.

Organisational effectiveness

Knowledge and management effectiveness

This is the translation of research knowledge into information for use by protected area managers including the determination of the condition and health of protected areas and the measurement of the effectiveness of programs.

Community programs

These are projects that promote, enhance and manage community volunteer and partnership programs including the administration of grants for projects (see Chapter 14).

Compliance

Compliance projects ensure that regulations established for the safeguarding of protected areas are respected and are assisted by patrol and enforcement activities, the use of surveillance technology and education programs. These can vary from minor regulation infringements to major and dangerous enforcement operations such as against the poaching of ivory in Africa and illegal commercial-scale fishing on the high seas.

Box 24.1 Examples of decision-support and multi-criteria decision-analysis tools

Program logic

Program logic is a planning, communication and evaluation tool that seeks to articulate what the program is, what it expects to do and how success will be measured. Program logic models provide a framework built around a series of structured steps that link program outcomes (short, medium and long term) with program outputs and inputs. Program logic models are particularly useful for clarifying assumptions and developing links between desired outcomes, actions and measures of success.

Conceptual models

Ecological or socioecological conceptual models are used to examine, compare and contrast hypotheses that can explain observed patterns of human and non-human influences in natural systems (White 2012b). Conceptual models seek to bring together the best available knowledge of how a complex system operates with alternative management options. For protected area management, conceptual models can identify and integrate the significant environmental and/or social drivers, attributes, management objectives, threatening processes and indicators for management effectiveness and enable the testing of assumptions about alternative management interventions. A range of conceptual model types has been developed and applied to park and conservation management. These include causal maps, fuzzy cognitive maps, state-transition models and Bayesian networks (White 2012a).

Open Standards for the Practice of Conservation

Open Standards for the Practice of Conservation are a set of guidelines for adaptive management, developed through the international Conservation Measures Partnership. The goal of this partnership is to create a common 'language' and structured process to improve the standards of conservation planning, delivery and reporting, and share this knowledge broadly. The open standards (which in some organisations are referred to as conservation action planning or CAP) are organised into a five-step project management cycle:

- conceptualise the project's vision and context
- plan actions and monitoring
- implement actions and monitoring
- analyse data, use the results and adapt
- capture and share learning.

The CAP process is being widely implemented across landscapes around the world at various scales, from national and bioregional to catchments and individual reserves (see Chapter 13).

The Open Standards for Conservation Practice have also served as the framework for the development of Miradi adaptive-management software. The software guides practitioners through a 'wizard', working through each step of the CAP process. Users build up visual models and text boxes that demonstrate interactions between focal assets, threats, viability assessment, objectives, contributing factors and management strategies. Priority monitoring, work plans, result chains and dashboard reporting functions are also built into the software.

Structured decision-making

Structured decision-making (SDM) is an established framework for thinking critically about decisions, providing an organised and evidence-based approach to identifying and evaluating creative alternatives and making defensible choices in difficult decision situations (Gregory et al. 2012). There are six steps in SDM:

1. define the decision frame
2. define objectives
3. develop alternatives
4. estimate expected consequences
5. evaluate trade-offs and select an alternative
6. implement and monitor.

Helicopter water bombing a controlled burn as part of a program to restore the breeding habitat of the threatened little penguin (*Eudyptula minor*) on Montague Island Nature Reserve, New South Wales, Australia

Source: Ross Constable

An emphasis on the development of possible alternatives is a key component that sets SDM apart from other decision-assessment methods. SDM can be used to integrate *cause-and-effect judgments* concerning the effectiveness of management alternatives in conserving identified park values, and *value judgments* concerning trade-offs between the conservation of identified park values, costs and other relevant considerations. SDM can quantify trade-offs, calculate overall decision scores for each alternative and build in levels of uncertainty. It generally uses expert elicitation (experts, staff) to go through these tasks.

Benefit–cost analysis
Benefit–cost analysis involves comparing options based on their financial performance and selects the best option based on financial outcomes, and is often used for built-asset management.

Multi-criteria decision-analysis tools
Multi-criteria decision analysis considers a number of characteristics that competing options have and makes a decision based on an accumulative total of individual characteristic comparisons. There are many decision-support and multi-criteria decision-analysis tools available, both open source and proprietary products. Many of these tools include a spatial analysis function. A number of spatially based multi-criteria analysis tools are available. These include the Multi-Criteria Analysis Shell for Spatial Decision Support (MCAS-S) tool (Lesslie et al. 2008), developed by the Australian Bureau of Rural Sciences.

Risk based
A risk-based framework looks at asset management decisions through a risk-elimination or a risk-reduction prism.

Applications
Decision frameworks have recently been applied to better inform management priorities and decisions for protected areas in Victoria, Australia. Structured decision-making and Bayesian models were used to rank a series of potential alternative management strategies to address specific conservation objectives within protected areas in south-western Victoria. Structured decision-making and modelling were applied to inform spatial priorities for the control of invasive willows within the Alpine National Park.

Standards for public and employee wellbeing

Protected area organisations are responsible for the safety and wellbeing of employees, contractors and the public in protected areas, and there are major projects that are associated with compliance with regulations and statutes. Non-compliance could expose the land manager to litigation. This may include regulations associated with accommodation standards, fire detection and fire warning requirements, the provision of risk and road safety signage, the provision of safe drinking water, structures built to design standards, and the provision of a safe workplace based on occupational health and safety standards. Employee assistance programs provide advice and counselling services to support staff health and wellbeing.

Programming operations

The effective programming of operations is critical to achieving good on-ground outcomes, efficient use of resources, value for money and a committed and supportive protected area team. The operations cycle (Figure 24.1) outlines the components of the operations programming phase. The programming process involves:

- identification of tasks and actions needed to meet protected area management objectives
- prioritising actions for funding bids
- building approved actions into a ratified action plan
- preparing a work program for timely delivery of the action plan
- developing a capacity plan to identify resources and skills needed
- after delivery, reviewing project and program effectiveness.

Operation activities need to be determined and programmed through a planning framework and a thorough and defendable decision-support process that, if done effectively, leads to a project being supported.

Decision-support tools to inform operational planning and resource allocation

Most natural systems are complex, with many interacting components and many potential outcomes from management actions (White 2012a). These interact with equally complex social systems, with many public demands and expectations on protected areas. Park managers are faced with the challenge of meeting many competing environmental and social obligations

and demands, usually with limited resources. When deciding how and where to undertake management programs, protected area managers need to identify:

- the most significant values and assets, where they are and their current and desired condition
- key threats and levels of risk to values and assets
- strategies and actions likely to provide the best outcome for the resources available
- the effectiveness of management actions in achieving defined objectives.

A wide range of decision-support tools is available to provide a structured approach to determine preferences among options, thereby enabling more transparent, evidence-based adaptive management (Box 24.1). Such tools can assist park managers to:

- document more clearly how priorities for management are determined
- test assumptions about the potential success of proposed interventions
- assess trade-offs and undertake cost–benefit analysis of alternative interventions
- document how management actions connect to defined and measurable goals for the priority conservation assets.

Restoring high-value alpine wetlands following fire, Alpine National Park, Victoria, Australia

Source: Iris Curran

The purpose of these decision-support tools is not to provide the answer, but to enable decision-makers (from policy advisers to local protected area managers) to systemise and structure decision-making and priority-setting processes using the best available knowledge. The tools can support the programming, planning and delivery of operational projects.

Levels of protection and levels of service (and variations of these) are programming processes typically used by protected area agencies, including Parks Victoria, Australia, to determine operational priorities.

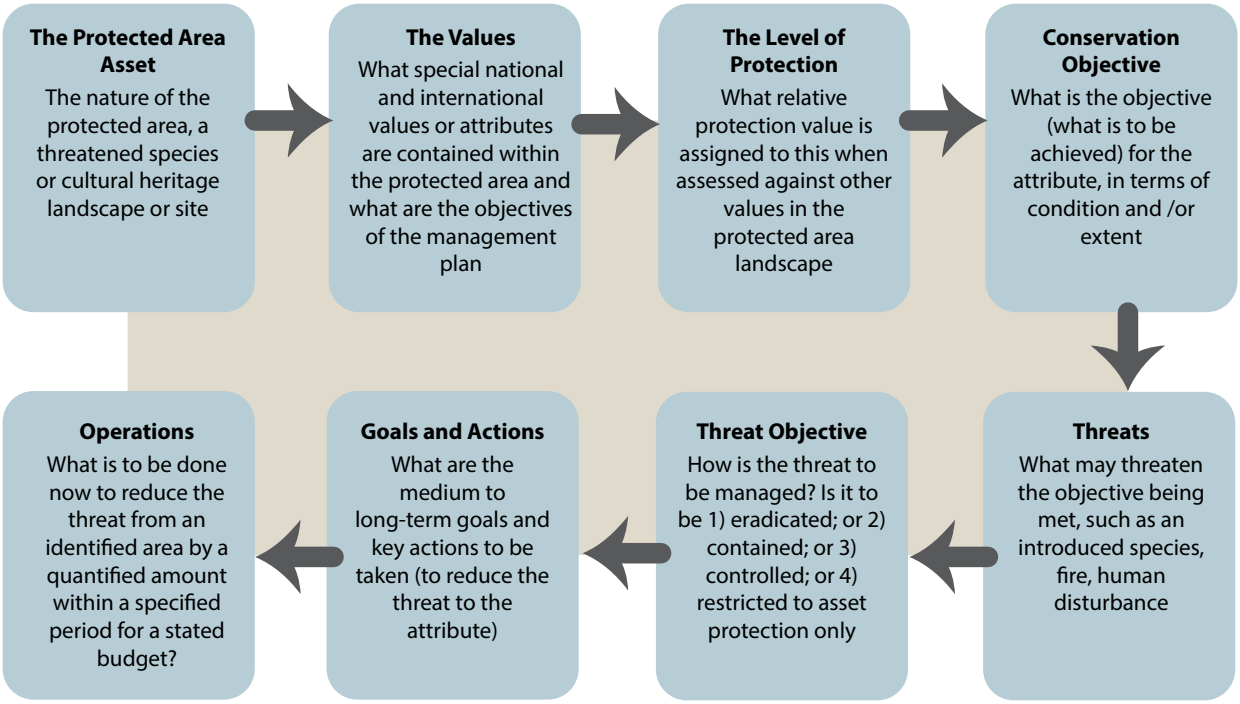

Figure 24.3 'Levels of Protection' step process for determining environmental and cultural program operational priorities

Environmental and cultural heritage programs

Determining and assigning 'levels of protection' are step processes that can be used for developing and programming operational priorities for environmental, land and water and cultural heritage programs and can incorporate elements of the decision tools described in Box 24.1. This aims to identify key environmental and cultural values of the protected area and to prioritise threats relative to those values, to determine the most appropriate response and to make best use of the response resources available.

The process does rely somewhat on the available information on values and threats, and decisions may need to be made based on limited information. In the case of inadequate information, a judgment needs to be made and the principle of precaution should be used while sufficient data are gathered. The process of applying the levels of protection step process to determine operational priorities for environmental and cultural programs is illustrated in Figure 24.3.

Visitor experience programs

Determining and assigning 'levels of service' are step processes that can be used for developing and programming operational priorities for visitor experience programs and can incorporate elements of the decision tools described in Box 24.1. This aims to provide the most appropriate visitor experiences in the right place at the right time and makes best use of the resources

Camping areas established to support a community-based ecotourism program, Sakteng Wildlife Sanctuary, Bhutan

Source: Gillian Anderson

available to the protected area. It also guides planning for rationalising and meeting savings constraints if needed and runs parallel with 'levels of protection' to ensure the right match between visitor experience and environmental protection.

Service levels are considered across a landscape, taking into account key visitor experiences, journeys and destinations. Visitor sites or precincts in the protected area are then assessed as to their importance and value in contributing to the visitor experience and what level of service is required to maintain that value. The assigned service level will vary across a spectrum, from very highly maintained sites to sites with only a basic level of service.

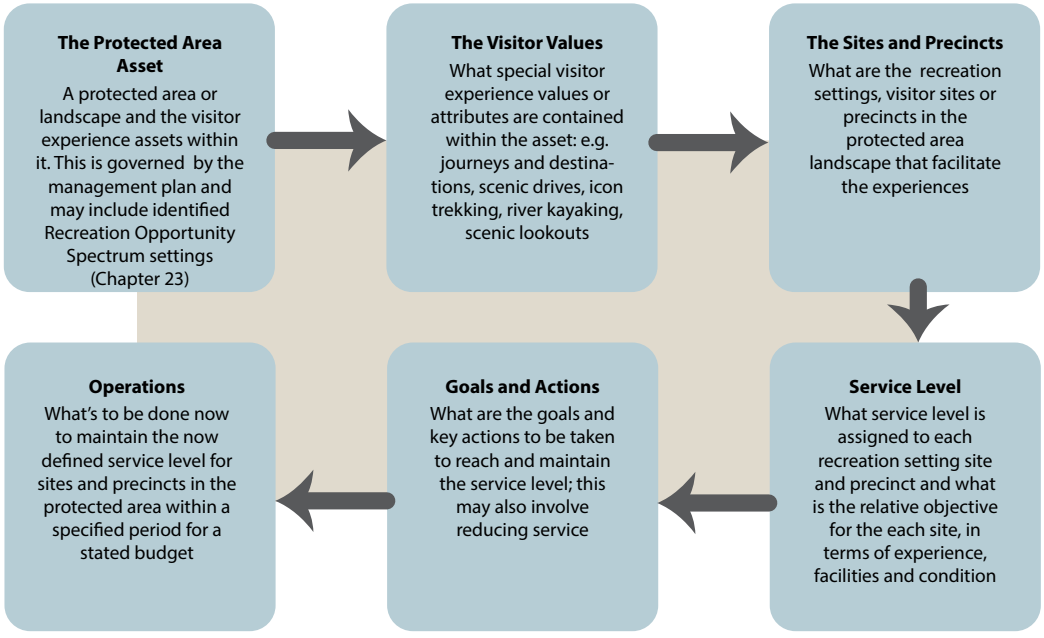

Figure 24.4 'Levels of Service' step process for determining visitor experience program operational priorities

This, then, guides programming investment and operational resource allocation for:

- access
- amenities
- information, interpretation and education
- recreational facilities
- management services.

The visitor service can be provided under a lease or licence to a private operator (see 'Delivering operations' section and 'Lessees, licensees and concessionaires' subsection below). The process of applying the 'levels of service' step process to determine operational priorities for visitor experience programs is illustrated in Figure 24.4.

Reducing visitor services to align priorities with available funding can result in a very negative community reaction, which may have other consequences for protected area agencies. A communication strategy is a necessary component of such action (see subsection on 'Stakeholder and communication plan' below).

Funding projects

All projects will need to secure funding to proceed. This funding may be one of the following:

- **Tied funding:** This is grant funding that is provided by governments, non-governmental organisations (NGOs), communities, sponsors or donors for a particular initiative or outcome, and will have specific reporting requirements.
- **Recurrent funding:** This is base funding usually available within organisations for recurring services and is allocated on an annual basis. This is often the funding source for asset servicing and maintenance and protected area administration and business operations.

Action plan

A number of priority projects may be planned for a protected area, and these may be organised further. Some organisations use the concept of a protected area 'action plan'. The action plan process evaluates proposed actions against available fund sources (which may be scarce) and the corporate priority criteria used for approval. An action plan lists all the programs of approved works that will be carried out for a specified period in the protected area and directs the operational business of the work group. The period is typically a one-year budget cycle but may include an outlook over a period of three or more years. The action plan identifies the 'line of sight' from a protected area organisation's corporate programs area to actions on the ground. An action plan would, at a minimum, have the components indicated in Figure 24.5. On-ground operations should only proceed once this planning and programming process has been considered and approved.

Works programming

A work centre or group in a protected area responsible for works will face myriad operational, planning and administrative tasks during the implementation year, with critical 'time and event' elements for delivery. The orderly arrangement throughout the year of the delivery of operational tasks identified in an action plan is typically done through a 'works program'. When the action plan is approved, a works program is prepared for delivery. This includes effective resource planning so delivery is timely, well organised and meets objectives. The works program also informs the development of individual staff 'work plans' so they understand their responsibilities and expectations in contributing to the delivery of the action plan. The works program needs to consider the whole cycle of project delivery including adequate provision of project

PROTECTED AREA ACTION PLAN

Corporate Program Description	Program Objectives	List of Projects/ Actions	Priority ➲ High ➲ Medium ➲ Low	Risk Assessment ➲ Potential losses ➲ Reputation ➲ Financial ➲ Legal ➲ Injury ➲ Business interruption ➲ Environmental ➲ Cultural	Budget and Fund Source	Accountable Person and Support

Figure 24.5 Protected area action plan components

Table 24.1 Indicative operations business milestone checklist

Operations business milestone	Checklist task
Planning	Complete planning and programming of operational activity
Action plan	Preparation and approval of the action plan
Budgeting	Budget loading
Staff	Preparation and approval of staff work plans
	Preparation of capacity plans
Project plan	Preparation and approval of the project plan
Staff rosters	Monthly rosters submitted for approval
Project evaluation	Monthly reporting on delivery
	Review and refinement of the project plan
Operational preparedness	Annual review of emergency management plans
Review of assets	Asset condition validation and reporting
Occupational health and safety review	Work centre safety audits
Staff review	Review of staff work plans

planning (including design aspects). Not allowing enough time for operational project planning and preparation is a common cause of delivery failure.

Capacity planning

Capacity planning is when resource and skill availability is considered in the works program to determine if any resource or skills gaps appear. The 'capacity plan' is most effective when applied by matching the works programs with the whole work group to share skills and availability across the team. Where resourcing requirements exceed availability, other options need to be considered rather than trying to make them fit. These include looking to other parts of the organisation, buying in the labour and skills through contractors, seeking volunteer support or, if necessary, reviewing the work programs and removing lower-priority tasks.

Annual business diary

The annual operational business cycle of protected area organisations will typically have a number of key reporting and corporate milestones that will need to be met throughout the year. These are essential to a well-functioning operations environment. The operations manager will have corporate milestone tasks programmed into the work unit's capacity, to ensure they are dealt with smoothly and efficiently. A useful approach is to develop an annual operations calendar that designates the known business milestones throughout the year to assist staff (Table 24.1).

Major works and specialists

Operational tasks fall into two broad categories: major and minor. Major works are projects with large budgets and highly technical design and standards, and are typically complex. These projects are often associated with buildings and structures, roads and bridges, and service infrastructure such as water, sewerage and power. These operations require technical specialists and are most effectively managed through major works divisions of organisations or contracted out to project managers. Minor works are the more regular operations that protected area staff are skilled and resourced to undertake. These include most environmental projects, fire and emergencies, visitor facility maintenance and servicing, and less-complex facility development such as minor walking tracks. It is important that the level of technical skill required is understood and resourced correctly before embarking on more complex operations.

Planning operations

Once an action plan is approved and works programs and capacity plans are in place, it is time to start project planning and organisation. The operations cycle (Figure 24.1) outlines the components of the operations planning phase. This includes project governance, design aspects, environmental impact assessments, research needs, contractor tendering, stakeholder consultation where appropriate, partner agreements, liaison with neighbours, occupational health and safety requirements, meeting project objectives, securing permits and approvals, evaluating success and many others. Without good management of a project, a lot can go wrong.

This is where on-ground operational project management starts, and with that, the importance of a clear and approved project plan is crucial to successful delivery. Allowing sufficient time for the preparation and approval of a project plan is a key part of works programming. The nature and complexity of the project should reflect the complexity of the plan.

The project plan

Protected area organisations have developed guidelines for managing projects, and a distillation of these is presented in Table 24.2. Project planning frameworks such as the Conservation Measures Partnership framework and its supporting Miradi software or the CAP framework (Box 24.1 and Chapter 13) also support project planning.

This project planning outline has been presented in its most comprehensive form and represents best-practice guidance for large projects being managed through well-resourced programs as well as by established protected area agencies. Some projects may be smaller and less complex and aspects of these guidelines will not be relevant, so the table should be adapted to suit local circumstances. Specialist advice, guidelines and manuals (Case Study 24.1) are critical resources when planning operations.

Table 24.2 Components of a project plan for operations

Component	Description
Project name	A name that briefly and clearly identifies the title and nature of the project
Corporate and administrative details	Identify connection to organisational business priority actions, file numbers, project codes, budgets, funding source, project manager, workforce allocation and expected budget outlook for the next three years. Time lines for commencement of planning, implementation period and expected completion date
Business risk assessment	An assessment of the project's negative risk to the business by considering the likelihood and consequence of the project failing to deliver. The assessment may find • the risk to business of delivery failure is below an established corporate threshold (or low) and a brief project plan only is needed • the risk to business of delivery failure is above an established threshold (or high) and the project plan process would be more inclusive including a full risk assessment, an environmental impact assessment and a communications management plan
Project description	This is where the project detail is described in readiness for approval. The project description will outline the vision, describe why it is being done, what it involves, how it will be delivered, when it will be completed and who will undertake the work. The description will include consideration of skills, the resources and competencies needed, the design or industry standards that may apply and the project logistics. The description will also provide a geographical context statement for the project including a very brief description of the protected area, its significance and its special values
Objectives	List the key objectives the project is aiming to achieve in its vision. Ensure the written objectives are clear and presented as 'succinct, measurable, achievable, resourced and timely' (SMART) statements
Performance measures	Each objective must have a related performance measure to ascertain how success in meeting the objectives is to be measured and reported
Project evaluation plan	Prepare a project evaluation plan for the entire project that includes performance evaluation measures for each key milestone
Operational, environmental and cultural risk assessment	The likely operational risks associated with carrying out a project are identified, assessed and rated and their treatment described. A risk rating is the consideration of likelihood (the probability or frequency of occurrence) and consequence (the degree of outcome or impact of the occurrence) that are presented in a matrix. Operational delivery risks where treatment may be required could include: • the timely availability of resources, services and skills • favourable weather • effective communications • minimising disruption to the community and visitors • political sensitivities • the health and safety of staff, contractors and the public. Environmental and cultural risks are considered. Procedures to guide this are in the 'Environmental impact assessment' subsection below

Component	Description
Project scope	Defining the project scope describes when each task is to be completed, and what support and resources are needed. Tasks and milestones are best presented in a Gantt chart for complex projects
Review of sustainability considerations	The project scope includes the selection of materials and the method of implementation (see 'Sustainability in operations and asset management' subsection below)
Budget phasing	The breakdown of the total budget into expected monthly expenditure of budget and resources provides a 'monthly phasing' that may be used for budget-control reviews
Approvals, permits and notifications	Projects will need to meet internal and external planning approvals and there is a need to consider all possible planning permits, and legislative and other legal requirements. These may include government planning schemes, environmental regulations, biodiversity conservation requirements, discharge licences, pesticide regulations, cultural heritage approvals and occupational health and safety regulations. Permits or advice from authorities responsible for essential services may also be relevant
Stakeholder communication; communications planning	For large and complex projects, it is common to prepare a comprehensive stakeholder and media communications plan (see 'Stakeholder and communication plan and media management' subsection below)
Project plan sign-off	A project plan is typically prepared by the project manager (and key staff) and approved by a senior officer with the appropriate delegations
Project evaluation	Performance evaluation of the project is undertaken (based on the evaluation plan) during the project and at its completion (see 'Reviewing the effectiveness of operations' subsection below).

Environmental impact assessment

It is a fundamental responsibility of protected area managers to ensure that a full assessment is made of any potential impact of operations on the natural and cultural heritage values of a protected area (Chapters 3 and 4). The level of impact assessment will depend on the complexity, scope and nature of the operations works. The approach to environmental impact assessment (EIA) will vary internationally depending on legislation and policy, and terms used may have different meanings; however, the general principles are shared.

An initial risk-assessment step in project planning (Table 24.2) will help determine the level of impact assessment required. The outcome of that initial assessment may be:

- simply a list of identified risk-management measures in the approved project plan
- an environmental management plan (EMP) to support an approved operation that further identifies impacts and prescribes mitigating actions that need to be built into project delivery to avoid or minimise effects
- an internal 'review of environmental factors' or equivalent document that carefully follows a protected area organisation's thorough environmental impact appraisal procedures involving many specialists, for assessing and approving a proposed operation
- a full environmental impact statement (EIS), which is only employed in the case of potentially high-impact and high-consequence projects where legislation may direct the need for a full EIS to be prepared for approval by the executive level of government.

Such documents reflect a protected area organisation acting responsibly (and consistently) and can also provide an internal peer-reviewed checking mechanism to ensure that an operation has little or no impact. They can be time-consuming and expensive to prepare, review and approve, so sufficient consideration of lead time for their development to meet operations delivery schedules is vital.

Environmental management plan

The purpose of an EMP is to support a more complex project, as prescribed in the approved project plan. The EMP will identify in more detail than in the project plan the potential impacts and prescribe mitigating actions that need to be built into the project delivery to avoid or minimise those impacts and, where necessary, direct ongoing management: The EMP should:

- describe the project scope
- identify in detail environmental, water and catchment values and attributes including biodiversity and soils
- identify legal constraints, requirements and approvals
- outline an overall environmental management strategy with objectives and performance measures
- identify risks and control measures

Case Study 24.1 A manual for management of walking tracks in Alpi Marittime–Mercantour trans-frontier protected area

Alpi Marittime and Mercantour are two adjoining mountain protected areas in the south-western Alps, in Italy and France. Because of the geographic situation and the history of the area, they are connected by a dense network of mountain mule tracks and footpaths, leading from one country to the other and often crossing the national borders at very high altitude (2800–3000 metres). From the beginning it was clear to the managers that it was necessary for the two countries to cooperate not only in the field of wildlife management but also for footpath maintenance and restoration.

First, there was an agreement regarding the common signposting to be placed on the mountain passes on the border, and then it was decided to extend this cooperation to entire footpaths on both sides. Thanks to grant funds from the European Union for trans-frontier cooperation, the two parks produced a manual, in French and Italian, aimed not only at the operational staff of both parks but also at the technical services of local French and Italian administrations.

The text is complemented with several pictures of path work, and in particular with practical technical drawings. The information that was put together is in part local traditional knowledge of path-building from both sides of the mountains, but also some innovative technical solutions and new materials tested by the field staff of both parks. The manual provides information for the operations staff and communities with a connection to the area on the following topics.

- History of the footpaths: The area has origins from time immemorial—from the Neolithic to the Roman Empire, from the Middle Ages to the Industrial Revolution; the salt routes in the Alps, the big changes in the 19th and 20th centuries; the religious connections, the hunting tracks for the king, the military roads and, after World War II, the first tourists.
- Path assessment and problem analysis: Guidance on how to segment and assess a footpath, analyse and observe its degradation, compile a grid/checklist for the analysis of the problems, plan the works, and provide common questions and answers.
- Footpath restoration and maintenance: Technical information on path surfacing, drainage, paving, managing gradients, dry-stone walls, bank and slope stabilisation and path definition.
- Some practical examples from the field.
- Footpaths in the wider French/Italian national/regional context.

The manual promotes the values of footpaths.

- Footpaths have multiple functions: They had important commercial, agricultural and pastoral (transhumance) uses in the past, and a religious function for pilgrimages. In the 21st century, their purpose is mainly recreational and for visitors. For this reason they are an important economic resource. In Europe, some 10 million people use pathways.
- They are a physical cultural heritage: They are an important component for understanding and discovering the social, economic and cultural history of a whole territory. Paths are, however, also a place for the spirit and self-regeneration, because they put us in contact with the beauty of nature and its relaxing landscapes.
- They are a tool for discovery and communication in the context of protected areas. A well-managed footpath gives a positive impression of the general management of the whole protected area. They are also an important management tool to steer or redirect visitor flows and to monitor use through eco-counters. This provides important information on visitor patterns and needs.

Footpaths are increasingly a tool for sustainable development. When planning path works, the following principles should be considered:

- the project should have the support of local stakeholders; they should be consulted and their suggestions taken into account
- the project should generate benefits to the local population, including sustainable economic returns
- the technical solutions chosen should fit with the environment, respect the territory and its history, and interpret the ‘spirit of the place’; the material used should reflect this and where appropriate should be locally sourced, according to local tradition
- any negative impact, direct or indirect, should be avoided
- any decision should consider the long-term outlook, including funds being available for ongoing path maintenance.

Under our feet, footpaths tell us unique stories about times gone by. They are a collective memory, and the means through which we can approach nature. Our footpaths are precious; let us do our best for their conservation.

— Patrizia Rossi

Reconstruction of an ancient walking path in Alpi Marittime–Mercantour trans-frontier protected area, Italy

Source: PNAM

Environmental management plan in place for removing dangerous fire-killed trees in the Alpine National Park, Victoria, Australia

Source: VicRoads North Eastern region

- identify the most effective operational methods and mitigating actions that minimise impacts on the environment and maximise workplace safety
- identify the roles and responsibilities of stakeholders and the accountability of operational roles including communication needs
- identify skills and competencies, training and induction needed to carry out the project work
- outline a process for dealing with noncompliance with the plan
- identify a monitoring and reporting program
- evaluate other factors such as impacts on the community and visitors
- address site management and rehabilitation requirements
- identify ongoing and long-term follow-up actions.

Environmental impact statement

This is the highest level of EIA and is appropriate only for potentially high-impact and high-consequence projects as directed by national or State environmental legislation. In relation to an activity in a protected area, an EIS would typically require a comprehensive assessment of the natural and cultural heritage values of the affected area and the potential impacts and threats of an operation on those values. Overall, the purpose of the EIS is to protect the environment, to improve public participation in government decisions and to minimise costs (if appropriate) and maximise benefits of approval processes (Thomas 2001:11).

Box 24.2 US National Park Service criteria to determine if an EIS is appropriate

The following is a summary of 10 criteria from the *Director's Order 12* handbook (NPS 2013) to determine whether an EIS is appropriate.

1. Impacts that may have both beneficial and adverse aspects, but that may still have significant adverse impacts.
2. The degree to which public health and safety are affected.
3. Any unique characteristics of the area.
4. The degree to which impacts are likely to be highly controversial.
5. The degree to which the potential impacts are highly uncertain.
6. Whether the action may establish a precedent for future actions with significant effects.
7. Whether the action is related to other actions that may have individual insignificant impacts but cumulatively significant effects.
8. The degree to which the action may adversely affect historic properties, or other significant scientific, archaeological or cultural resources.
9. The degree to which an action may adversely affect an endangered or threatened species or its habitat.
10. Whether the action threatens a violation of federal, State or local law or requirements imposed for the protection of the environment.

Source: NPS (2013)

Protected area organisation procedures would usually have environmental impact appraisal procedures with some type of 'trigger' that an EIS is required. The US National Park Service provides guidance through its 'Director's Order 12' (NPS 2013; Box 24.2). For detailed content guidance, many governments and organisations around the world have been assisted by the US *National Environmental Policy Act* and its EIS requirements. This legislation describes the contents required for an EIS (DOE 1998; Thomas 2001).

Review of environmental factors

A review of environmental factors (REF) is an internal organisational approval process that determines whether an activity should go ahead, taking into account to the fullest extent possible all matters affecting or likely to affect the environment. It further assists in the development of appropriate conditions should approval

be given and may prescribe the need for an EMP to be prepared to direct the activity. The review also assists the determination of whether the activity is likely to have a significant effect on the environment, in which case an EIS will need to be prepared and considered before approval may be granted. A REF can include many items and often they are in the form of a checklist, as follows:

- climate
- geology and geomorphology
- soils
- plants (species and communities)
- animals (species and habitats)
- water catchment and water quality
- significance for indigenous and local communities
- historic sites
- recreation and visitor settings
- landscape values
- traditional and existing uses
- air quality (Worboys et al. 2006:233).

The environmental impacts that may be of concern could include:

- air pollution
- noise pollution
- vehicle traffic
- aircraft movements
- disturbance to geoheritage sites including karst sites
- disturbance and erosion of soils
- disturbance to streams and the pollution of water
- impacts to native animal species and habitats
- impacts to native plant species and communities
- introduced plant species impacts
- introduced animal species impacts
- introduction of unscheduled fire(s)
- disturbance to cultural heritage and sacred sites
- disturbance impacts (poaching, theft, vandalism, wildlife disturbance) to protected area values
- project disturbance to neighbours, local communities and the tourism industry (Worboys et al. 2006:233).

There are operational matters that should be, as a matter of course, considered as part of minimising the impact of a project at any level. These include:

- the layout of a temporary worksite and its containment
- the safe storage of chemicals and fuels
- the planned movement and parking/location of plant and vehicles
- hygiene regimes for vehicles and machinery to prevent introduced plants and pathogens
- avoiding and minimising disturbance to biodiversity and, if necessary, offsetting impacts
- avoiding and minimising disturbance to soil, sediment and water movement
- taking care in the use of chemicals given their potential to impact on non-target values
- introducing measures for dust and noise control
- organising for the removal of project waste off-site and preferably off-protected area
- implementing fire-prevention measures
- being prepared for project incidents such as the management of spills and emergencies
- retaining 'guarantee funds' for project site restoration and any follow-up works
- implementing biodiversity recovery monitoring as part of the extended 'project'.

Cultural heritage

A project plan should identify the need for permits and/or more specific plans to be prepared for managing environmental heritage, cultural heritage and historic values. This need, underpinned by either legislation or judiciousness, provides the basis for cultural heritage management plans to be prepared prior to project approval. If the operations are expected to disturb sensitive cultural landscapes or registered sites, permits and/or an approved cultural heritage management plan will be required. Their preparation generally requires detailed knowledge and skills and usually involves many different specialists including traditional owners.

The requirement for a cultural heritage management plan may be associated with legislation related to indigenous traditional ownership or association with the land or with registered historic sites and landscapes (Case Study 24.2). The cultural heritage values may be associated with indigenous peoples and traditional ownership, historic associations of indigenous and non-indigenous people, or both. If the nature of the project is such that a cultural heritage management plan is not required by law, the project manager may nevertheless choose to include cultural heritage assessment as part of the environmental impact appraisal process. The purpose of a cultural heritage management plan is to:

- assess and document the presence of cultural heritage and its associated values

- investigate the extent and nature of the values and legal status
- identify cultural heritage values at risk
- identify and work with indigenous traditional owners as appropriate
- identify and work with communities and people with historic connections where relevant
- consider if harm to values can be avoided, or, if harm cannot be avoided, to prescribe strategies to minimise harm
- obtain approval to proceed based on the plan.

In many countries, this will require communication with the government body responsible for implementing indigenous and historic cultural heritage legislation. The International Council on Monuments and Sites (ICOMOS) principles and guidelines underpin historic cultural heritage planning across the world (Chapters 4 and 22).

Sustainability in operations and asset management

While protected areas play a vital role in preserving our planet's natural and cultural heritage assets, it is hard to see how these areas will not come under growing pressure in the future without a widespread commitment to environmental sustainability principles and practices. It could be said that the manner in which humans behave outside the boundaries of protected areas could prove the key determinant in the destiny of protected areas. It is for this reason that protected area managers must seize the opportunity to demonstrate leadership in the area of environmental sustainability.

Sustainability policy

Protected area organisations can demonstrate leadership in sustainability through the development of a strong sustainability policy. The organisation's position is then delivered typically through an environmental management system or protocol (EMS) that contains environmental objectives and targets, and identifies review mechanisms and roles and responsibilities. This will build sustainability thinking into organisations by supporting environmental impact assessment and guiding operations.

The business case for environmental sustainability

Sustainability policies and procedures should reflect a triple bottom line (TBL) approach (DEH 2003), meaning that environmental, social and economic benefits are all considered. The TBL framework best supports the business case needed to justify environmental sustainability improvements as it helps quantify the return on investment (ROI) using a more holistic understanding of benefits. ROI is a common business term that can support the communication of outcomes sought to a conventional business-minded audience.

Energy efficiency projects can in some cases have a relatively attractive ROI as the energy cost savings that come with energy efficiency improvements can enable the investment to be repaid quickly. Once the cost of the works has been recovered, the ongoing savings can be used to implement more energy efficiency works or can be redirected to other operational priorities. Reduced fossil fuel energy consumption contributes to a reduction in greenhouse gas emissions and other atmospheric and land-based impacts. This in turn may provide broad environmental, social and economic dividends for the general community.

Key sustainability principles for operations in protected areas

There are four key sustainability principles that should be considered by project managers for operations in protected areas.

Leadership: Exercise leadership to achieve sustainability principles and practice when carrying out operations and making asset design and material decisions.

Triple bottom line: Environmental, social (including cultural) and economic sustainability objectives guide built-asset design, construction, maintenance and end-of-life disposal. Design decisions that aid environmental sustainability are an investment, not simply a financial cost. Some examples of practical triple bottom line leadership considerations for operations in protected areas include:

- undertaking appropriate environmental, social and cultural impact assessments (see 'Planning for operations' above) and implementing required actions to avoid or minimise impacts
- collaborating with local communities and traditional owners to be sensitive to needs, encouraging participation and ownership and minimising or avoiding impact on social and cultural values
- developing a TBL-based business case that gives the most appropriate return on investment and influences investment in good design
- ensuring work is carried out in a manner that is safe for workers and the community
- giving preference to using non-toxic materials or materials of low toxicity

Case Study 24.2 Planning for Indigenous cultural heritage: Hotham–Dinner Plain trail in the Alpine National Park, Victoria, Australia

The Aboriginal landscape of the Australian Alps is interconnected and interwoven with significant and sacred places linked by travel routes and pathways, frequented by a rich array of language groups and Aboriginal clans. Occupation has been recorded over 20 000 years (Flood 1996), with a rich history in inter-clan gatherings and ceremony. The advent of European settlement from the 1830s decimated the Aboriginal population through disease, massacres and displacement, causing severe social disruption.

Today, the Australian Alps are a popular year-round visitor destination serviced by alpine resorts and villages. A new 13-kilometre multipurpose trail linking the alpine villages of Dinner Plain and Mount Hotham has been established, in Victoria's Alpine National Park and the adjoining Mount Hotham Alpine Resort. The theme for interpretation along the trail is 'travel with traditional owners along an ancient mountain pathway to learn of the past, understand the present and discover the future aspirations of the Aboriginal peoples of the alps'. The trail may be walked, run, skied or ridden on bicycle. The construction method proposed involved removing sod and soil along the 2 metre-wide trail, 200 millimetres deep, for inlaying with gravel.

The entire route of the trail follows an ancient pathway for Aboriginal people seeking a safe and secure route from lowlands to the high country for gatherings and moth feasting or across the alps (Muhlen-Schulte 2010). For the traditional owners—the Gunaikurnai, Dhudhurhoa and Yaithmathang—this route represents an important attachment to place, kinship and country, and its richness and diversity complement other parts of their traditional country. The Victorian Aboriginal Heritage Regulations 2007 required the preparation and approval of a cultural heritage management plan (CHMP) as the work constituted a high-impact activity. This is defined in this case by disturbance using machinery in a sensitive area (a national park). The CHMP assesses and documents the presence, nature and extent of Aboriginal cultural heritage and determines if harm can be avoided and, if not, minimised. The plan must then be approved by the registered Aboriginal party or, in the case of no registered Aboriginal party, by Heritage Victoria, the statutory authority for Aboriginal heritage in the State of Victoria.

The CHMP for the Hotham–Dinner Plain multipurpose trail (Muhlen-Schulte 2010) was prepared in collaboration with representatives of the three traditional owner groups who participated in site surveys. They identified and described 19 'Aboriginal places'. These are places of cultural significance to Aboriginal people of Victoria and are registered under the *Aboriginal Heritage Act 2006*. The plan concluded that the proposed activity may proceed under the following conditions (in summary):

- a supervisor will direct works and remain on site to ensure ground disturbance is minimised
- all contractors and workers are to have a site induction with the traditional owners and the CHMP author prior to work commencing, for cultural heritage awareness and to ensure legal responsibilities are clear
- the entire activity area is to be marked with flagging tape to ensure no disturbance occurs outside it

Elevated walkway built to protect a high-value Aboriginal place in the Alpine National Park, Victoria, Australia

Source: Gillian Anderson

- the extents of the 19 Aboriginal places are to be clearly marked to minimise harm
- two Aboriginal places identified as the most significant are not to be disturbed—for one, an elevated walkway is to be installed with no machinery allowed and an archaeologist is to be on site during construction to record and restitute artefacts; and for another, gravel is to be laid over geofabric
- no trail markers are to be used in Aboriginal places, and installation of interpretative signs in Aboriginal places must involve an archaeologist to record and restitute any artefacts disturbed
- the trail is to be renamed with an appropriate Aboriginal name by traditional owners
- all artefacts collected are to be restituted in collaboration with the traditional owners.

The key values and outcomes the CHMP brought to this project are:

- greater understanding of the Aboriginal cultural and scientific significance of the area
- opportunities for land managers to work with traditional owners through their reconnection with country
- the opportunity for visitors to safely and comfortably enjoy the nature and culture of the Australian Alps while learning about Aboriginal history, traditional owner connection to country and their future aspirations
- avoiding or minimising impact on Aboriginal heritage.

The key learnings for the protected area operational manager were as follows.

- Research early (through the project plan) the potential impact of the activity and determine if a CHMP (or similar) is needed. It may be possible to avoid a CHMP by reviewing the project scope and/or methodology. This is entirely legitimate as it encourages impact avoidance.
- Budget for significant costs and time associated with the CHMP preparation. This will involve consultant fees and survey work and analysis with the traditional owners, who, as consultants and knowledge-holders, require payment for their services.
- There may be disputed traditional owner interests; this may take time to resolve.
- Allow for the cost of implementing conditions that may arise from the CHMP.
- Appreciate the valuable information and relationships that a CHMP will reveal for the area and the professional development that will come with the experience.

- maximising economic value to local communities and utilising local materials and services where possible
- using sustainable building materials that meet contemporary and internationally accepted accreditation standards (such as certified sustainable timbers)
- considering the carbon footprint of works and minimising or offsetting this pollution.

Whole-of-life asset thinking: The evaluation of environmental and material costs and benefits of a built asset is undertaken in a holistic fashion by looking at all stages in an asset's life including design, fabrication, construction, maintenance and end-of-life disposal. Considerations for whole-of-life thinking for operations include:

- designs that seek to optimise scope for environmentally sensitive fabrication, construction and maintenance techniques
- life-cycle costs minimised by using low-maintenance materials and equipment, with maximum expected useful life.

Resource efficiency: Considering the modest and diminishing budgets available for many protected areas, resource efficiency in operations is critical as well as globally responsible. Costs can be minimised by good design, type of materials and maintenance requirements. Examples of where resource efficiency may be achieved in operations include:

- designing built assets that are proportional to needs and adaptively reusing existing facilities where feasible
- designing built assets to minimise resource consumption, energy, water and waste
- meeting predetermined quantity and quality standards for energy consumption and waste generation and disposal
- using recovered or recycled content materials where practical and safe to do so
- maximising the recovery of materials at the end of the asset's life
- incorporating renewable energy systems where practical, feasible and cost-effective
- minimising the use of building materials with high embodied energy

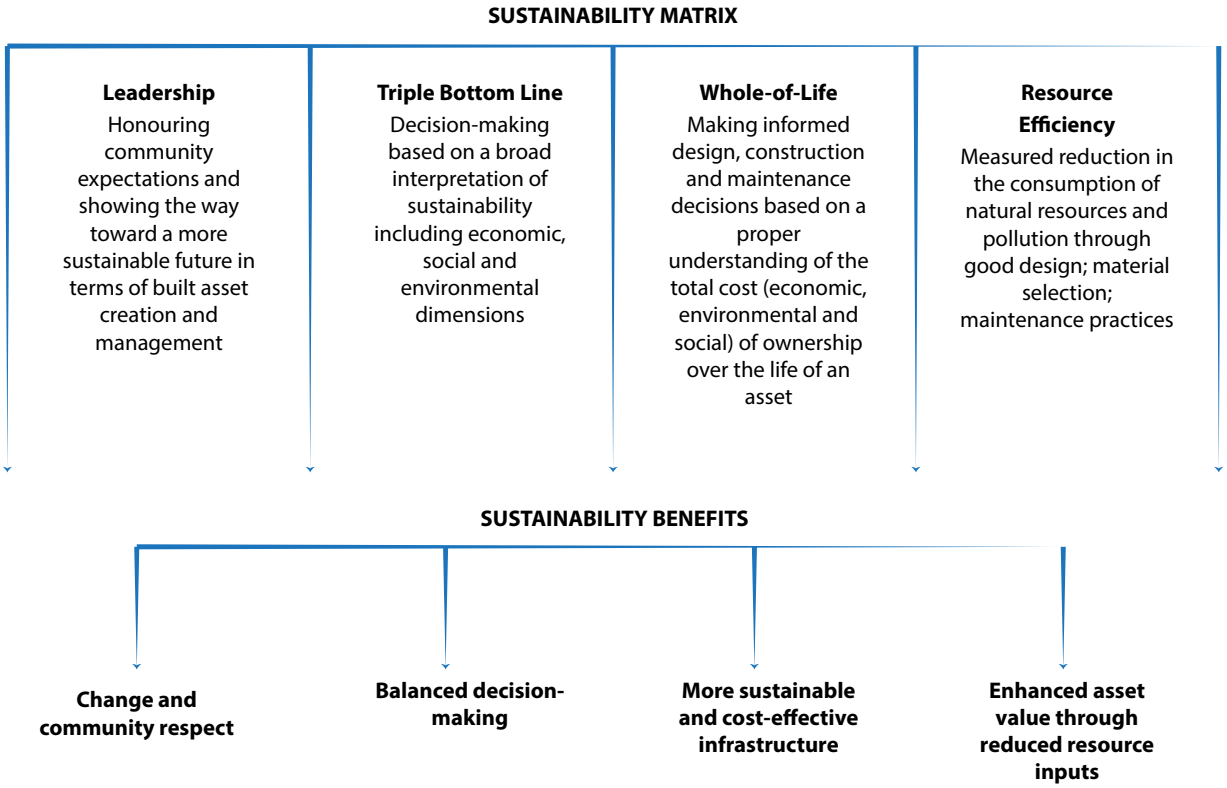

Figure 24.6 Sustainability principles and benefits

- designing landscaping using local protected area species to facilitate year-round, safe moderation of the internal climate of buildings
- targeting a low carbon future for the completed project that may include greenhouse gas offsets.

The relationships between these principles and sustainability benefits are summarised in Figure 24.6.

Stakeholder and communication plan and media management

During the delivery of a project, positive and negative issues involving the community and other stakeholders may arise. They can range from minor queries from individuals to community outrage. The most effective way to manage this is through pre-planning and being proactive with communications. During the preparation of the project plan, an assessment of the complexity and risk of the project will direct whether the communications and media issues are low risk and can simply be addressed in the project plan, or if a more comprehensive stakeholder and communication plan is required (Chapter 15). A comprehensive plan could save valuable time later by avoiding issues that have arisen from poor communication. Some potentially controversial issues that would benefit from being addressed in a stakeholder and communications plan include:

- smoke impacts from planned fuel reduction burning
- closure of roads, walking tracks and facilities for safety or maintenance
- removal or control of introduced plants or animals and culling of native animals
- removal of structures, especially in regard to historic structures
- development of facilities
- reduction of visitor services due to budget pressures
- delivery of a service or facility that is not proceeding at the planned pace.

The aim of a stakeholder and communications plan is to inform and engage with the community and stakeholders, so they do not feel excluded from decision-making, and to explain why operational actions are being taken and the benefits arising. The executive level of government may be a key stakeholder identified by the plan. The plan should be developed with the project delivery team and includes nine key sections (Figure 24.7).

Delivering operations

The process of identifying operational priorities, securing funding, programming the work, identifying capacity, preparing a project plan and seeking approvals

Scope of the Project	Describe the project and what is potentially controversial, likely to impact on stakeholders and any opportunities for positive messaging.
Communication Goal	Describe what is to be achieved through communication and what the key messages to deliver are.
Key Audience and Stakeholders	Identify who the communication messages are aimed at. List the stakeholders both within and external to the organisation and government, their interests, expected attitude to the project and relevant message.
Identify Opportunities for Public Participation	Identify aspects of the project where the public can engage in decision-making and provide feedback, and how that will be communicated and managed.
Tools	Identify the most effective tools for each audience and stakeholder. These may include web site information, media stories, newsletters, targeted meetings, personal briefings and communications, signage, education and intepretation programs or establishing a specific stakeholder group.
Accountability and Timing	Identify when during the delivery phase each tool will be used and who is accountable.
Frequently Asked Questions	Prepare a list of likely questions that may be asked about the project and prepare answers. These may be released publically at the start of the project or used as an internal tool if issues arise.
Spokesperson	Identify the spokesperson for this project. This must be strictly adhered to so the messaging is consistent and accurate. The person must be media savvy and confident in public speaking. The media, community and stakeholders prefer to have a regular contact. (See Chapter 15).
Budget	Budget and allocate adequate project funding for communication and stakeholder management.
Performance Measures	Identify key performance measures to assess the success of implementing the Plan.

Figure 24.7 Key sections in a stakeholder and communications plan

is now complete and signed off. It is time finally to start the work and deliver the project. Presented here are some key considerations that are important for successfully delivering operations.

Leadership

Implementation of operations requires effective leadership, showing confidence and focus on efficient organisation and processes and quality and timely outputs and outcomes. Challenges arise constantly that need timely action and effective decisions to keep the project on track. A good operations leader manages and delegates effectively, provides consistent and positive direction to staff and contractors, keeps stakeholders well informed, insists on high standards of behaviour, work practices, quality and governance, keeps focus, has attention to detail and manages the unit's workload effectively to reduce stress. Such leadership also means maintaining effective communication and informing progress up and down the management chain and not hesitating to seek specialist advice should problems arise (see Chapter 12). Above all, a leader ensures the work is carried out in a safe workplace, compliant with occupational health and safety regulations.

Working with staff

The delivery of projects relies heavily on protected area staff either through direct actions or through their management of contractors. Staff involvement in project delivery is typically identified in their annual work and capacity plan so that their annual priorities and the relationship between projects are clear. This

An armed warden ensures visitor safety is paramount when viewing large game such as in South Africa's Mkhuze Game Reserve

Source: Ian Pulsford

provides staff with the chance to discuss operational sequencing details and other practicalities with their manager. The important starting points with staff are engagement and empowerment. Involving operational staff in the planning phase will facilitate ownership and therefore a greater desire for a good outcome. Time spent at the beginning of a project going through the project plan, what is to be achieved and outlining proposed individual roles, responsibilities and expectations will also facilitate engagement and enthusiasm in the project and draw out any unexpected issues or misalignment of staff skills and competencies. Delegating as much as reasonable and possible will empower people to perform well and take personal leadership. Staff must understand that with responsibility comes accountability and being answerable for the actions and decisions made.

Confidence by staff in the project leadership is also achieved through outlining the thinking that has gone into ensuring a safe workplace and that sufficient resources are available. Fatigue is an important negative factor for project delivery and if unmanaged will lead to poor performance.

Occupational health and safety

Providing a safe workplace and public space is the primary responsibility of a project manager and the whole team, whether managers, supervisors, contractors or workers. The project manager must have a good working knowledge of any occupational health and safety legislation and organisational safe workplace policies and procedures. The project plan should have considered and evaluated workplace risks associated with the project. This then needs to be operationalised through a job safety analysis, which is a specific examination of operations tasks, related potential risks and mitigating actions. This is developed with the input of the whole project team or contractors and is signed off by the project manager. It is prudent for the project manager to have daily 'toolbox' meetings with operations staff or contractors to discuss the day's activities and go over the job safety analysis and actions. Considerations for managing operational workplace safety risks include:

- providing directives, procedures and training for the use of specific tools, equipment, plant and vehicles; the use of chemicals; the safe use of firearms; and search and rescue operations
- ensuring specific staff accreditations and training are up to date
- providing guidelines for working in extreme weather
- using personal protective equipment
- providing first-aid facilities, first-aid training and emergency evacuation procedures.

Public safety as well as worker safety must also be considered. This may involve:

- closing roads, walking tracks and built structures
- closing areas that include flyover and drop zones
- closing large areas for culling operations

- closing areas recovering from landscape-scale events such as fire and flood
- providing suitable and appropriate warning signs at worksites.

Closures of protected areas for safety reasons may require high-level approval. This needs to be planned and achieved well ahead of project operations.

Implementation: The project plan

The project plan and associated documents such as environmental, cultural heritage, risk and communication management plans must firmly direct the implementation of the project, with careful attention to the time frames and critical path (see Planning Operations, above). Situations might arise where the original project plan needs review; indeed, flexibility and adapting to changing circumstances or new information are normal for projects. Any changes, however, must be formally amended on the project plan and reapproved.

Approvals, permits and notifications

The project plan has identified all approvals, permits and notifications needed to implement the work. Some approvals may require follow-up reporting and monitoring. Project implementation would not proceed until all approved documents are received and any conditions required are carefully built into the project plan.

Project management support

To keep more complex projects on track, communication and decision-making may need to involve a wider group of stakeholders and staff. Depending on the nature of the project, project governance, steering, consultation and technical reference groups may be formed. These may require administrative support. For complex projects, it is often prudent to establish a small project control group to govern the project. This is normally led by either the project sponsor or a senior manager and involves other key decision-makers. The project manager reports to the project control group but is not part of it, to ensure its independence in governance. The small project control group is not a technical or consultative group, rather, its key role is to direct project procedure and governance.

A project steering committee may be established for large projects. This brings together a range of internal staff with various skills and functions related to the project, to guide it to a successful outcome. For projects that involve many stakeholders or projects of community interest, it is wise to establish a stakeholder reference group to ensure key stakeholders are kept informed throughout the project. The stakeholder reference group can be a larger group and operate like a round table to collaborate and provide advice, but is not a decision-making group. Projects of a highly technical nature will benefit from establishing an expert group to advise on technical issues as they arise and advise on relevant research.

Reporting

A project manager will provide regular reports to the organisation and stakeholders on project delivery progress. Commonly, reports are completed monthly and report on progress of the four key stages of a project: planning, procurement, delivery and review. The use of corporate 'traffic-light reporting' each month is a simple reporting system. Green indicates the project is on track to be delivered on time and budget; yellow indicates there is a risk to delivering the project on time; red indicates likely failure. Yellow and red indictors require proposed actions as part of the report. If the stakeholder reference group is formed, qualitative project progress reporting is typically provided.

Contingencies

Planning for the unexpected may be a contradiction in terms; nevertheless it is critical. Project planning involves considering contingencies to deal with the unexpected and how they might be managed. Some examples include:

- material and/or contractor costs being higher than expected
- fires and other incidents that impact on staff availability and the availability of contractors
- unseasonal weather that affects delivery schedules
- key staff becoming unavailable
- contractors failing to meet contract conditions
- machinery and equipment unavailable when scheduled.

Some of these contingencies can be managed by allowing a proportion of the budget (often about 10 per cent) to deal with financial issues. Having business continuity arrangements in place for high-risk periods such as fire or flood seasons is also prudent. This may include having contractors positioned to operate independently or other supervisors and specialists brought in should key staff become unavailable. A good project manager is thinking ahead all the time and predicting potential project interruptions.

Contractors delivering specialist weed-control services, Alpine National Park, Victoria, Australia
Source: Rick Box

Lessees, licensees and concessionaires

Protected area services may be provided by partnerships with external businesses through formal licence or lease arrangements. These may be associated with services across a large area such as a park or a group of parks, a particular site or a service that is mobile. These may include:

- cafes and restaurants
- visitor centres
- revenue collection
- campgrounds
- roofed accommodation in safari-style tents, huts or hotels
- visitor education and interpretation
- porter and guiding services.

The operations manager must establish a strong relationship and partnership with the business to ensure there is a mutual understanding of the balance between the values and objectives of the protected area and the commercial business environment. The more successful a business is in a protected area, the more likely it is that the values of the area are well understood and managed by the business and the relationship with the protected area manager is healthy.

Working with contractors

Contractors can be a critical resource for delivering operations in protected areas. They provide specialist skills and labour that can be regularly drawn on. Staff working with contractors should have appropriate training in contract management and relevant organisational procedures. Some common uses of contractors for protected area operations include:

- road and walking track construction and maintenance
- building and facility construction, maintenance and servicing
- introduced plant and animal control works
- restoration work for disturbed sites
- project management services
- environmental and cultural heritage impact assessment for proposed works
- fire protection and suppression works involving machinery
- nursery supplies for restoration work
- security services
- transportation services including helicopter services
- conducting research and monitoring
- preparing management plans and strategies
- visitor services.

Maintaining a good relationship with specialist contractors and building a thorough understanding of competencies and standards expected provide an efficient and effective resource base and capacity for protected area managers. This can be more efficient than building those skills, machinery and resources internally into the capacity of the organisation. Having external resources available for operational delivery also reduces the likelihood of failure to deliver when organisational resources are redirected to other demands such as fire and emergencies. It is important, however, to align with the intent of relevant industrial relations agreements in regard to the appropriate use of staff and contractors and be clear on the role of contractors in representing the public face of the organisation.

The importance of having a well thought through 'offer of services' or 'brief' for a contractor cannot be overstated. Many protected area organisations have standard legal documents for offers of services, tenders and contracts. Time and effort put into the brief save problems later with ill-defined contracts. Based on the project plan, the tender brief should provide a clear indication to the contract tenderer of:

- the setting where the works are required and any environmental, cultural or community constraints or specialised climate conditions
- the business arrangements of the protected area organisation seeking a contractor
- the task and exactly what outputs and outcomes are sought, where, when and why
- key milestones to be met

- accreditations, insurance, occupational health and safety policies and procedures and other business requirements of the contractor
- payment method, payment milestones and budget.

Contracts for products and services are commonly awarded using one of two main payment methods: 'lump-sum payment' or 'schedule of rates' payment.

Lump-sum contracts require a single final quote for the total cost of delivery. Two approaches may be used. First, the budget available for the project may be disclosed to guide the contractor on scope, in which case the successful contractor is selected for best likelihood of quality delivery. Second, an undisclosed budget seeking a lump-sum quote is used when price is the key differential. Lump-sum contracts are best suited to works that can be clearly specified and articulated. The positive value of lump-sum quotes is knowing the project delivery cost prior to starting. The negative value is contractors will build significant risk into their quotes, particularly if the specifications are imprecise, and the project may not get the best value for money.

Schedule of rates contracts are where quotes are sought based on an hourly or daily rate for services and are best suited to works that are less able to be fully specified or articulated and where some flexibility is needed by the project manager to adapt to changing circumstances. The positive value is flexibility and contractors are more competitive given they do not need to build in risk as they are simply paid for the time they work. The negative value is the project manager must manage budgets more closely to ensure the project stays within budget and there is no guarantee that all project outcomes will be met within the budget.

The brief or offer of services must include a clear indication to a project tenderer of the selection criteria used to select the successful contractor. Some common selection criteria include:

- appropriate qualifications or accreditation required for the task
- demonstrated experience in the field of work
- quality of personnel and equipment
- value for money
- availability at critical times
- good safety record and company occupational health and safety policy
- demonstrated ability to complete the task.

A tender committee is usually put together to assess the tenders and make a recommendation to the operations manager. To avoid any potential for corruption, members of the tender committee will need to have declared any links with any of the tenderers and the nature of those links. In some circumstances, they will not be able to remain on the tender committee. A background check and referees substantiate the character and quality of work of the contractor. Finally, it is wise to verify who will actually be on site and carrying out the work. You may think you have engaged a quality operator and find that the work is actually carried out by other employees or subcontracted out.

The use of 'preferred supplier panels' of contractors is an efficient way of engaging contractors. This reduces the need to call for quotes or tenders for each project to meet governance requirements. Panels are established to preapprove contractors for different groups of operational functions, such as an 'introduced plant and animal control' panel. The preferred-supplier panel of contractors is set up by inviting potential contractors to submit their particulars on relevant business details such as insurance and occupational health and safety plans, skills and competencies, personnel employed, equipment and schedules of rates. Suppliers who are considered to meet appropriate standards are then approved to be a member of the panel. The project manager can then go directly to the panel to invite and select the most appropriate contractor based on the best match of competencies, resources and rates for the work.

Contractor management

Contractors should be managed following the principles of fairness, respect, trust and mutual benefit. Managers must also understand and respect the business needs of contractors including their need to be profitable. Building a fair and healthy relationship with quality contractors is an important achievement for the protected area manager.

Contractors must be managed as one would an employee and ensure the contractor meets all organisational and community standards expected. Some of the key factors to consider when managing contractors are the following.

Contractor briefing and induction

The principal contractor must have a clear understanding, prior to work starting, of the contract agreement, the use of subcontractors, the scope of works and performance measures, and the requirements of all relevant plans. A full induction to the protected area workplace would

then be carried out with contractors, their employees and subcontractors prior to commencing work. The induction typically includes:

- geographic context information about the protected area project site
- a code of ethics and appropriate behaviour
- workplace safety, public safety, risk identification and job safety analysis
- emergency response and evacuation procedures
- environmental and cultural issues
- key personnel and their roles
- key stakeholders
- communication tools and channels.

It is prudent to provide induction notes and to have all those who attend the induction sign a statement that they have attended the induction and understand all topics raised. Should new subcontractors or employees be engaged on the job, the contractor must ensure they are also inducted.

Contractor supervision

The key to effective contract supervision is clear and decisive communication, ensuring two-way communication channels exist between the project supervisor and contractor. The contract needs to be clear on authority so contractors are not receiving instructions and comments from a range of staff. This can lead to the contractor being confused about directions, leading to poor outcomes and claims by contractors for variations due to wasted time.

The project supervisor must develop a good professional and trusting working relationship with the contractor. This is best achieved by means of regular scheduled contractor meetings rather than constant surveillance and interference by the project supervisor, and the supervisor must be responsive to the contractor when requested.

Reporting, compliance and renewable bonds

Regular contractor/supervisor meetings will provide progress reports and link with critical milestones so progress payments can be authorised. For on-ground works, this involves reporting on the progress of delivery of outputs and outcomes. For licensees or concessionaires, this is a scheduled meeting with a standard agenda of items related to the protected area/licence area relationship and licence conditions. This is the time to discuss compliance with contract or licence conditions and raise any issues that need addressing. Should serious compliance issues be identified, these should be put in writing to the contractor or licensee, seeking a formal response for rectification. In the case of compliance with conditions not being adequately addressed, following allowance for a fair and reasonable time to do so, this can show cause for withdrawing the contract or licence and potentially for seeking compensation to rectify a situation. Contracts should include a clause for settling disputes, nominating an independent arbitrator.

In some instances, contracts are prepared that include a 'renewable' bond fee. The contract manager can use this bond fee to restore any unauthorised disturbance to the protected area. Under the contract, the amount set aside is automatically replenished immediately it has been used, and can be used again if there is another infringement.

Contractors may also be required to record and report the locations of their activity. This is common, for example, with weed-control work where the contractor is required not just to treat the weed species, but also to record using GPS the location, date, herbicide used and other information required by the manager. This is invaluable when the protected area manager is preparing data for weed mapping and control activity to help determine overall performance of the programs and future needs. In this case, the skill of the contractor to provide this information correctly is as important as applying the herbicide appropriately.

Performance and payment considerations

Contract payments will be subject to meeting defined performance outcomes identified in the contract. The clearer the definition of the expected output in the contract, the clearer it is to authorise payment or defend non-payment. Larger contracts will involve part payments on reaching defined milestones. The contractor would provide a written report on reaching those milestones to claim the payment due. The contract manager would assess the report, observe results on the ground and determine if the milestone has been adequately met to the standard required to authorise payments. Contractors may seek early payment for cash-flow purposes. While this may be tempting in order to maintain working relationships, this must be avoided to prevent any professionally embarrassing experiences where a contractor abandons a project having received payment for work not completed.

Contractors will from time to time underperform in their agreed obligations. It is important for the contract supervisor to look for the signs of potential underperformance early in the project and deal with them decisively. Early signs may include slippage in

delivery times, cutting corners, unreliable attendance at a worksite, evasive communications or poor reporting. Poor performance is identified and discussed at contractor meetings, either regular meetings or a special meeting. The project supervisor must formally present underperformance issues, seeking redress, noting them in the meeting minutes and following up in writing with the contractor for evaluation at the next meeting. Should poor performance continue, a letter would be sent to warn the contractor that failure to improve performance could result in contract termination. The first step in managing performance is to be clear on performance expectations in the contract. It is neither acceptable nor defendable to hold a contractor to account for unstated performance measures.

The project supervisor may also not perform to an expected standard—for example, non-supply of important maps or briefings in a timely manner. The contractor should have an avenue for complaint if it becomes necessary.

Logistics

Planning logistics is a fundamental task for efficient project delivery. The skill and time invested in lining up the right tools, vehicles, machinery and equipment, materials, human resources and support services at the right time cannot be underestimated. If the project is being delivered by a contractor, it is wise to build the logistics role as much as possible into the contractor's responsibilities so that any costs with delays must be met by the contractor. Typical logistical considerations for projects are as follows.

Transport

Transport is needed to get personnel, machinery, equipment, materials and waste materials on and off the project site efficiently. Transport may include bicycles, motorcycles, four-wheel drives, trucks, buses, boats, hovercraft, fixed-wing aircraft, rotary-wing aircraft and other transport support. In remote mountain areas, this may include use of animals such as yaks, llamas, horses, donkeys and mules. Project managers need to carefully balance the impacts, logistics and efficiency associated with transport options to select the most appropriate means.

Quarantine considerations

Restricting the spread of particular pathogens or invasive species is an aim of many protected areas. Some have stations where humans must clean their boots and equipment before entering or require watercraft

Mules transporting goods in Sakteng Wildlife Sanctuary, Bhutan

Source: Peter Jacobs

to be washed before launch. Many protected areas are important wildlife sanctuaries with quarantine provisions in force. Wash stations for heavy machinery being moved during wildfire operations are becoming normal practice. The thorough cleaning and disinfecting of all equipment entering a protected area is considered to be a desirable basic practice for all protected areas, particularly in areas known for weeds and/or pathogens.

Accommodation and food

Some project sites may have accommodation nearby with food, shelter and toilet facilities, while others are isolated, meaning long travel times to remote base camps. Whatever the case, the provision of healthy food and water, first-aid facilities, clean accommodation and toilet facilities, and allowing for good sleep patterns and after-hours leisure activity are vital. For work in remote areas, workplace agreements may allow for longer on-site day shifts to be introduced in exchange for a shorter working week and/or special salary loadings.

Project sites

Project sites need to be carefully designed, located and constrained, with segregation of areas for animals, vehicles, aircraft landing, equipment, materials and waste from areas for shelter, sleeping, kitchens and toilet facilities.

Machinery and equipment

The project manager needs to ensure that project machinery is appropriate, accredited, operational and available by checking that spare parts, maintenance tools, fuels and oils are available and routine servicing is carried out during the project. Securing access to aircraft can be challenging. Acquiring the right aircraft, securing specialist equipment and personnel to undertake flight operations, preparing operations plans and approvals and securing authorised landing areas are complex.

Materials

The project manager needs to ensure that materials required for the job are procured and securely stored on site well before they are required. Considerations include:

- is the material the best fit for purpose
- is the material compatible with the project site
- is the material from a local, sustainable and accredited source
- are there manufactured sustainable alternatives available in steel and artificial materials
- is the material free of potentially harmful chemicals
- is the material free of introduced plant species and pathogens?

Personal protective equipment

Project managers should ensure that site personnel are supplied with appropriate personal protective equipment for the job, such as hard hats, overalls, boots, ear protection, face masks and, where chemicals are being used, overalls, specialised gloves, face masks as well as post-work washing facilities.

Security

Project sites in protected areas are vulnerable to non-authorised access, vandalism, theft and, in some cases, terrorism. Project managers will need to consider providing a secure worksite proportionate to the threat. This may include security fencing and security service attendance.

Governance of operations

Governance refers to processes by which organisations are directed, controlled and held to account (Chapter 7). Governance is a fundamental operating function for protected area organisations and some 'good governance' principles for operations are described here. Operations managers must ensure they are well informed of governance requirements for projects they manage. Matters to consider include:

- project approval authority
- financial approval authority
- organisation-approved business plans, action plans and project plans
- organisational policies and procedures, particularly regarding procurement of goods and services
- relevant legislation
- organisation-approved contracts, consents and documents.

Good governance requires that:

- procurement of goods and services is undertaken in an open, fair and transparent manner free from discrimination or unfair advantage
- all projects and contracts are managed to achieve the best possible results for the money available
- all projects and contracts are managed in accordance with approved legal obligations, action plans, project plans and contracts and any variations are approved and recorded
- all purchasing, procurement and other transactions including contracts and key decisions are recorded and filed in the organisation's official filing system and are available for audit at any time
- official standard documents are used for all agreements and contractual arrangements (unless otherwise approved by legal advice)
- personnel declare any conflict of interest and remove themselves from decision-making if deemed necessary
- personnel ensure that all decisions and actions they take are within their authority and are implemented in a way that is consistent with the law and their organisation's policies and procedures
- any recommendations must be made following a full consideration of risks relative to the expected results
- for complex projects, provision of legal advice in the planning phase is most prudent.

Asset management and operations

Protected area operations rely on a range of built assets for their effective implementation. Assets may be portable or capital in nature, owned or leased. Portable assets are typically plant and equipment and range from hand

tools, chainsaws, all-terrain vehicles, guns, animal cages, boats, lawnmowers and brush-cutters to spray units, trucks and tractors. Capital assets commonly include workshops, offices, visitor centres, storage sheds, visitor facilities and infrastructure such as roads, walking tracks and bridges. The range and nature of built assets will be influenced by the type of protected area (Chapter 2) and the resources of the protected area organisation. This section describes how protected area organisations manage their built assets.

The definition of an asset can be broad across industries (IPWEA 2011; IASB 1998). For the purposes of protected areas, however, they are defined here as 'physical objects that are built by people to provide services for the enjoyment or management of a protected area'. Under this definition, assets are real objects and are not intangible ideas such as intellectual property or goodwill. They are not wildlife or landscapes or people. Being built, they inevitably fail to function effectively at some stage. Assets:

- exist to provide services, which may include inherent value such as community or heritage significance
- have a financial value that changes over the life of an asset
- have fiscal value and this means they are accounted for, and are formally tracked and managed within larger organisations using asset-tracking tools.

Many categories and varieties of built assets are commonly used or are in place to support management of protected areas. These may be owned, leased or contracted by the protected area organisation. Examples include:

- fences, barriers and gates
- walking tracks, roads, car parks, bridges and signs
- visitor facilities
- offices and depots
- firebreaks, helipads and aircraft landing strips
- utilities, power, water and sewerage systems
- communication towers, phones and radios
- vehicles and heavy plant
- minor plant, equipment and hand tools
- computers and associated software
- technical tools such as meteorological devices, global positioning systems and others.

The number, value and purpose of built assets in a protected area vary in accordance with management objectives. Iconic protected areas such as Yosemite National Park in the USA have a high number of assets of large financial value. Conversely, IUCN Category I protected areas typically have a limited number of assets, which are provided for management purposes only. Assets are important for:

- natural and cultural heritage protection—through minimising visitor impacts by provision of sustainable access and information and access for management activity
- visitor experiences—by supporting a range of safe visitor experiences through provision of infrastructure and facilities
- operations—through provision of offices, accommodation, workshops and plant and equipment
- local economies—through available, high-quality visitor destinations that provide economic returns
- local communities—through protected area organisations being a good neighbour and their capability to assist with plant and equipment during joint operations and incidents.

Management of built assets is a fast-developing field of protected area management, and asset management systems are integral to a professional and systematic approach to how assets are organised and maintained. Most protected areas require specialist officers responsible for ensuring that built assets are suitably maintained, have support systems to manage them and standards that ensure they are safe and appropriately designed.

The *International Infrastructure Management Manual* defines (built) asset management as the 'systematic and coordinated activities and practices of an organization to optimally and sustainably deliver on its objectives through the cost-effective lifecycle management of assets (i.e. from manufacture or construction to effective retirement)' (IPWEA 2011:xii).

Asset management is most effective when it is undertaken in a strategic and inclusive manner. Three important questions need to be addressed by a protected area organisation.

1. What service is to be delivered by the assets?
2. What asset life-cycle strategies enable the assets to deliver the services?
3. What is needed to support asset management planning and decision processes?

Contemporary-design 'fly-out waste' toilet at Dibbin Hut Camping Area to replace the old earth pit, Alpine National Park, Victoria, Australia
Source: Kevin Cosgriff

Asset management systems

Asset management systems (AMSs) (IPWEA 2011) encompass all aspects of managing assets and comprise the inputs, processes and outputs that deliver asset management services pertaining to a group of assets. These systems can be simple or sophisticated. The type of AMS used should be guided by a protected area organisation's size, risk exposure, asset portfolio and budget. Components of an AMS are as follows.

Policy and planning

Establishing an asset management policy is the first step in designing an AMS. A policy such as 'asset management will help protect the values for which this protected area system has been established' quickly captures the essence of asset management across the organisation. An asset management plan for a protected area, region or organisation reflects the policy and provides direction to ensure that the required services are being delivered and align with other corporate planning priorities. The plan will highlight life-cycle strategies and gaps and indicate planning needs for future asset-related decisions.

Roles and responsibilities

The roles and responsibilities for asset management need to be carefully defined and allocated to suitably qualified staff. An organisation's asset management team may be structured in many ways including separating the asset owner, asset manager and service delivery provider roles.

Asset information system

Protected area organisations need to know what they own and in what condition these assets are in. They need to establish, as a minimum, an asset register or, in a more sophisticated form, an asset information system (AIS). Such a register enables the storage of a range of asset data. Asset information would typically include the asset identification and type, its location, its value and replacement costs, condition, maintenance requirements and remaining life.

The AIS enables the analysis of these data to assist strategic asset management decisions. The AIS provides the ability to forecast future capital replacement costs to estimate rates and charges for asset use, to predict the decline in asset condition (and the consequent maintenance programs) and to model 'what if' scenarios for asset management. Establishing an AIS is resource intensive and needs organisational support for regular updating. Not all data are always necessary so care needs to be taken to start with critical assets and critical data. The AIS should be integrated with other protected area management business systems if possible and this can range from simple spreadsheets and supporting processes to whole-of-enterprise software.

Asset condition

The asset condition will be recorded in the AIS and may range from very good to unserviceable. Assessing the condition of an asset involves examining its physical condition and focuses on whether the asset is capable of delivering the service it was designed for, and for what period. Asset condition assessment critically evaluates risk to users and the organisation and underpins the asset maintenance and replacement programs. It should include information such as the likelihood of asset failure, the appropriate maintenance treatment needed, age and remaining life. The effort put into condition assessment should be determined by the type, size and functional importance of the asset or group of assets. The assessment of asset condition needs an appropriate level of staff skill and expertise and must be validated on a regular basis (Case Study 24.3). Historic building condition assessment is a particular specialist skill where inherent asset values are not expressed simply as condition.

Case Study 24.3 Cave Creek: A tragic case of asset management failure

Cave Creek is in Paparoa National Park on the South Island of New Zealand. The park is known for its limestone karst system, and Cave Creek weaves its way around, under and through this landscape. Activities are diverse and many assets have been built to cater for such activities. In 1994, the New Zealand Department of Conservation (DOC) erected a viewing platform above a 30-metre deep chasm at Cave Creek. At this time, the general procedures and framework for erecting such a structure were not guided by appropriate design or construction standards or by resourcing and staffing protocols.

On 28 April 1995, the viewing platform collapsed, resulting in the deaths of 14 people. On the day of the tragedy, a group of students was visiting the park with two officers from the DOC. The group split in two, with most of the students and one of the DOC officers reaching the platform first. As they reached the front of the platform, it toppled forward into the chasm. Carolyn Smith, a survivor, described the scene: 'Suddenly and with no warning, except for yells of surprise, the platform was falling under our feet. It began sliding down at approximately 30 degrees and then tripped and fell vertically with everyone falling in front of it' (New Zealand Department of Internal Affairs 1995:13). Of the 17 students who fell with the platform, 13 were killed and four survived with serious injuries. The DOC officer with them was also killed.

A commission of inquiry was held to determine the cause of the collapse. In summary, the inquiry found that:

- the platform was not designed and approved by a suitably qualified engineer
- the construction of the platform was not managed appropriately
- statutory requirements for buildings and health and safety were not followed
- there was a lack of inspections and an inspection regime
- there was a lack of warning signs regarding load limits
- there was a failure of corporate systems, particularly a lack of project management systems.

The commission also found that the DOC operated in a tight resourcing environment and was frequently forced to accept poor-quality standards. It recognised that DOC quickly and appropriately acknowledged its failures and undertook remedial action.

After the collapse, DOC put in a number of measures to improve its operations. More than 520 structures were inspected in protected areas around New Zealand and 65 were closed for repairs. The review also led to the removal of a large number of structures on public land, and many safety notices appeared on the remainder relating to load limits. Eighty engineers were hired to write safety standards, and design new and modified structures. Extra funding was allocated to continue the upgrade of visitor infrastructure. The 13 000-kilometre network of tracks throughout New Zealand was walked and every building and structure, including signs, was documented, photographed, assigned a number and assessed for required maintenance. All of this information was recorded in a new and central visitor asset management system. The use of a visitor asset management system brought to attention some high-risk structures that had previously been overlooked. Ongoing resourcing limitations often meant that if DOC was unable to maintain a hut, bridge or other structure to a standard judged as 'safe', it might instead be removed. In some cases, removal was contentious and community organisations agreed to voluntarily keep them maintained to an agreed standard. The Government also commissioned a full review of DOC, which led to changes in reporting and accountability processes. Importantly, DOC examined numerous corporate systems including project management and risk-management systems and now operates an asset management-conscious environment.

The tragedy of Cave Creek is a stark reminder to protected area managers of the importance of asset management. The key lessons are as follows.

- Asset failure can lead to deaths. An asset management system that addresses the following questions is critical.
    a. Planning. Does the asset meet the desired needs and the planning framework of the relevant legislation? Have all the approvals been obtained? Is the planning undertaken by appropriately qualified people?
    b. Standards. Are standards in place, understood, accessible and used? Does the design comply with appropriate standards?
    c. Construction. Is construction consistent with the plan and is it undertaken by qualified people?
    d. Use. Does the asset have appropriate information about its use and is this information available to staff and users?
    e. Inspection. Does the asset have an adequate inspection regime during and after construction and is it undertaken?
    f. Maintenance. Has a systematic maintenance regime been established and is it undertaken?
    g. Renewal. Does the asset undergo timely and appropriate renewal based on current and future needs?
    h. Decommissioning. Does the asset undergo decommissioning in a timely and appropriate manner?
- Ongoing risk assessment is an important part of asset management.
- Asset management decisions must be made in the full knowledge of funding and resource constraints.
- Systems are needed to record, maintain, update and communicate information and designated responsibilities for asset management decisions. This needs to be done across the whole organisation and be consistent with organisational policy.

— Steve Mossfield

Critical assets

Critical assets are identified as a priority in the AIS. They are those assets of high importance that have a higher risk of failure and that can have a great impact on an organisation achieving its objectives. These critical assets need to be identified and the business risks assessed. Risk assessments help to identify these critical assets. A risk-management assessment process involves establishing the risk-management context, identifying and evaluating treatment options, implementing treatment and monitoring and review. The critical assets with a high chance of failure and consequence would therefore receive priority maintenance or replacement ahead of other assets.

Levels of service

Levels of service are outputs a customer receives from an organisation and are determined by the visitor experience or other management service provided (IPWEA 2011). The notion that an asset is in place to supply a defined level of service, rather than for its own sake, is fundamental for operations and asset management.

Forecasting future demand

An ability to forecast the demand for services allows a protected area manager to better plan for the expansion, contraction, adaptation or change of individual assets or a collection of assets and informs the asset management plan. This can be a difficult task, however, and reducing service can result in a hostile response from stakeholders. Managers should first monitor the current demand for a service and look at the issues that are leading to that demand. For visitor use, this monitoring and analysis could include assessing changes to a nation's population size and composition, economic growth, leisure trends or even climate change influences. There are well-established social science mechanisms for monitoring these trends. Demand forecasts can be developed and scenario modelling undertaken. It is also advantageous to look at these scenarios over different time frames and with new information.

Asset management life-cycle strategies

Consideration needs to be given to asset life-cycle use and costs. This includes defining the purpose and use, funding, creation, operations, maintenance, rehabilitation, upgrading, renewal, revaluation, depreciation and disposal. This enables long-term financial forecasts to be undertaken, which ensure future service needs are matched by funding. This information is compiled for the AIS and asset management plan.

Operational asset plans

Operational strategies and plans help determine how an asset will be used efficiently and effectively. This will help to achieve the optimum use of expensive equipment such as earthmoving equipment. Important planning considerations include:

- the nature and pattern of use
- the amount of programmed use available versus demand
- the probability of non-forecast incidents impacting on programmed use
- planned maintenance programs.

Successful implementation of these plans can result in reduced risk of asset failure, can defer asset replacements or upgrades and provide better service delivery from the assets. It also provides the basis for the day-to-day activities of protected area staff or contractors and thereby has a strong link with works programs. Ideally, organisations should strive to keep all maintenance as a planned activity.

Capital investment procedures

Capital asset investments are usually significant long-term financial decisions and need to be carefully planned (see 'Programming operations' section above). The AMS will include a structured procedure for capital investment decisions. Those decisions compare the need for a new asset with replacement or renewal of existing assets or rethinking the level of service and need for the asset. When capital investments are being considered, thought should also be given to sharing the ownership with other organisations with similar needs to share costs.

Decision-support tools

Decision-support tools are described in the 'Programming operations' section above. Asset decision-making methods and frameworks allow a manager to assess various asset management options. Outcomes will be improved where there are quality data, underlying assumptions and objectives are tested, sensitivities are identified and options and estimates presented. An AMS should incorporate an appropriate decision-support tool.

Service delivery and quality

Quality management, high levels of customer service and continuous improvement are outcomes that a good asset management system can contribute towards meeting the objectives of the protected area. Historically, service delivery models have meant that protected area managers and staff have done all the work themselves.

Increasingly, however, this is no longer the case and other delivery models need to be considered. Partnering with a stakeholder is one method of delivering the services. Other methods include public–private partnerships or contracting and leasing.

Reviewing the effectiveness of operations

Management effectiveness evaluation across a protected area involves a wide range of considerations and processes (Chapter 28). The evaluation of the management effectiveness of an operation makes an important contribution to the strategic evaluation of whole programs, a protected area or system of protected areas. The evaluation of an operation may be guided by the IUCN management effectiveness framework (Hockings et al. 2006) and would typically use an evaluation plan developed specifically for the project and early in the planning stage of the project. The task of reviewing operational effectiveness is not left to the end of the project; rather it starts in the project planning phase and is built into the scope and tasks throughout the project plan. The IUCN framework provides guidance to what may be included in the project evaluation plan:

- planning: the constant need to refine and fine tune the project plan during the project
- input: how well and how timely financial resources, human resources, materials and plant are being secured
- process: checks on whether procedures and standards of implementation and environmental protection are being correctly undertaken
- output: may be linked to major milestones within the project, with each output potentially being measured for its contribution to the overall project objective
- outcome: identifies how well the objectives of the project have been achieved.

The project plan identifies the objectives for the project and then, importantly, defines quantitative and/or qualitative performance measures for each objective. Well-considered and planned performance measures at the start of the project make the continuous project review process more meaningful and efficient.

The process of review of performance measures, to determine if the project objectives were achieved, should be carried out by the project manager and involve the whole project team, specialists and contractors and, in some cases, external stakeholders. If they were not met, the question 'why not?' could be asked, along with 'what can be learnt and adapted'. This process may also reveal that the performance measures were not well aligned to the objective. The project effectiveness review forms part of the planning process and is submitted to the project approver for sign-off. The outcome of the review will then influence:

- planning and programming: inform the next business planning and programming round, which will consider continuing the project in future action plans, adapting to address underperformance, increasing or decreasing budgets, or ceasing
- operational delivery: identify effectiveness of operational delivery and any lessons learned, with operational staff considering adapting project management techniques to meet any underperformance in the delivery phase
- a revised project plan: should the operational project be approved again in the next action plan, the revised project plan will adapt to address underperformance issues raised in the review.

Conclusion

Key principles for managing operations and assets are as follows.

1. Protected areas require active management. Proactive and effective protected area management involves carrying out a range of operational activities as appropriate to meet the objectives established for the area. Good stewardship of protected areas is achieved through the identification, planning and delivery of defined programs and projects.
2. The effective programming of operations is critical to achieving good on-ground outcomes, efficient use of resources, value for money and a committed and supportive protected area team and stakeholders. Operational activities need to be determined and programmed through a planning framework and a thorough and defendable decision-support process. This ensures the project is the right response to an issue, threat or initiative and has the organisational support, adequate funding and capacity to deliver.
3. A clear and comprehensive project plan is crucial to successful operational delivery and no project in a protected area should proceed without one. Allowing sufficient time for the preparation and approval of a project plan is a key part of works programming. The nature and complexity of the project will reflect

the complexity of the project plan and the level of environmental impact appraisal required.

4. Sustainability in operations means that built assets should embody sustainable materials and sustainable design considerations; they should maintain resource efficiency throughout their life and their sustainable use functions should help educate the community. The four key sustainability principles of leadership, triple bottom line, whole-of-life asset thinking and resource efficiency should be exercised by operations and project managers.
5. Implementation of operations requires effective leadership, showing confidence and focus on efficient organisation and processes and quality and timely outputs and outcomes. Such leadership also means excellence in staff and contractor management, maintaining effective communication, informing progress up and down the management chain and not hesitating to seek specialist advice. Above all, a leader ensures the work is carried out in a safe occupational health and safety-compliant workplace.
6. Governance is a fundamental operating function for protected area organisations, and operations managers must ensure they are well informed of the governance requirements, procedures and tools available for projects they manage.
7. Management and engagement of stakeholders and effective communication with the community, media, key stakeholders and within organisations are vital to achieve efficient operational delivery and stakeholder support. A stakeholder and communication plan will save valuable time later by avoiding issues that may have arisen from poor communication.
8. Built assets are a fundamental component of protected areas. Management of built assets is most effective when it is undertaken in a strategic manner, in collaboration with the community, when it has support systems to manage them and standards that ensure they are safe and appropriately designed. An AMS is an effective framework to achieve this.
9. The evaluation of the management effectiveness of an operation is vital for learning and adapting and contributes to the strategic evaluation of whole programs, a protected area or a system of protected areas. The task of reviewing operational effectiveness is not left to the end of the project; rather it starts in the project planning phase and is built into the scope and tasks throughout the project plan. Well-considered and planned performance measures at the start of the project make the continuous project review process more meaningful and efficient.

Operational activities in protected areas can be complex and varied in nature, both technically and politically. The framework and procedures outlined in this chapter will assist managers to technically program, plan and carry out operations in an efficient and effective manner to achieve great outcomes for protected areas. Influences from outside the operational manager's capacity and extent of control are inevitable, however, due to the high degree of political sensitivity and wide range of community attitudes to protected areas and opinions on how they should be managed. This is intrinsic to a community engagement approach to managing protected areas, but can be challenging for managers trying to implement important programs and projects.

In the face of political and stakeholder challenges, protected area managers should continue to work from sound principles and put forward thorough evidence-based decision-making founded on good science. If, however, political influences distract operations, it is not a reflection of the abilities of the operational manager if sound process is followed.

Area Manager Tony Baxter, NSW National Parks and Wildlife Service within an ancient rainforest gully, Monga National Park, southern NSW. Tony's operational responsibilities include helping to protect these relatively rare and localised habitats found in gullies along the crest of the Great Eastern Ranges and within a *Eucalyptus* dominated forest environment that is susceptible to regular forest fires

Source: Graeme L. Worboys

References

Recommended reading

Department of Energy (DOE) (1998) *Environmental Impact Statement Summary*, US Department of Energy, Washington, DC.

Department of Environment and Heritage (DEH) (2003) 'Triple bottom line reporting in Australia', in *A Guide to Reporting against Environmental Indicators*, Australian Government, Canberra.

Department of Environment, Climate Change and Water (2010) *National Parks and Wildlife Service, Park Facilities Manual 3: Principles for facility design*, NSW Department of Environment, Climate Change and Water, Sydney.

Flood, J. M. (1996) *Moth Hunters of the Australian Capital Territory: Aboriginal traditional life in the Canberra region*, J. M. Flood, Canberra.

Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T. and Ohlson, D. (2012) *Structured Decision Making: A practical guide for environmental management*, Wiley Blackwell, Chichester, UK.

Hockings, M., Stolton, S., Leverington, F., Dudley, N. and Courrau, J. (2006) *Evaluating Effectiveness: A framework for assessing management effectiveness of protected areas,* 2nd edn (No. 14), IUCN World Commission on Protected Areas, Gland.

Institute of Public Works Engineering Australia (IPWEA) (2011) *International Infrastructure Management Manual*, international edn, Institute of Public Works Engineering, Sydney.

International Accounting Standards Board (IASB) (1998) *International Accounting Standard 38: Intangible assets*, International Accounting Standards Board, London.

Lesslie, R. G., Hill, M. J., Hill, P., Cresswell, H. P. and Dawson, S. (2008) 'The application of a simple spatial multi-criteria analysis shell to natural resource management decision making', in C. Pettit, W. Cartwright, I. Bishop, K. Lowell, D. Pullar and D. Duncan (eds) *Landscape Analysis and Visualisation: Spatial models for natural resource management and planning*, pp. 73–96, Springer, Berlin.

Muhlen-Schulte, R. (2010) *Hotham–Dinner Plain Multi-Purpose Trail, Alpine National Park,* NE Victoria, Aboriginal Cultural Heritage Management Plan, Aboriginal Affairs Victoria Management Plan Project No. 10320, Aboriginal Affairs Victoria, Melbourne.

National Parks Service (NPS) (2013) *National Parks Service Director's Order 12: Conservation planning, environmental impact analysis and decision making*, US National Parks Service, Washington, DC.

New Zealand Department of Internal Affairs (1995) *Commission of Inquiry into the Collapse of a Viewing Platform at Cave Creek near Punakaiki on the West Coast. Part 1*, Department of Internal Affairs, Wellington.

Stasinopoulos, P., Smith, M. H., Hargroves, K. and Desha, C. (2009) *Whole System Design: An integrated approach to sustainable engineering*, Earthscan, London.

Thomas, I. (2001) *Environmental Impact Assessment in Australia: Theory and practice*, 3rd edn, Federation Press, Sydney.

White, A. L. (2012a) *Conceptual models for Victorian ecosystems. Pilot programs: grasslands*, Parks Victoria Technical Series No. 64, Parks Victoria, Melbourne.

White, A. L. (2012b) *Ecosystem conceptual models for Victorian ecosystems*, Parks Victoria Technical Series No. 65, Parks Victoria, Melbourne.

Worboys, G. L., Winkler, C. and Lockwood, M. (2006) 'Threats to protected areas', in M. Lockwood, G. L. Worboys and A. Kothari (eds) *Managing Protected Areas: A global guide,* pp. 223–61, Earthscan, London.

This text taken from *Protected Area Governance and Management*,
edited by Graeme L. Worboys, Michael Lockwood, Ashish Kothari, Sue Feary and Ian Pulsford,
published 2015 by ANU Press, The Australian National University, Canberra, Australia.