MANAGING AUSTRALIA'S PROTECTED AREAS
a review of visitor management models, frameworks and processes

Greg Brown, Barbara Koth, Glenn Kreag & Delene Weber
MANAGING AUSTRALIA’S PROTECTED AREAS

TECHNICAL REPORTS

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ABSTRACT

This research report examined and reviewed visitor impact modelling applications in Australia. The objectives of the report were to review the effectiveness of various visitor impact modelling approaches and their future direction, to identify the primary modelling approaches used in Australia, and to determine priorities for developing and/or implementing future visitor impact models for protected areas. This report used three methods for assessing protected area models:

1. A review of various models, frameworks, concepts, and processes from the academic and professional literature.
2. The completion of a Delphi process with selected protected area experts from academia in the U.S. and Australia.
3. The completion of an industry reference group process with individuals selected from different state and commonwealth agencies in Australia.

The results indicate there are a variety of models and processes available for protected areas management and no single method has gained ascendency among experts. The level of sophistication in protected area model use is low worldwide with Australian adoption lagging behind North America. The adoption and diffusion of protected area management tools in Australia are likely to be slow due to limited staff and financial resources. We suggest that rather than fund additional research on new protected area models, resources should go toward:

- Building a more extensive case history of protected area modelling applications in Australia.
- Developing a national training program with reference materials.
- Standardising protected area models and methods in Australia where possible.
- Leverage Australia’s current world leadership in incorporating Aboriginal perspectives in protected areas management.

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SUMMARY

This report examines and reviews visitor impact modelling applications in Australia. A variety of visitor impact models and processes have been used in Australia and internationally but the extent of their use and perceived effectiveness are not well understood. This project used a Delphi technique and reference group to collect expert opinion from two different panels: an expert academic panel; and an industry reference group consisting of individuals from state and commonwealth agencies.

Objectives of Study

- Review the effectiveness of various visitor impact modelling approaches and their future direction as determined by an international panel of academic experts.
- Identify the primary modelling approaches used in Australia to identify, inform and manage visitor impacts in protected areas.
- Determine priorities for developing and/or implementing future visitor impact models for protected areas in Australia.

Methodology

- Conduct a review of visitor impact modelling efforts in Australia and elsewhere.
- Convene a Delphi panel of academic ‘experts’ to collect expert opinion on approaches to visitor impact modelling effectiveness to vision the future of protected areas planning methods.
- Convene industry reference group of state and commonwealth agency representatives in Australia to:
  - Assess agency familiarity with different protected area models,
  - Identify the primary models and methods approaches used to identify, inform and manage visitor impacts in protected areas, and
  - Evaluate agency perceptions of future needs.

Key Findings

- The expert Delphi panel lacked consensus on whether it is realistic to create an integrated ecological, economic and social sustainability model for protected areas management.
- The level of sophistication in impact model usage worldwide is generally low so that attempts to integrate models are premature and likely to violate a desire for simplification and low-cost application in current agency environments.
- Australia uses PA impact management tools less than their North American counterparts, but (a) different overarching structure of land management at the federal agency level; as well as (b) more University partnerships may account for some of the higher adoption rates overseas.
- The adoption and diffusion of protected area management tools in Australia are likely to be slow due to limited staff and financial resources.

Future Action

- Develop a more extensive case history of protected area modelling applications in Australia.
- Develop appropriate national training program and reference materials on the topic of the application of protected area visitor impact management models.
- Examine potential ways to standardise protected area models and methods in Australia.
- Leverage Australia’s current world leadership in incorporating Aboriginal perspectives in protected areas management.
Chapter 1

MODELLING APPROACHES FOR VISITOR IMPACTS TO PROTECTED AREAS IN AUSTRALIA

Introduction
The degree to which a protected area can sustain a viable tourism and recreation presence is dependent on the physical environment, the behaviour of visitors, and appropriate management and resourcing. There have been numerous models and processes developed in response to the needs of protected area managers to minimise the impact of visitor use in parks and reserves, while providing quality visitor experiences. The tourism industry (particularly the ecotourism sub-sector) also has a stake in the success of sustainable protected areas and as such has created demand for improved modelling of potential visitor impacts and for appropriate management to mitigate such impacts.

The concept of ‘visitor impact’ in protected areas management is multi-faceted with no clear consensus on the modelling components that are most important to address sustainable tourism development. As a result, there is a large range of approaches available to planners and managers. These different approaches vary in their scope, focus, application and effectiveness. Some examples of visitor impact models that have been used in Australia and internationally include the Recreation Behaviour Simulator (RBSim), the Visitor Impact Model (VIM), and Visitor Experience and Resource Protection (VERP). Another management strategy is to implement sustainability processes, e.g. Limits of Acceptable Change (LAC) or the Tourism Optimisation Management Model (TOMM). Although some of these processes have been applied widely, the extent of the use of others is unclear and the effectiveness of most of these processes is poorly documented and largely anecdotal (McCool & Christensen 1996). The goal of this research is to create a more comprehensive understanding of how to deliver a quality tourism service without compromising the integrity of the resource. The key to achieving this goal may lie in managers better understanding the different approaches and the most suitable application for each. The development of a new holistic model based on the strengths of existing models will also be considered in this report.

Summary of Modelling Processes
One of the first observations regarding natural area management modelling is that many of the so-called ‘models’ being employed are not true models, but rather concepts, techniques, or frameworks. To qualify as models, the processes must have standardised inputs and outputs, and use standard analysis techniques on the input data. The results must achieve a level of accuracy which is found to be widely acceptable within industry and academic disciplines.

Frameworks and processes that do not meet the status of model are nevertheless valuable as conceptual and organisational advances that provide specific organisational or management insights or contribute data outputs that have management utility. Effective tourism management involves both scientific and judgemental considerations, and it may be the case that with the complex and multi-disciplinary nature of outdoor recreation, frameworks and processes may prove to be more useful for managers than predictive models.

Broadly, the management processes (concepts, techniques, frameworks, or models) analysed in this study fit into four categories:

1. Frameworks based on the concept of recreational carrying capacity (e.g., Limits of Acceptable Change).
2. Tourism specific models (e.g., Tourism Optimisation Management Model).
3. Discipline-based assessments (e.g., social, environmental and economic impact models).
4. Other useful management concepts (e.g., Adaptive management).

Recreation and tourism frameworks and models have a number of processes that directly link human activity with resource use. The discipline-based assessment models deal with processes that focus exclusively or predominately on one area of impact (e.g. social, environmental or economic impact) and as such, have varying relevance to the topic of visitor management in protected areas, but may be supplementally supportive. The fourth category includes a selection of concepts and processes that were not developed specifically for investigating visitor impacts in protected areas but provide guidance or background information that would be helpful to managers.

It is argued that the complex and multi-disciplinary nature of outdoor recreation means that one standardised approach to visitor management will not be appropriate. However, there is a clear need for logical, thoughtful and defensible processes on which to base management decisions. A well articulated example of the stages in the decision-making process for maintaining quality park resources and visitor experiences is offered by Anderson, Lime and Wang (1998) and presented as Table 1.
Table 1: Stages in decision process for maintaining quality park resources and quality visitor experiences

<table>
<thead>
<tr>
<th>Stages in the Decision Process</th>
<th>Potential Resources for Decision-Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem Awareness</td>
<td>• Statements of park purposes, significance, primary interpretive themes, and specific resource conditions and visitor experiences to be achieved and maintained over time.</td>
</tr>
<tr>
<td></td>
<td>• Observations of park staff</td>
</tr>
<tr>
<td></td>
<td>• Indicators and standards of quality</td>
</tr>
<tr>
<td></td>
<td>• Public input</td>
</tr>
<tr>
<td>2. Problem Specification</td>
<td>• Resource condition and visitor experience data available from (a) research, (b) resource use monitoring, and (c) public input</td>
</tr>
<tr>
<td></td>
<td>• Comparison of existing condition with predetermined standard of quality</td>
</tr>
<tr>
<td></td>
<td>• Public input</td>
</tr>
<tr>
<td></td>
<td>• Public Input</td>
</tr>
<tr>
<td>4. Plan Implementation</td>
<td>• Supervisors, office staff, and field staff determine appropriate tasks and workloads</td>
</tr>
<tr>
<td>5. Monitoring</td>
<td>• Resource condition and visitor experience data available from (a) research, (b) resource use data, and (c) public input</td>
</tr>
<tr>
<td></td>
<td>• Comparison of existing condition with predetermined standard of quality</td>
</tr>
<tr>
<td></td>
<td>• Public input</td>
</tr>
<tr>
<td></td>
<td>• Various publications, in particular the VERP handbook (USDI NPS 1997).</td>
</tr>
</tbody>
</table>

Adapted from: Anderson et al. 1998

As will be seen in the following chapter, many of the processes include these steps, with emphasis and sequence varying depending on the purpose of the model. This chapter provides a review of each of the major planning tools used to manage visitors in protected areas. The intention is not to promote one framework over another, but rather to demonstrate the purpose of each model, their strengths, and weaknesses and the relationships between them. Matching the appropriate framework to a specific problem relies on a number of factors:

1. Clear management vision and understanding of objectives and scope.
2. Awareness of the variety of frameworks, the applications they are suitable to, and their strengths and weaknesses.
3. Ability to prioritise which problems are most important and the scale to which they need to be addressed.

Following the overview of visitor impact processes currently used in Australia and elsewhere, Chapter 3 explains the methods used to collect expert opinion using two methods: (a) Delphi technique to solicit expert opinion about current and future protected areas (PA) impact models and methods, and (b) the convening of an industry reference group (IRG) in Australia to ensure that the project is grounded in meeting the future needs of state and federal protected area managers. Chapter 4 presents the results of the two data collection methods while Chapter 5 provides recommendations for future actions relative to PA models and methods in Australia.
Chapter 2

A REVIEW OF MODELS, FRAMEWORKS, AND PROCESSES FOR PROTECTED AREAS MANAGEMENT

Frameworks Based on the Concept of Recreation Carrying Capacity

Large increases in outdoor recreation in the 1950s and 1960s stimulated concern over the appropriate level of visitor use in protected areas (Manning 1999). In the early 1960s the concept of carrying capacity was applied to recreation, especially wilderness management, to describe how wilderness conditions deteriorate in the face of rapidly escalating levels of use. Carrying capacity is a term adopted from range management where it defines the maximum level of use an area can sustain as determined by natural factors such as food, shelter and water. Research in recreation carrying capacity began in earnest with a conceptual monograph on the idea by J.A. Wager in 1964 and an empirical study by Lucas (1964). By the early 1970s the contemporary three-dimensional view of carrying capacity as a function of environmental, social and managerial conditions was established. Research on carrying capacity led to the development of a number of frameworks for visitor management. These include: the Recreation Opportunity Spectrum (Clark & Stankey 1979), Limits of Acceptable Change (Stankey et al. 1985), Visitor Impact Management (Graefe, Kuss & Vaske 1990), Visitor Activities Management Process (Parks Canada 1991), Visitor Experience and Resource Protection (Hof & Lime 1997; Wilkinson 1995; Manning, Graefe & McCool 1996), Visitor Experience and Resource Protection (Hof & Heberlein 1986), and Quality Upgrading and Learning (Chilman, Foster & Everson 1990).

Each of the aforementioned frameworks, provide a logical structured approach for making management decisions. While there are variations in the terminology used, and sequence and number of steps, the core elements of each framework are the same. Manning (1999) explains these as:

- Defining the recreation opportunities to be provided.
- Monitoring indicators to determine if current conditions meet standards of quality.
- Implementing some type of management when and where monitoring suggests the standards or quality has not been met.

The following discussion of these frameworks reveals that most originated as a result of collaboration between researchers and a US federal agency (e.g. Limits of Acceptable Change) or between researchers and a non-governmental organisation (e.g. Visitor Impact Management). The frameworks also reflect the level of knowledge in the recreation and tourism areas, as well as the state of politics, at the time of their conception. As such, many can be viewed as refinements upon existing models. More specific similarities are outlined by Nilsen and Tayler (1998) in their comparative analysis of protected area planning and management frameworks. The 11 factors they believe the leading frameworks have in common are:

1. Encouraging the use of interdisciplinary planning teams.
2. Focussing on management of recreation-related impacts.
3. Relying on sound natural and social science information.
4. Establishing clear, measurable management objectives.
5. Defining recreation opportunities as a function of natural, social and managerial conditions.
6. Assuming a link between activities, settings, experiences and benefits.
7. Recognising the complexity of relationships between recreation use and resulting environmental and social impacts.
8. Recognising the importance of providing a diversity of recreation opportunities.
9. Focusing on elements of the recreation experience that can be influenced by management.
10. Advocating for the use of a range of recreation management strategies and tactics.
11. Requiring ongoing monitoring and evaluation.

It should be noted that most of the leading frameworks commonly rely on management indicators and standards developed during the process that become the basis for ongoing monitoring and evaluation.

The frameworks discussed below typically fall into what is considered the experience-based management (EBM) phase of protected area management. EBM represents a shift from the earlier emphasis on activity-based management (ABM) in terms of both research and management. Instead of focusing on what people do when they recreate, EBM seeks to understand the relationships between how, why and where they recreate. The focus of management becomes providing a mix of recreation opportunities that target desired visitor experiences, rather than providing opportunities for specific activities (Weber 2004).

Researchers such as McCool, Stankey and Clark (1985) argued that the setting can facilitate or hinder the activity that occurs and the quality of the recreation experience. Research that explores the relationships between activities,
desired experiences, and preferred setting attributes formed the basis for the widely used visitor and resource management strategy: The Recreation Opportunity Spectrum. This process will be discussed first.

Later recreation management phases include benefits-based management and meanings-based management. The application of these frameworks to visitor management will be discussed later.

Recreation Opportunity Spectrum (ROS)

The Recreation Opportunity Spectrum (ROS) concept is based on the precept that different recreationists engage in specific recreation activities in particular settings (each described in terms of specific physical, social, and managerial attributes) in order to attain desired experience outcomes (Virden & Knopf 1989). Through managing the integrity of physical, social and/or managerial setting attributes, managers can provide a spectrum of desired recreation opportunities to satisfy the diversity of visitor motivations (Manfredo, Driver & Brown 1983). The ROS was developed in the 1970s by researchers working for the US Forest Service and Bureau of Land Management in response to concerns about growing recreational demands, increasing conflict over use of scarce resources, and a series of legislative directives calling for an integrated and comprehensive approach to natural resource planning (Nilsen & Tayler 1998).

The basic concept underlying ROS has been used since the 1960’s. The U.S. Outdoor Recreation Resources Review Commission (1962) called for a classification of recreation resources along a spectrum from high density to sparsely used, and Wagar (1966) called for a continuum of recreation camping opportunities.

The ROS process comprises six classes (or management zones) which define a continuum of recreation opportunity classes ranging from most natural to most developed. The six classes aid in understanding physical, biological, and social and managerial relationships, and set parameters and guidelines for management of recreation opportunities. The actual titles of the classes used in Australia vary from the traditional classes used in the United States, but the intention is the same. Table 2 presents the ROS classes as typically described for Australian conditions.

The end product of the ROS process is a definition of the opportunity for experience expected in each setting within a park. A particular park may use any number of these classes, depending on the characteristics and mission of the park, the resource protection needs and the types of experiences people desire. Each class is defined by a set of indicators associated with the experience, and the parameters and guidelines for management.

Key Steps

1. Inventory and map the setting conditions that affect the experience of the recreationists (i.e. the physical, social and managerial components).
2. Complete analysis:
   a) Identify setting inconsistencies.
   b) Define recreation opportunity classes.
   c) Integrate with forest management activities.
   d) Identify conflicts and recommend mitigation.
3. Schedule.
4. Design.
5. Execute.
### Table 2: Recreation opportunity spectrum categories

<table>
<thead>
<tr>
<th>ROS Category (alternative titles adopted in various states)</th>
<th>Class 1 Remote</th>
<th>Class 2 Semi-remote / non-motorised</th>
<th>Class 3 Roaded-natural / Semi-remote motorised</th>
<th>Class 4 Semi-developed / Natural</th>
<th>Class 5 Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Description</td>
<td>Essentially unmodified environment of large size</td>
<td>Predominately unmodified environment of moderate to large size</td>
<td>Predominately natural environment, generally small development areas</td>
<td>Modified environment in a natural setting – compact development area</td>
<td>Substantially modified, environment, natural backdrop</td>
</tr>
<tr>
<td>Access</td>
<td>No roads or management tracks – few or no formed walking trails</td>
<td>No roads – management tracks and formed walking tracks may be present</td>
<td>Dirt roads – management tracks and walking tracks may be present</td>
<td>2WD roads (dirt and sealed) good walking tracks</td>
<td>Sealed roads, walking tracks with sealed surfaces, steps etc.</td>
</tr>
<tr>
<td>Modification and Facilities</td>
<td>Modifications generally unnoticeable – no facilities, no structures unless essential for resource protection and made with local materials.</td>
<td>Some modifications in isolated locations – basic facilities may be provided to protect the resource (such as pit toilets and BBQs)</td>
<td>Some modifications but generally small scale and scattered – facilities primarily to protect the resource and public safety – no powered facilities</td>
<td>Substantial modifications noticeable – facilities may be relatively substantial and provided for visitor convenience (such as amenity blocks), and caravans may be present at times</td>
<td>Substantial modifications which dominate the immediate landscape – many facilities (often including roofed accommodation) designed for large numbers and for visitor convenience</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>Small number of brief contacts (for example, less than five per day) – high probability of isolation from others – few if any other groups present at campsites</td>
<td>Some contact with others (for example, up to 20 groups), but generally small groups – no more than six groups present at campsites</td>
<td>Moderate contact with others – likely to have other groups present at campsites – families with young children may be present</td>
<td>Large number of contacts likely – variety of groups, protracted contact and sharing of facilities common – may have up to 50 sites</td>
<td>Large numbers of people and contacts – groups of all kinds and ages – low likelihood of peace and quiet</td>
</tr>
<tr>
<td>Visitor Regulation</td>
<td>No on-site regulation – off-site control through information and permits may apply</td>
<td>Some subtle on-site regulation such as directional signs and formed tracks</td>
<td>Controls noticeable but harmonise (such as information boards, parking bays)</td>
<td>On-site regulation clearly apparent (such as signs, fences, barriers) but should blend with natural backdrop</td>
<td>Numerous and obvious signs of regulation – rangers likely to be present</td>
</tr>
</tbody>
</table>

Source: Worboys, Lockwood & De Lacy 2005

**Appropriate Situations to Apply Tool**

ROS is intended for regional planning (Driver 1990). It assists in assessing appropriate diversity of recreation opportunities on a macro scale and can also be used to estimate the impacts of management decisions on the provision of recreation opportunities.

**Example of Application**

ROS is probably the most widely used management tool in protected areas. It is used by many park agencies in Australia and remains a mainstay of planning tools in North American parks.

**Strengths**

The key advantage of the ROS system is that it promotes consideration of providing a diversity of recreation opportunities for visitors. It also encourages planners to consider management on a regional scale. Nilsen and Tayler (1998) explain that ROS is a very practical and easy to use process which encourages managers to rationalise management from three perspectives:

- Protection of the resource.
• Opportunities for public use.
• The organisation’s ability to meet preset conditions.

Limitations
Nilsen and Tayler (1998) list the weakness of ROS as the fact that its setting indicators and their criteria must be accepted in total by managers before any options or decisions can be made, and that disagreement will affect the rest of the planning program. Watson, Asp, Walsh and Kulla (1997) found that visitors and managers may perceive the various classes differently. As such, it may provide a useful, systematic tool for managers to zone landscapes, but it does not necessarily reflect different visitor opportunities. Pierskalla (2000) believes frameworks such as the ROS and those that incorporate it (e.g., Benefits-based management) ignore the fact that visitors freely flow between zones without noticing. He instead advocates an ecological management approach to understanding visitors.

Relationships
ROS was the first of the key recreation frameworks to be widely adopted. It is now incorporated into many of the frameworks discussed in this section including the Limits for Acceptable Change (LAC). It can be used with VIM and is recognised within VAMP but not used specifically as a result of the zoning system used by Parks Canada.

Limits of Acceptable Change (LAC)

Overview
The LAC process was developed in the mid-1980’s by researchers working for the US Forest Service in response to concerns about the management of recreation impacts. The nine-step process identifies appropriate and acceptable resource and social conditions and the actions needed to protect or achieve those conditions (Nilsen & Tayler 1998).

The selection of appropriate indicators and standards for those indicators is a difficult yet critical task in the process. Standards for each indicator must be specific. The standards are the measurable aspects of the indicators and are the basis for judging whether a condition is acceptable or not. Standards describe acceptable and appropriate conditions for each indicator in each recreation opportunity class.

Physical, biological and social indicators may be selected, depending on condition of the area and the objectives of management. Physical indicators could include soil density, pH, compaction, erosion or trail width. An example of applying a standard to a physical indicator could be ‘trail width should not exceed 30 cm’. Likewise, biological indicators may be measured by loss of ground cover, proportion of weed species or abundance of wildlife species. An example of applying a standard to a biological indicator could be ‘ground cover loss must not exceed 10%’. Social indicators could include visitor complaints, party size, noise, visitor satisfaction or number of visitor encounters. An example of a standard applied to a social indicator is ‘no more than five encounters on the wilderness trail’. Indicators are generally chosen on the basis of four criteria:

1. They should be suitable to being measured in a cost effective and accurate manner.
2. The condition of the indicator should be reflective of the amount of use occurring.
3. Social indicators should be related to user concerns.
4. Condition of the indicator should be at least partially responsive to management control.

Key Steps
The LAC comprises a nine step process, normally illustrated as a circle of steps:

1. Identify area concerns and issues.
2. Define and describe opportunity classes (based on the concept of ROS).
3. Select indicators of resource and social conditions.
4. Inventory existing resource and social conditions.
5. Specify standards for resource and social indicators for each opportunity class.
6. Identify alternative opportunity class allocations.
7. Identify management actions for each alternative.
8. Evaluate and select preferred alternatives.
9. Implement actions and monitor conditions.

Example of Application
The LAC has been used primarily in wilderness settings in the United States, although it has also been applied on some historic sites, wild and scenic rivers and tourism areas. The classic study using the LAC process was conducted in the Bob Marshall Wilderness Complex in the United States (McCool 1990; Stankey, McCool & Stokes 1984).
Appropriate Situations to Apply Tool

LAC is an extension of the ROS concept and was specifically developed for use in wilderness areas, although it has been used in a variety of other settings. It provides a framework which identifies the appropriate amount and extent of change that managers, and very often the public/visitors, believe is acceptable and can be used to alert managers to the need for action when change exceeds those standards.

Strengths

The LAC has proven to be a useful vehicle for deciding the most appropriate and acceptable resource and social conditions in wilderness areas (Hendee, Stankey & Lucas 1990). It provides a strategic and tactical plan for an area based on defined limits of acceptable change for each opportunity class, with indicators of change that can be used to monitor ecological and social conditions (Nilsen & Tayler 1998).

Limitations

The key criticisms of the LAC process are (Hendee et al. 1990; Nilsen & Tayler 1998):

- The time taken to implement the process.
- The focus on current issues and concerns may result in a lack of strategic direction if there are no current concerns.
- There is only intermittent public involvement in the process.

Relationships

It incorporates the ROS framework and is integrated into the US National Park Service VERP framework.

Visitor Activities Management Process (VAMP)

Overview

Created in the late 1980s and early 1990s by Parks Canada (Nilsen n.d.) as a companion process to the Natural Resources Management Process within the Parks Canada Management Planning System, VAMP is a detailed planning process designed to provide guidance for planning and management of new parks, developing parks and established parks (Nilsen & Tayler 1998). It strongly emphasises the use of marketing techniques, such as product development and market segmentation. The outcome of the VAMP process is a management plan related to the selection and creation of opportunities for visitors to experience a park’s heritage settings through appropriate educational and recreational activities. Decisions about managing and delivering support services for each activity are reflected in the service plan.

When analysing visitor information, the VAMP process considers type of visitor, number of visitors, diversity of visitors and where they are recreating. It also calls for analysis of the experiences and benefits visitors’ desire, and the types of services and facilities they require at various stages within the trip cycle. The process also identifies appropriate interpretive themes, resource values, constraints and sensitivities. The process is embedded within existing legislation, policy, and management plans and considers current services and facilities offered on a regional scale, as well as data on visitor satisfaction.

Key Steps

The general steps of the management plan process are:

1. Produce a project terms of reference for the project.
2. Confirm existing park purpose and objectives statements.
3. Organise a database describing park ecosystems and settings, potential visitor educational and recreational opportunities, existing visitor activities and services, and the regional context.
4. Analyse the existing situation to identify heritage themes, resource capability and suitability, appropriate visitor activities, the park’s role in the region and the role of the private sector.
5. Produce alternative visitor activity concepts for these settings, experiences to be supported, visitor market segments, levels of service guidelines, and roles of the region and the private sector.
6. Create a park management plan, including the park’s purpose and role, management objectives and guidelines, regional relationships, and the role of the private sector.
7. Establish priorities for park conservation and park service planning and then implement the plan.

Appropriate Situations to Apply Tool

This process is designed specifically for the regional planning program of Parks Canada but could be applied in other protected area settings. The focus of VAMP is the analysis of opportunity, rather than issue of visitor impact, which is addressed in the Parks Canada Natural Resource Management Process (Nilsen & Tayler 1998). It is a particularly useful
framework for making strategic and operational decisions about target markets, market position, appropriate interpretive and recreational activities and service facilities.

**Example of Application**

VAMP has been applied in various Canadian national parks.

**Strengths**

The key improvement of VAMP over other contemporary models is that it combines social science principles with those of marketing to focus on visitor opportunities. It promotes structured and strategic thinking and is very well-developed at the service planning level.

**Limitations**

The main limitation of VAMP is it does not yet have the clout it should have at the management planning level. Nilsen and Tayler (1998) argue this is because the ‘opportunities for experience’ definition has not been built into management plans or into the zoning. VAMP is ‘a skeleton in need of further development to establish a technical capability… there is no capability in the park management planning process which can be called upon to express VAMP input spatially’ (Graham et al. 1988, cited in Hall & McArthur 1998). It has had limited application beyond areas managed by Parks Canada.

**Relationships**

VAMP is based on the principles of ROS and the four levels of demand (i.e. activities, setting, experience and benefits). It can easily incorporate the principles of VIM, LAC and VERP. The focus of VAMP is assessment of opportunity, rather than visitor impact, which in the case of Parks Canada is addressed through the Natural Resources Management Process (Nilsen & Tayler 1998).

**Process for Visitor Impact Management (VIM)**

**Overview**

The VIM process was developed in the late 1980’s for the USDI National Park Service. It was developed by researchers working for the U.S. National Parks and Conservation Association, a national non-government organisation. The VIM process addresses three basic issues relating to impact: problem conditions; potential casual factors; and potential management strategies (Nilsen & Tayler 1998). It is broader in scope than the LAC process. Like LAC and VERP it is an indicator based approach.

**Key Steps**

There are eight key steps associated with the process

1. Conduct pre-assessment database review.
2. Review management objectives.
3. Select key indicators.
4. Select standards for key impact indicators.
5. Compare standards and existing conditions.
6. Identify probable causes of impacts.
7. Identify management strategies.
8. Implement.

**Appropriate Situations to Apply Tool**

VIM is a reactive process best suited to site-specific problems. It is a flexible process parallel to LAC and can be applied in a wide variety of settings.

**Example of Application**

VIM was applied to Great Smokey Mountains National Park (Graefe, Kuss & Vaske 1990).

**Strengths**

The main strengths of the VIM process is it provides for a balanced use of science and professional judgement. It places heavy emphasis on the need to understand casual factors when identifying management strategies. In fact, despite it seeming such an obvious step, it is also the only one of the reviewed frameworks that specifically calls for identifying
the probable cause of the impacts (step 6). This level of understanding is something that Nilsen and Tayler (1998) believe needs to have greater emphasis in any future models. The decision-making process advocated by Anderson et al. (1998) and used by Lime et al. (2004) also calls for ‘understanding the root cause of the problem’. Another strength listed by Nilsen and Taylor (1998) is the fact that the guidelines provide a classification of management strategies and a matrix for evaluating them.

**Limitations**

Nilsen and Tayler (1998) identify the key weakness of the process as not making use of the ROS, despite the capacity to do so. The process is also developed to address current conditions of impact, rather than to assess potential impacts. Both LAC and VIM identify issues and concerns, followed by management objectives at the outset of the process. These then guide the selection of indicators. As a result these processes result in a narrow range of factors being considered.

**Relationships**

VIM incorporates elements of ROS, LAC and VAMP. It employs a similar methodology to LAC to assess and identify existing impacts and particularly the causes. Like LAC, this process has been incorporated into the VERP system.

**Visitor Experience and Resource Protection (VERP)**

**Overview**

VERP is another indicator-based approach. It was created by the US National Park Service for use in both wilderness and non-wilderness settings. It is a refinement of the Canadian VAMP system and builds on the basic framework used in the LAC. It differs from LAC in terms of how and when public involvement occurs. It is based on the concept of carrying capacity and the desire to maintain quality resources and quality visitor experiences. It contains a prescription for desired future resource and social conditions, defining what levels of use are appropriate, where, when and why (Nilsen & Tayler 1998).

VERP uses an analytical, iterative process which attempts to bring both management planning and operational planning together. It emphasises strategic decisions pertaining to carrying capacity based on quality resource values and quality visitor experiences. The final product is a series of prescriptive management zones defining desired future conditions with indicators and standards (Nilsen & Tayler 1998).

**Key Steps**

The 9-step process reflects a more modern approach to planning, calling for an interdisciplinary project team, public involvement and visioning.

1. Assemble an interdisciplinary project team.
2. Develop a public involvement strategy.
3. Develop statements of park purpose, significance and primary interpretive themes; identify planning mandates and constraints.
4. Analyse park resources and existing visitor use.
5. Describe a potential range of visitor experiences and resource conditions (potential prescriptive zones).
6. Allocate the potential zones to specific locations within the park (prescriptive management zoning).
7. Select indicators and specify standards for each zone; develop a monitoring plan.
8. Monitor resource and social indicators.
9. Take management actions.

**Appropriate Situations to Apply Tool**

Appropriate strategic management tool, both wilderness and non-wilderness settings.

**Example of Application**

The original and classic example of the use of VERP was conducted at Arches National Park in the south-western United States (Wilkinson 1995).

**Strengths**

Similar to VAMP, VERP provides a structured thinking process that makes use of the talents of a multi-disciplinary team and is guided by policy and the park purpose statement. The focus of management is zoning and statements of significance and sensitivity are used to guide resource analysis, while visitor opportunity analysis is guided by statements defining important elements of the visitor experience (Nilsen & Tayler 1998).
Limitations
The VERP process has not been tested sufficiently in different environments to provide adequate evaluation. Nilsen and Tayler (1998) believe a weakness of the process is that ‘experience’ is not defined and the indicators for it are absent beyond the examples for Arches National Park. Similar to LAC, the time required implementing the process and the will and ability to monitor sufficiently to provide information to guide management actions is also an issue. Another key issue is that despite the admirable goal of ‘ignoring’ existing facilities, in reality, the probability of removing existing facilities is very low.

Relationships
VERP specifically refers to both LAC and VIM and its strategic nature reflects the fact it was based on the VAMP system. VAMP focuses more on market research and the factors that lead to a quality park experience (e.g. interpretation, facilities) than does VERP. It does not use either VAMP or the ROS framework, but does parallel the basic processes associated with them (e.g. through use of management zones rather the recreation opportunity classes).

Other Tools Available to Managers
As mentioned previously, most of the aforementioned processes rely on experienced based management approaches. Other approaches that may be useful to managers include:

- Satisfaction approaches.
- Benefits-based approaches.
- Meanings-based approaches.
- Adaptive management.

The principal measure of quality in outdoor recreation has traditionally been visitor satisfaction (Manning 1999). The satisfaction approach is based on the economic model of marginal utility input - output. In other words, the model is based on the assumed inverse relationship between use density and visitor satisfaction, i.e. increasing numbers of users would result in diminishing satisfaction for each individual user. It has been the traditional way to measure quality visitor experience since the early 1970’s. The key weakness of this framework is that research does not support a relationship between visitor density and satisfaction (Graefe, Vaske & Kuss 1984). Borrie and Birzell (2001) suggest a multi-dimensional model of satisfaction that incorporates various setting and experience attributes may be more appropriate than a single measure of visitor satisfaction, but point out that no standardised sets of multi-dimensional measures of satisfaction have been developed or commonly adopted. Satisfaction approaches can be particularly useful in providing information on the perception of quality of various facilities and setting attributes. They generally collect data at the aggregate rather than individual level, and provide limited insight into the actual visitor experience.

Benefits-based management (BBM) has been widely adopted in Canada and the United States and is now being used by protected area managers in both Victoria and South Australia. BBM (also known as the Benefits Approach to Leisure, and the Net Benefits Approach) was developed by Bev Driver and associates in the mid-1980s. The concept is based on the expectancy theory in social psychology. The approach states that people select and participate in recreation activities to meet certain goals or satisfy needs and recreation activities are more a means to an end rather than an end themselves. Driver and Brown (1978) expanded on this stating four levels or hierarchies of demand for outdoor recreation.

- **Level 1:** Demand for activities.
- **Level 2:** Settings in which the activity takes place.
  - Environmental setting.
  - Social setting.
  - Managerial setting.
- **Level 3:** The experience, the satisfaction, motivation or desires psychological outcomes.
- **Level 4:** The personal and social benefits that flow from the satisfying experience which was taken from recreation.

Research into leisure ‘experience’ can be broadly split into two paradigms. One is focused on the psychological antecedents and benefits of leisure participation, such as the satisfaction of underlying needs. The other is focused on structural reasons for participation or non-participation, such as management conditions that facilitate attainment of desired outcomes (e.g. Driver, Brown, Stankey & Gregoire 1987). Gaining an understanding of the psychological benefits of leisure participation has tended to dominate academic inquiry in the past (e.g. Iso-Ahola 1980; Csikszentmihalyi 1975). However, the increased focus on customer service since the late 1980s has seen a renewed interest in the managerial approach, with a greater focus on structural reasons for recreation behaviour based on setting factors (i.e. EBM and BBM).

The meanings-based approach has typically been applied to attempts to understand the wilderness experience in terms of the role that it plays in the broader context of the participant’s lives, rather than focusing on the experience as a discrete recreational engagement. Patterson, Watson, Williams and Roggenbuck (1998) suggest that people are actually seeking from their recreation experience, stories that ultimately enrich their lives. Borrie and Birzell (2001) explain:
review of visitor management models, frameworks and processes

Satisfaction is not the result of positive comparison between neither desired and actual outcomes nor the actual multidimensional, multiphasic experience, but rather the extent to which the experience produced a fulfilling narrative that is consistent within the context of the participant’s life (p. 34).

Adaptive Management

The concept of Adaptive Management was developed in the early 1970s by C. S. Holling and co-workers at the University of British Columbia, Canada, and the International Institute for Applied Systems Analysis. It is based on the precautionary principle and provides a way for managers to proceed responsibly in the face of uncertainty. Lee (1993) explains it is an alternative to either ‘charging ahead blindly’ or ‘being paralysed by indecision’. It is a formal systematic rigorous approach to learning from the outcomes of management actions, accommodating change and improving management. There are six basic steps associated with the process:

1. Assess problem.
2. Design solution.
3. Implement solution.
4. Monitor results.
5. Evaluate results.
6. Adjust solution/treatment based on re-assessment of problem if evaluation indicates solutions not satisfactory, and then repeat steps.

The key advantages of adaptive management are it encourages innovation and learning while fostering an organisational culture that emphasises learning and responsiveness. The main barriers to the use of adaptive management models are associated with cost, unwillingness to experiment with high value, threatened ecosystems, fear of making mistakes, and resistance to trying new solutions.

While there are certainly many applications of, and recommendations for, adaptive management in the natural resource management sector of Australia (e.g. for assessing impacts of closing bores in the Great Artesian Basin), the concept of monitoring and adaptive management is inherent in most formal visitor impact models. Adaptive management is a process, rather than a model and as the concept behind it is implicit in most visitor impact processes, it seems of limited value to explore this option further.

Adaptive management should be viewed as a normal part of protected areas management. The IUCN World Commission on Protected Areas (WCPA) has developed a framework for assessing management effectiveness of both protected areas and protected area systems using a systems approach. The framework evaluates protected area management by examining the protected area context (e.g. status and threats), planning goals, management inputs, processes, outputs, and outcomes (Hockings, Stolten, & Dudley 2004). This management framework has been applied in Australia (e.g. Fraser Island) and elsewhere and is being promoted by the IUCN and World Wildlife Fund. By providing a general management framework that includes the principles of adaptive management, the WCPA framework is intended to be adaptable to variety of protected area types around the world.

Tourism Specific Models

Tourism Optimisation Management Model (TOMM)

Overview

Developed in the 1990s by the Sydney-based consulting firm of Mandis Roberts Consultants (1997) for application to Kangaroo Island (SA), the Tourism Optimisation Model (TOMM) was designed specifically for tourism planning in natural areas. The objectives of the model are to monitor and quantify the key benefits and impacts of tourism activity, and assist in assessing emerging issues and alternative future options for sustainable tourism.

The model is based on the LAC process but users consider there are several differences that distinguish TOMM:

- Wider scope - it has broad regional application and covers a number of land tenures, both public and private.
- Extensive stakeholder involvement specified, from identification of indicators to data collection and interpretation.
- User-friendly process, with simple reporting requirements.

The name TOMM was selected to take the emphasis away from the concept of limits and capacity that have led the tourism industry to equate LAC with anti-growth and anti-business sentiments. The five dimensions addressed within the TOMM framework are:

2. Market opportunities: key market profile characteristics and marketing activity.
3. Experiential: the nature of the core visitor experience provided.
4. Community: the quality-of-life of local residents and indigenous people with a connection to the area.
5. Environmental: the biophysical environment, ranging from biodiversity and wildlife status to energy consumption patterns.
MANAGING AUSTRALIA’S PROTECTED AREAS

The overall goal of the TOMM process is to create a sustainable tourism industry as defined by the various actors involved. Optimal conditions specifying a desirable and realistic state that tourism activity is striving to achieve are set for variables associated with each dimension. Each optimal condition is measured via an indicator; each indicator is given an acceptable range. McArthur (2000) states that an acceptable range is a more flexible approach than a limit, as it allows for some variation that may occur naturally or by accident. For each measurement cycle, every indicator is termed to have met performance standards, to be outside parameters for the desired condition, or to be in flux or provide non-conclusive evidence.

Key Steps
The process consists of six steps divided into three key components: context identification; monitoring; and management response, which identifies what type of cause-effect relationship exists and helps to decide how to respond. The six steps are:
1. Plan process and commence stakeholder involvement by identifying stakeholders and generating tourism scenarios.
2. Compile and write a context description to define the current situation. Review planning and policy documents for the region. Continue stakeholder involvement, and begin engagement by conducting a briefing with stakeholders.
3. Develop monitoring programme that identifies what to measure, how to measure, and defines reporting standards. Draft a set of optimal conditions and investigate associated indicators.
4. Refine context description and monitoring programme through a workshop process with stakeholders. Narrow down the number of indicators, determine acceptable range and benchmark for each indicator.
5. Prepare draft and final versions of TOMM plan, and brief stakeholders.
6. Implement and refine model. Commence monitoring. After first cycle, identify indicators outside acceptable range, identify potential cause and effect relationships in order to develop management responses. The iterative process continues with ongoing refinement of indicators, optimal conditions and ranges.

Appropriate Situation to Apply Tool
Can be applied to a range of communities or regions where tourism has become a significant or dominant social and economic force. Methodology is best applied proactively before the negative aspects of tourism growth become pervasive.

Examples of Application
Examples of application include Kangaroo Island, South Australia; Quarantine Station Sydney, New South Wales, and Dryandra, Western Australia.

Strengths
The inclusion of the political and economic environments in which use of natural areas occurs and stakeholder involvements throughout development are clear strengths of the TOMM process. The common-sense approach analogous to a health/car check-up or early warning system also draws non-traditional participants into the planning process.

Limitations
The main limitations associated with this process can be seen as:
- The amount of information needed, given that TOMM covers a breadth of tenures across a region and requires market, economic, socio-cultural as well as biophysical information.
- Locating and working with stakeholders across large areas and focusing on a complexity of issues is resource-intensive.
- Data management and manipulation require a significant level of resources. Investments are needed both in terms of data collection, as well as the sometimes more difficult summation and trends analysis.
- TOMM outcomes provide only an indicative view of tourism, so additional research may be required to fully understand serious variations from the acceptable ranges.

Tourism Futures Simulator (TFS)

Overview
A newer model, the Tourism Futures Simulator attempts to look at future environmental, social and economic visitor impacts through computer simulations. Developed by Australia’s CSIRO and led by Walker, Greiner, McDonald and Lyne (1998), TFS is also designed to provide insights into natural resource impacts based on scenario changes to
tourism such as increased visitation, development of new attractions, or expansion of visitor services. The model is designed to emulate complex systems by showing the interdependencies of a particular element (e.g. number of visitors) on the various systems they affect.

CSIRO researchers are working closely with local government, the tourism industry and other organisations to increase the level of tourism that is ecologically sustainable. They are investigating the trade-offs between tourism and biodiversity conservation, developing modelling technologies for planning sustainable tourism in different regions, and exploring alternative scenarios for the future of the nation's tourism industry.

The model takes into account the holistic, interdependent nature of all the pieces that make up a complex system such as a tourist destination. These pieces include the natural attractiveness of the region, the man-made amenities such as lodging, the investment in this infrastructure, potential crowding, travel patterns and spending patterns of visitors. The model uses a systems approach and current as well as historical data from numerous sources. The model is adapted specifically to each individual region and can therefore be useful for unique situations. Historical data availability and ongoing data collection are the greatest obstacles for the TFS model.

**Appropriate Situation to Apply Tool**
Defined geographical area, particularly areas where existing data exists. The model is highly adaptable to investigate specific issues related to many types of tourism concerns including environmental and social issues, economic predictions, and market information.

**Relationships**
This model is a type of systems modelling and systems thinking. TFS is related to wildlife and ecology systems modelling.

**Strengths**
The main strength of the TFS is it explicitly treats tourism as a system. It is useful where there are contrasting, often conflicting theories about causes and effects. TFS deals well with dynamic systems where oscillation (boom/bust) in economies or ecosystems is present and can be helpful where other (short term) solutions have been unsuccessful. It deals well with feedbacks, both positive and negative, and is a strong process for engaging the industry in learning about a systems view of their industry - it gets past the marketing and occupancy rate syndrome. Other strengths of the models are it deals explicitly with time delays (e.g. in investment and responses); it enables scenarios to be quantitatively evaluated and compared, and it links directly to monitoring activities.

**Weaknesses**
The main weaknesses of TFS can be seen as:
- Historical data is needed which is often spotty or non-existent.
- Existing data can be difficult to adapt to the intended application.
- Ongoing data collection required to keep model up to date can be expensive.
- Cooperation to obtain needed data can be difficult to obtain, particularly on a continuing basis.
- Time to build a model.
- The over-emphasis of industry on the model (process of thinking about the future) and tendency to believe the model results as predictions rather than scenarios.
- Ability of industry to use the model.
- Requirement of an academic partner to update and manage the model.

**Input Variables (Examples)**
- Visitor numbers, groups, occupancies etc.
- Local demographic and job info.
- Public services and infrastructure costs.
- Visitor distribution (seasons, markets, regions, themes).
- Restaurant data.
- Event spending.

**Output Variables (Examples)**
- Potential visitor numbers and growth rates.
- Accommodation supply and demand forecasts.
- Employment forecasts.
- Training requirements.
- Future visitor spending.
- Police resource needs.
Discipline-Based Assessment Models

Social Impact Assessment

Overview

Social impact assessment (SIA) is a means of assessing and predicting the probable effects of a potential change (e.g. a new development, change in policy and communities). Social impact assessment modelling related to natural resources has its roots in the U.S. National Environmental Policy Act (NEPA) of 19691. The act included a requirement for an environmental impact statement that ‘would change the way the world community looked at environment issues and development projects’ (Burdge 1994). The Trans-Alaska Pipeline was the first major test of the Act and the subsequent work to complete an EIS led to a successful project that met environmental requirements. During the process, a local Inuit chief pointed out that the social impact of the project had been ignored. The term social impact assessment (SIA) was first used in 1973 to refer to the changes in the indigenous Inuit culture due to the pipeline (Burdge 1994).

In 1974, Johnson and Burdge proposed the creation of a Comparative Diachronic Study which utilised the experience from similar previously completed natural resource projects to predict impacts for a proposed project. This model uses two sets of data for the similar projects: (a) data prior to the similar project’s development and (b) data from the present. The data sets reveal social impacts that have resulted from the similar development project. The results are compared to present data for the proposed project area and projections are made as to the future social impacts based on the comparative experience of the similar projects.

Johnson and Burdge (1974) used a list of 26 variables2, grouped into five categories:

1. Population Impacts (five variables).
2. Community/Institutional Arrangements (eight variables).
3. Conflicts Between Local Residents and Newcomers (four variables).
4. Individual and Family Level Impacts (six variables).
5. Community Infrastructure Needs (three variables).

Furze, De Lacy and Birckhead (1996) list issues that should be investigated as: physical and psychological health; material well-being and welfare; traditions, lifestyles and institutions; and interpersonal relationships.

Key Steps

1. Identify stakeholders who will be affected by a proposed change.
2. Identify what information is required.
3. Collect Data.
4. This is generally conducted through individual interviews, surveys or community forums.
5. Analyse Data to predict likely changes to the community and individuals.
7. Monitor changes to conditions after change is made.

Appropriate Situations to Apply Tools

Any time there is a major change proposed to a protected area. This might include change of designation, addition of major facilities, change in concessionaire policies, or change to operation hours.

Example of Application

The designation of the Errinundra National Park in East Gippsland, the Southeast National Park in New South Wales and most cooperative management agreements (i.e. joint management with indigenous communities).

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2 The 26 variables in each category are:
   1. Population Impacts - Population Change; Influx or outflux of temporary workers; Presence of seasonal (leisure) residents; Relocation of individuals and families; Dissimilarity in age, gender, racial or ethnic composition
   2. Community/Institutional Arrangements - Formation of attitudes toward the project; Interest group activity; Alteration in size and structure of local government; Presence of planning and zoning activity; Industrial diversification; Enhanced economic inequities; Change in employment equity of minority groups; Changing occupational opportunities
   3. Conflicts Between Local Residents and Newcomers - Presence of an outside agency; Introduction of new social classes; Change in the commercial/industrial focus of the community; Presence of weekend residents (recreational)
   4. Individual and Family Level Impacts – Disruption in daily living and movement patterns; Dissimilarity in religious practices; Alteration in family structure; Disruption in social networks perceptions of public health and safety; Change in leisure opportunities
   5. Community Infrastructure Needs – Change in community infrastructure; Land acquisition and disposal; Effects on known cultural, historical and archaeological resources
Strengths
SIA force managers to take into consideration the vast range of stakeholders associated with a particular protected area. They offer a systematic method of collecting and analysing a broad range of variables that affect individuals and communities.

Limitations
SIA still rely heavily on judgement decisions regarding the preferences of stakeholder groups. They provide valuable supporting data but used alone offer no consideration of the natural environment or economic impacts associated with changes.

Relationships
SIA is often used in conjunction with an environmental impact assessment process and an economic impact assessment. The idea of community involvement has been an important part of protected area planning in Australia since the 1970s and the Little Desert Campaign. Conservation Plan (C-Plan) is an example of a software system developed by New South Wales Parks and Wildlife to support conservation decision by involving a variety of stakeholder groups (e.g. local residents, timber industry, conservationists, Indigenous people). Although it is not an SIA as such, it provides a logical framework to collect individual and community input on changes to protected areas.

Environmental Impact Models

Overview
The greatest number of models that could be applied to natural resource management settings focus on environmental impacts. The website ‘WWW-Server for Ecological Modelling’ (http://www.wiz.uni-kassel.de/ecobas.html) contains a database of approximately 700 mathematical models that have been used in ecological research. The majority of these models deal with specific non-tourism related scenarios such as predicted changes to animal, plant, or other biological species as a result of changing variables such as agricultural regimes, timber management, weather and climate, water, landscape, and pollution.

Key Steps
These vary on the model in question. Typically ecological models involve computer simulation where for example particular species can be increased or decreased and the researcher can then view predicted impacts to the overall ecosystem.

Appropriate Situation to Apply Tool
Any time there is larger than normal changes or predicted changes in an area. For example, an EIA might be conducted before a particular species is reintroduced to an area, or when a new development is proposed.

Examples of Application
Warnken and Buckley (2000) report on 13 tourism developments that were subject to formal EIAs between 1982 and 1994, they included: day visitor pontoons on Moore, Agincourt, Wistari and Normal Reefs in Queensland; and ski resort and associated facilities at Thredbo, Kosciusko National Park. A more recent example is the proposed hotel at Pumphouse Point in Lake St. Clair National Park, Tasmania.

Strengths
It offers an excellent tool to predict long-term changes to flora and fauna species as a result of human-induced changes.

Limitations
The complexity of inter-relationships within any ecosystem means that many environmental impacts are difficult to model. Consequently, the accuracy of predictions is often questionable.

Relationships
In terms of visitor impact modelling such information is typically used in conjunction with more specific visitor use data.
Economic Impact Models

Overview
Economic models are used in the tourism industry to demonstrate the economic viability of recreational resources. The models can be grouped broadly into two categories: revealed preference models or stated preference models, although combinations of these are becoming increasingly more common and offer increased accuracy.

Most revealed preference models estimate either direct income generation or economic impact (primary, secondary and indirect revenue sources). For example, some models are used to show the overall economic impact of a region whose attraction base is natural resources (e.g. Carlsen & Wood 2004). Other techniques attempt to identify spending directly related to use of a particular natural resource attraction (e.g. through the use of visitor spending diaries). The most commonly used revealed preference model is the travel cost method, which has been used extensively for over thirty years. The travel cost method is designed to value an entire site by estimating the demand for trips to the site. It has been used repeatedly by numerous park agencies throughout Australia.

Stated preference techniques are based on what people say they would do, as opposed to what people are observed to do, i.e. visitors state their values, rather than having a researcher infer values based on actual choices, as occurs when using revealed preference methods. Although this provides a clear weakness (e.g. hypothetical bias), it also provides the greatest strength. Whereas revealed preference techniques estimate existing situations, stated preference techniques have the ability to model different future scenarios and predict the impact of potential changes to various segments of the population. While contingent value is the most commonly used stated preference technique, the newer technique of choice modelling is generally considered to offer considerable advantages.

Key Steps
The key steps depend on the econometric model used. While the most common method used to estimate the economic value of parks is the travel cost method, the authors argue that the technique of choice modelling has the greatest potential in terms of predicting changes to visitor patterns in protected areas.

Choice modelling is the only method that can generate a theoretically unbiased estimate of willingness to pay. It attempts to replicate a natural decision making process whereby an individual would acquire information and learn about alternatives, and then compare alternatives based on a set of attributes that they consider are important. For example, in a park setting, the individual may be provided with a range of four parks to choose from (choice set). These parks might be described using attributes that have been found to be important to visitors (e.g. level of crowding, amount of services, entrance fee). A number of levels for each attribute will be provided (e.g. entrance fee may be $0, $2, $5 or $10). By analysing respondents’ preference patterns for a number of different choice sets, researchers can examine visitor preference patterns and market segments.

Appropriate Situations to Apply Tool
Choice modelling has been used for a variety of applications ranging from understanding the impact of user fees at public recreation sites (Schroeder & Louviere 1999) to measuring forest resource values (Shapansky, Adamowicz & Boxall 2003), valuing Aboriginal artefacts (Boxall, Englin & Adamowicz 2003); measuring passive use values (Adamowicz, Boxall, Williams & Louviere 1998) and estimating environmental values (Morrison, Blamey, Bennet and Louviere 1996). Currently Parks Victoria and the Department of Environment and Heritage in South Australia are using choice modelling to examine recreation site choice (Weber 2005).

Examples of Application
The NSW National Parks and Wildlife Service commissioned a study in 1999 using the travel cost method. It was titled ‘The contribution of national parks to sustainable rural and regional development’. Carlsen and Wood (2004) also undertook a comprehensive study of the economic value of recreation and tourism in natural areas in Western Australia National Parks. Mules, Faulks, Stoeckl and Cegielski (2002) conducted an evaluation of the economic value of tourism in the Australian Alps.

Strengths
Economic models provide a bottom-line figure of what a change will cost. Providing a dollar figure to a change allows policy makers and manager to readily compare it to other known costs. Pearce (1993) argues that although putting on a dollar figure on the environment is offensive to some people, it means that it is at least considered in the equation as something of worth.

Limitations
Most economic models do not specifically account for environmental quality or environmental sustainability and therefore have limited use in terms of planning to reduce visitor impacts. The travel cost method is associated with a number of limitations (e.g. effects of time, effect of multiple destinations) which have led to increased demand for...
better tools for estimating economic impact. Techniques such as choice modelling can be used to assess preferences for economic, social and environmental conditions, but like most economic models, the trade-off information does not provide any information to the manager as to whether the preferences of these market segments are actually sustainable in light of the specific environment in question.

**Relationships**

Economic impact assessment is often carried out in conjunction with both SIA and EIA studies. The economic theory associated with EIA is also used in a number of computer-assisted programs that have been developed by public land management agencies. The Tourism Futures Simulator has been used in several areas around Australia, including Port Douglas, Queensland, and uses computer simulations to predict economic changes that would result from various tourism changes. The US Forest Service uses an economic impact modelling software known as IMPLAN (Impact analysis for PLANing). It identifies regional economic impacts from forest-related activities. The software allows the user to develop local level input-output models that can estimate the economic impact of new firms moving into an area. Initially, the use of IMPLAN for protected area management was limited to economic information such as its value to the economy based on resultant tourism activity. However, an updated version created in 1999 included a Social Accounting Matrix (SAM), and resulting SAM multipliers that significantly improved the practical application of the system (Minnesota IMPLAN Group 2005).

**Computer Simulation Models**

**Recreation Behaviour Simulator Model – RBSim**

The RBSim model was developed by Digital Land Systems Research in Melbourne in 1997 with Randy Gimblett (see Gimblett n.d.; Gimblett, Itami, & Richards 2000). It is an example of a computer simulation model that simulates the behaviour of human recreators in high-use natural environments. Computer simulation models have played a role in visitor management since Schechter (1975) developed the Wilderness Use Simulation Model (WUSM) for both river and backcountry recreation settings.

RBSim was first used in Broken Arrow Canyon, Arizona. RBSim is a computer program. It allows park managers to explore the consequences of change to any one or more variables. It has a qualitative approach where it understands management scenarios using map graphics from GIS, and quantitative by understanding management consequences by generating user statistics during simulation.

**Variables**

The model predicts the behaviours of parks and wilderness visitors. The following variables can be changed:

- Number of visitors.
- Number and kinds of vehicles.
- Facilities such as number of parking spaces.
- Road and trail width.
- Total capacity of facilities.

**Factors and Indicators**

It identifies crowding issues, bottlenecks and potential conflicts between user groups in environmental settings. The RBSim model joins two computer technologies:

- Geographic Information System (GIS) to present the environment (e.g., road or trail networks).
- Autonomous human agents (computer programs) to simulate human behaviour within geographic space.

RBSim uses object-orientated programming technology where each agent has physical mobility, sensory and cognitive capabilities and can move around the specific environment like robots. The park manager can input rules into the agent and every agent is different and you cannot predict its behaviour. The agents can gather data from the environment, make decisions from this information, and change behaviour according to the situation.

**Example of Application**

Wardell and Moore (2005) have applied this RBSim in Victorian protected areas.

**The Visitor Impact Modelling Matrix**

To deal with the number of individual models, frameworks, techniques and concepts to be analysed, a comparison matrix was developed. A summary of this matrix appears as Appendix A. It provides managers with a quick comparative overview of the strengths and weaknesses of the various models. Whether the tool is a model, framework, technique or concept is indicated in the first column, along with the scale of application. The matrix is also divided
according to the type of tool, i.e. tools based on carrying capacity, economic tools, social impact tools etc. This matrix is intended to be used in conjunction with Appendix B, which provides generalised guidelines as to selecting an appropriate management tool. Although it is recognised that available time, finances and current agency expertise are key factors in what tool is feasible, the decision-tool (Appendix B) guides choices based on common scenarios park managers are likely to face. While we have attempted to define guidelines for using particular tools, the actual decision is multi-faceted and often driven by agency requirements, tradition and individual preference. There are often several tools that would be appropriate to use for a given scenario. This chapter also makes it clear, that many of the tools are similar and often represent small adaptations designed for a specific purpose. For example, LAC, VERP and VIM are all 'indicator-based' approaches based on very similar steps, to achieve very similar outputs. What is important is that the choice of management tool be based on an understanding of appropriate existing options, and their various strengths and limitations.
Chapter 3

METHODS

Academic Delphi Panel

The Delphi technique (Brown 1968) is a method that provides for iterative adjustment of expert opinion based on successive rounds of blind review until consensus, or something approaching it, is achieved. The technique is broadly based on dialectic of thesis and antithesis with synthesis becoming the new thesis. The goal is evolution and refinement of expert opinion with a movement toward consensus. Broad representation of diverse backgrounds can be achieved while limiting the influence of over-dominant group members or political lobbying.

The Delphi technique was chosen for this study because the focus of the enquiry has elements of forecasting (e.g. what is the future of protected areas management?), is subjective (e.g. why is one model, process, or framework better than another?), and lacks obvious consensus (e.g. why is there a plurality of methods in use?). Further, a key strength of the Delphi is that the panellists remain anonymous throughout the process. Many of the ‘experts’ in the field of protected areas management have developed and/or used models, processes, and frameworks and may be somewhat vested in a particular method or outcome. We thought it imperative to protect the integrity of the exchange of ideas by limiting the influence of the specific personalities involved.

To identify experts in protected areas impact modelling, the research team identified a list of potential academic experts both internationally and in Australia based on the applicant’s publication record and acknowledged reputation. A group of 14 individuals (seven from North America, six from Australia, one from Europe) were initially identified for a target panel of 10 individuals. The prospective panellists were contacted by email and a small honorarium was offered to encourage participation. Agreements to participate were received from nine individuals and there were five refusals. One individual dropped out after agreeing to participate. There was special difficulty recruiting academic experts from Australia with refusals from four out of six individuals in contrast to no refusals from North Americans. The final panel consisted of eight individuals, six from North America and two from Australia. The Delphi participants are listed in Appendix C.

In the first round of questions for the Delphi process, the panel was provided with some working definitions for model, framework, process, and concept to encourage the participants to critique our definitions for protected areas. The first question asked whether the participants agreed with our definitions. For example, we defined a model as:

…an abstraction of reality designed to facilitate understanding. Models range in complexity from simple rules of thumb to complex mathematical models. Model effectiveness is evaluated in terms of the model’s ability to predict and explain the phenomenon of interest. For example, economic I-O models describe and predict relationships between revenue inflows and outflows within a predefined economic sector. A protected areas model should identify the variables that contribute to desired protected area outcomes and describe the relationship between the variables.

We defined a framework as a looser structure for identifying constructs or variables that might in some cases, be simply a process for identifying important variables for sustainable protected areas management. We noted that frameworks generally fall short of explicitly identifying pre-determined relationships between variables. In contrast to a model, the variables and relationships in a framework are often contextual and emergent, rather than pre-defined features.

In our initial review of protected areas management, we developed a matrix of models, frameworks, concepts, and processes related to visitor impacts on protected areas. This matrix is presented as Appendix D Because of the broad scope of the topic, we were unsure if our compiled list was accurate. Thus, our second question asked whether the matrix of protected area models was accurate and complete. The idea was to provide the panel with a brief review of the various models and processes and to have the panel examine the matrix for accuracy and comprehensiveness. The matrix is organised around key elements of each process. The format includes a definition of the process, key input variables, key output variables, and strengths and weaknesses of the model or process.

The panel was also provided with an experimental concept map with the various models and processes mapped into ‘sustainability space’ (see Appendix E). We were curious whether it was possible and useful to map the protected area models and process into a traditional three sphere representation of sustainability. The third question asked, ‘Does our graphical diagram that maps the different concepts, frameworks, and models into ‘sustainability space’ make sense? What should be dropped, added, or is inaccurately mapped?’
The fourth question asked which protected area models or frameworks represent best practice for managing protected areas. We anticipated a variety of responses based on participant familiarity and experience with the various processes.

The fifth question asked whether it is possible or realistic to integrate ecological, economic, and social variables into a comprehensive, sustainability model for protected areas management and the sixth and final question asked what are the most critical future research needs for developing protected areas models.

Delphi participants were requested to complete the first round of questions within about six weeks. However, due to requests for time extensions or simply the failure to respond, the deadline for submitting responses was extended several times. All first round responses were eventually received approximately three months from the first request in December, 2004.

In the second round of the academic Delphi process, the responses from the first round were summarised and sent to the list of participants along with detailed responses from the other participants. Consistent with the Delphi process, participant identities were not disclosed. Participants were asked to review the responses and summary and to comment on whether they were still satisfied with their original responses and whether they wanted to modify or clarify their responses. Further, participants were asked to comment on the responses from the other panellists.

In the next section, participants were provided with two findings from the IRG process and asked to comment on them. Specifically, participants were informed that with the exception of ROS, LAC, carrying capacity, and Aboriginal perspectives, there is a general lack of awareness of many of the various protected areas models and frameworks in Australia and that few frameworks/models were actually being used in practice. Participants were asked if they had experience working in the US, to please comment on whether or not the results would be similar in the US in terms of managerial awareness and adoption of protected area models. If the participants had Australian experience, they were asked to comment on the circumstances, settings, context or differences that would contribute to the lack of awareness/adoption of these models by Australian protected area managers.

In the third section, we provided the observation from the first round results that the academic panel perceives great complexity and causal chains in protected area impact models while agency practitioners appear to use what is simple and cite working constraints such as funding, time, and staffing demands. We asked whether the participants agreed there is a perceptual gap between academics and agency practitioners, and if there is a gap, whether it should be closed. We then asked how protected area model adoption and diffusion will happen and how the evolution of protected area models will occur over time.

The final second round question asked the participants to provide at least a paragraph of sage wisdom on what protected areas management for tourism impacts will look like 25 years from now, including the conditions, institutions, and managerial practices.

The final second round academic Delphi responses were received in early February 2005.

Industry Reference Group Delphi Panel

To increase the likelihood of a match between academic project output and ‘industry’ needs, an industry reference group (IRG) composed of designees from Australian state and federal park management agencies was convened. As an initial strategy for building project support, South Australia’s Director of National Parks and Wildlife Greg Leaman were approached. A written overview of draft project objectives, strategy and desired outcomes was prepared, and in a follow-up discussion Director Leaman agreed to support the project by appointing a senior staff member to participate in the IRG, and then asking his agency peers to do the same. Director Leaman attended the Heads of Agency (HOA) meeting in Perth in February 2003 and gained informal commitments from attendees. In April, the project team sent a personalised email to HOAs in all seven states, as well as Parks Australia and Environment ACT in Canberra. An invitation to participate in the project IRG was extended regardless of whether or not official membership in the Sustainable Tourism CRC.

All states except New South Wales nominated a senior level designee, usually from the planning function. Despite repeated contacts, the Parks and Wildlife Commission of the Northern Territory did not respond. However, Parks Australia appointed an Associate Director from the Darwin office, thus providing a perspective from that region. There was also concern about obtaining input from the Tourism and Protected Areas Forum (TAPAF), an informal group of representatives from state, commonwealth and New Zealand park agencies who meet regularly to progress issues of common interest. This was achieved when Environment ACT’s designee, the agency’s Manager of Education, Communications & Recreation, also served as a TAPAF representative. Eventually the NSW agency did appoint a contact, and although this individual did not directly participate in the first Delphi round, she reviewed and contributed to the results summation and responded in the second round. The names and affiliation of the eight state and federal park management professionals selected by their Head of Agency are appended in Appendix F.

Two Delphi iterations were completed where a series of questions was scripted, sent by email with supporting materials, with text responses then arrayed and summarised for further panel comment. In the first contact, IRG members were provided with a project overview and anticipated schedule, with thanks for their input. Three weeks later on August 22, the first set of questions was emailed (Appendix G). The initial intent was to assess general familiarity with the range of PA impact tools, and associated application rates. The first questions were sent in the same message,
but in two separate files so as to minimise ‘learning’ or contamination that could occur if respondents were asked about specific tools before generating their own lists.

The first question asked the respondent to name tools (including concepts, frameworks, models, and process) currently used by the agency to manage and plan for sustaining protected areas and managing visitor impacts. The follow-up query asked for an evaluation of outcomes of using each planning/management tool, and for specification of the level at which the tool is applied (i.e. park unit or system-wide). The second question followed an identical format in requesting identification of tools or management procedures used to maintain and monitor ecological systems and biodiversity conservation. Similarly, an evaluation of each tool was requested, with details about the geographic level at which it was applied. The third and final question of the set asked which concepts, frameworks, models and processes the agency had trialled or examined, and then chosen not to use, and for detail regarding the rationale for that decision.

In the first Delphi round, participants were clearly instructed not to answer a second subset of questions until they had replied to the questions above. In fact, over half of the IRG members sent the responses separately, on different dates. The concurrent (but sequential) phase of round one was a formatted survey where a complete listing of the tools reviewed was provided, and participants formally ranked tools on various attributes using a 5-point Likert scale. More specifically, within the shortened summary matrix describing each tool, respondents were asked about their level of familiarity with each tool, and the extent of current agency usage of each tool. Three of the most useful and least useful protected areas impact management tools were also identified.

Despite the desired two-week turnaround time, the first Delphi round stretched over a one month period due to competing workload requirements cited by panel members. Results were compiled and arrayed in a summary matrix, and sent back to park agency experts as part of the second Delphi stage. In accordance with standard procedure also utilised with the academic panellists, the first questions asked for clarifications and modifications to original answers that might have been necessary when viewed in the full range of responses received. The level of interest in little-known methods contributed by other panellists was also assessed.

Turning to patterns evident in the first round, the third question asked for an explanation of the fact that most models and tools for protected areas management, with the exception of ROS and LAC, are not used in Australia to the degree they are used in North America. Insights as to why this adoption difference exists was probed, with a follow-up query as to model content changes and process requirements that that might encourage each agency to improve application rates of the available models and tools.

The fourth question asked participants to elaborate on the mix of threats to parks and protected areas. In addition to a complete listing, researchers asked for an analysis of environmental and socio-cultural threats from inside the protected area boundaries (e.g. visitation, development, resource extraction) where management and legal authority exists for the agency, versus those threats from outside the boundaries (e.g. encroaching development, land clearing, pollution, agricultural practices, water diversion) exhibiting more management and legal complexity. Panellists also distinguished between threats caused by visitation and those unrelated to visitation.

Finally, there was an expert assessment of how well the agency’s planning and management focus was adequately targeting the greatest threats.

Another line of questioning dealt with how each agency would allocate financial resources for protected areas management tools. Specifically, panellists hypothetically earmarked a percentage to either: (a) develop/revise/adapt protected areas models and tools for application in Australia, or (b) engage in capacity building (training and education) to help management agencies learn about the wide variety of current models and tools. Responses totalled 100%, and many agency representatives wrote comments explaining the rationale behind their choices.

The last question asked how academia could best help each agency become more effective in protected areas impact management, with suggested action steps welcomed.

Completed questionnaires were returned from all eight designees by mid-January, 2005. On February 3, as part of the CAUTHE annual conference (Council for Australian University Tourism and Hospitality Education), one researcher led a dialogue session about the research with a small group of academics. After presenting both the academic and IRG results to date, there was a dialogue about how to proceed with increased Australian capacity to use PA management tools and how models would evolve. The attendees were asked about standardisation, the efficacy of a national approach, University links, managing visitation, the next generation of models, and building capacity. Specifically:

1. Is the diversity of PA practice a positive adaptation based on local conditions or an obstacle to system-wide thinking? Would there be any benefit to standardisation of PA practice across the states/jurisdictions?
2. Would there be benefit to adoption of an overarching, integrated/national approach to PA management (e.g. ecosystem management, ‘wildlands project’)?
3. Academic participants cited the education system linkages in U.S. as one of the reasons why there was greater agency/industry familiarity with (though not necessarily adoption of) PA models than Australia. Does this observation appear valid, and if so, are there changes that could be made to tertiary education programs in Australia to improve the situation (e.g. curriculum standardisation or accreditation, partnerships)?
4. Most agency responses cite increased visitation as a major threat to PAs and yet, relatively few agencies have adopted capacity-based models (e.g. LAC, VERP, VIM). Agencies cite resource constraints and lack of training as primary reasons for non-adoption. Are there creative ways to enhance PA capacity (resources/expertise) in Australia, e.g. through tourism initiatives?
5. Many academic participants were sceptical that a comprehensive model for sustainable PA management was feasible or even desirable. Can/should models be integrated?

6. Do you agree with how Australian practitioners say capacity building should be encouraged?
   - Teach ‘how-to adapt models for local conditions’
   - Case study documentation, trial and testing, feedback
   - Training and capacity building

The schedule of the Delphi and IRG rounds were as follows:

- August 10: First round of questions sent to academic Delphi panel
- August 22: First round of questions sent to IRG
- September 30: Second round of questions sent to academic Delphi panel
- December 17: Second round of questions sent to IRG
Chapter 4

RESULTS

Academic Delphi Panel

Responses were received from the eight panellists over two rounds of questions. Responses are presented as Appendix G.

Round One Results

The panellists generally agreed with our definitions of model, framework, and process but with several important clarifications. One respondent indicated that models can either explain or predict, but generally not both. Another respondent indicated that models in the social science seldom get beyond ‘describing’ or suggesting relationships between variables to the point of actually explaining. Finally, one respondent indicated that models are limited in what they measure and may mask research agendas while the model assumptions and implications are seldom acknowledged.

The tools matrix was seen as a good way to summarise the various models, frameworks and concepts for protected area management. Delphi panellists (with one exception) felt the matrix was fairly complete. There were several suggestions to improve and correct some of the model descriptions. Benefits Based Management (BBM) was nominated for inclusion as an extension of the satisfaction model. Three new models, currently under development were identified for inclusion:

1. Sense of Place (SOP) (U.S. Forest Service).
2. Community Agency Trust (CAT) model (various federal agencies), a model that incorporates, BBM, SOP, and social capital concepts.
3. Travel Simulation Model for social carrying capacity (U.S. National Park Service).

One panellist believed additional models should be listed including corporate management and public administration models. We did not include these models in the matrix because they seem less directly applicable to protected area management than the other models. Based on panellist comments, the following tools were added to the matrix for the second round:

- Benefits Based Management (BBM)/ Benefits Approach to Leisure (BAL).
- RBSim was expanded to include the Extend Model.
- Travel Simulation Model for social carrying capacity.
- Sense of Place (SOP; US Forest Service).
- Community-Agency Trust (CAT) model.

The conceptual diagram did not seem to provide additional insight or clarity for Delphi group members, but could prove useful with further development and refinement. Although there were arguments about boundaries and placement, the concept map ‘starts to provide a link to the sustainability initiative.’ It might be helpful to indicate the classification (model, framework, or concept) of each element. Delphi members suggested various alterations and corrections such as adding a ‘policy’ element, a ‘political’ element, and changing the ‘ecological’ sphere to ‘biophysical.’ Suggestions about the proper placement of the ‘ecological’ circle include an argument that it should have ‘supremacy’ over other elements. The most common observation about the concept map was that it appears to marginalise indigenous views in protected area management. This is an interesting result in that most of the current protected area models in Western society do not explicitly account for indigenous views for management. Aboriginal perspectives need to be integrated into the model, but the challenge is to find a way to illustrate an added dimension by which cultural paradigms intersect the model. It was also suggested that a ‘cultural’ circle, ‘adaptive management’ and ‘human ecosystems’ also need graphic integration. Most additions would add complexity (e.g. three dimensions) but the value in creating a more encompassing but complex diagram was questioned.

The Delphi group members evaluating the various models from a ‘best practices’ standpoint identified two key problems:

1. Many of the models/frameworks were developed for specific applications or agencies and respond to mandates or needs of that agency. Generalising is not appropriate as most users would have to modify the models to fit individual agency needs. The best models would be flexible or adaptable to meet these needs.
2. Internationally, ‘best practices’ must account for a variety of paradigms and values for which individual models/frameworks are not necessarily designed.
In addition, members noted that agencies must have adequate resources, research, and public process to implement the models.

Delphi group members were divided on whether it is realistic to create an integrated ecological, economic and social sustainability model for protected areas. About half of the panellists think it can be done while others have reservations or feel it may not be a useful objective. Some panellist observations were as follows:

- ‘Existing models don’t do it but we are getting close’.
- ‘Possibly but...[a] model that managers can understand and use [is needed] – if this model is too sophisticated then it has no chance of being implemented on the ground’.
- ‘It would be very difficult because this is not what protected areas are about and certainly not what management is about...in practice’.
- ‘I think what’s realistic with any of these comprehensive models is to lay out the variables and the process for addressing them; be prepared to add new variables or new understanding to existing variables’.

When asked about the most critical future research needs for protected areas, most panellists indicated that a better understanding of the values represented by protected areas is needed. In the words of one panellist:

There is an urgent need for research to better define the values and qualities of the protected area that are to be protected. For example, instead of generally seeking sustainable ecological conditions, there needs to be a specific definition of what is ‘natural’, ‘wild’, ‘biodiversity’ or ‘self-perpetuating’, and why society should be pursuing these goals.

Other research needs mentioned by panellists include:

- Quality recreational experience needs more definition.
- Specify economic benefits and to whom they accrue.
- Models need to consider threats from outside of protected area boundaries (urban development, farming, air and water quality, etc.), social justice questions, landscape valuation, and community-level approaches.
- Research needs to account for perspectives outside ‘the Anglo-European view of resources.’
- Clarity or ease of understanding is needed for implementing academic models and frameworks into protected areas management. Simple, adaptable models have the most acceptability amongst managers. Models that are hard to understand, are complex, or are difficult to implement (because of time or money) have less support.

**Round Two Results**

In the second round review of the matrix, few respondents took the opportunity to revise their original responses although respondents noted more differences about where models, frameworks, and concepts belonged in the matrix. These responses are presented as Appendix H. Clarifications and improvements to definitions continued, and panellists began to develop arguments to support or discount various tools. For example, one respondent eloquently made the point that the notion of carrying capacity is not useful and will never be useful. Another researcher noted that to make the matrix historically and conceptually accurate would require great effort and could not be done by committee. One respondent suggested that some early concepts and frameworks should be included that were precursors to those listed in the matrix. These included Al Wagner’s Recreation Spectrum - there is no ‘average’ recreation site any more than there is an ‘average’ recreationist - a concept fundamental to development of the Recreation Opportunity Spectrum. The Outdoor Recreation Resources Review Commission generated a recreation land classification system that recognised a series of land types ranging from urban to wilderness. The U.S. Forest Service and U.S. National Park Service both had intermediate frameworks. These historical antecedents, while important, were not added in order to avoid additional matrix complexity.

Although imperfect, the utility of the matrix may be in that it ‘provides a forum for discussing the existing models, where the biggest reward may be as it helps us to move to improved views of what to do in protected areas and how to do research.’

When asked about whether the managerial awareness and adoption of protected area models from the IRG in Australia would be similar in the U.S., respondents agreed that adoption levels would be similar in Australia and the US with the exception that the U.S. Forest Service and U.S. National Park Service each have adopted models and have been putting efforts into training managers in their implementation and use. Other US federal land management agencies are also attending these training sessions which are held throughout the country and on a regular basis.

In general, protected area models and frameworks generally have low adoption by PA managers. Newsome, Moore and Dowling (2002) suggest several reasons for the lack of implementation including:

- Managers focus on preparing management plans which tend to be general in nature to comply with legal requirements.
- The frameworks are much more specific and managers have struggled with incorporating this level of specificity in management plans and associated planning processes.
- Confusion regarding the purpose of each framework and deciding which to choose.
- The extensive use of acronyms such as LAC and VAMP also tends to alienate those unfamiliar with the frameworks.

Respondents suggested that management agencies have not given sustainability high priority and that current models are not easy for managers to adopt. Problems include the lack of simple concept descriptions (currently too abstract)
that make understanding easier, straightforward instructions and processes for their use, and training programs to raise skill levels.

Despite the training mentioned above, the adoption rate in the US is low. A new survey of 90 U.S. PAs shows 16% of managers have used the Limits of Acceptable Change (LAC) framework in making carrying capacity decisions and 11% have used the Visitor Experience and Resource Protection (VERP) framework in making carrying capacity decisions (Manning, personal communication).

Respondents with experience in Australia were asked to comment on circumstances, settings, or differences that would contribute to the lack of awareness and adoption of PA models by Australian managers. One respondent suggested that Australia does not have a multiple use paradigm for PA's but rather 'total protection' philosophy, therefore these concepts have less applicability. Another respondent was 'not surprised about the familiarity/use of the different models. We did an exercise with Urban and National Parks managers and they had no interest or understanding of the models generally with the exception of ROS.'

One respondent said that for a model to be adopted in Australia, it would need a support package for PA managers including simple step-by-step actions, surveys that can be used, mechanisms to analyse the data, and staff to support managers. With respect the latter, staff shortages appear endemic to protected areas management in Australia.

When asked whether respondents agreed there is a perceptual gap between academics and agency practitioners, the general consensus was, yes, but that it was caused by managers needing to address more immediate problems rather than lack of desire to implement PA models. Most respondents felt that having a gap was not a major concern as academics are always improving existing or creating new models or frameworks and that it would be impossible, and perhaps undesirable, for managers to try to adopt the latest models and frameworks. Yet another respondent noted that Australian PA managers have fewer opportunities than their U.S. counterparts to contact academics who are developing the models. When asked whether the gap should be closed, respondents suggested the gap should be closed somewhat, however, there should always be a gap as change and improvement was part of the process.

Panellists were asked what is needed for PA model adoption and diffusion. In response, they indicated that agency support for model adoption is critical with training programs for managers. Management tools should not be invented unless there are a few managers who have signed on to help develop and implement it. Progressive managers with specific needs will find and try new PA models/frameworks and their help in trying and refining models will encourage others to use the models. Having user friendly methods and tools will encourage use while applied academics can help bridge the gap between model makers and PA managers. More case studies would help the adoption and diffusion process.

Delphi participants were then asked how the evolution of PA impact models will occur over time. Panellists suggested it would be slow due to lack of staff and resources. One respondent could not see the required resources being available in Australia to achieve significant progress. One respondent said scientists would need to be involved in thinking through the impacts of various management decisions in order to understand information needs and assist managers in making more science-based decisions, while another respondent countered that academics need to understand manager needs to provide more meaningful tools.

The second round of the Delphi process concluded with a question seeking the ‘sage wisdom’ of the panellists on what protected areas management for tourism impacts will look like 25 years from now. Two responses are listed below:

I see PA management driven by accountability! SoP reporting is the start! We will see formalised practices of adaptive management with specialists working with field staff to modify practices. Resource assessment commissions (or equivalents) will look at landscapes where conservation and production will be integrated. It will be quickly realised that PAs are not the answer! Respondent's ideal: There will be a range of strict nature preserves to strict production areas with a myriad of possibilities between. IUCN categories will be outdated concepts as will be the concept of PAs as we see them now. They will exist, but their role will be different. There will be many community PAs, as government increasingly fails in the delivery of its conservation obligation. The protection of natural capital will return to where it belongs, with the people. Social capital will be protected and strengthened and amassed financial capital will be converted to social capital and natural capital. The city will pay for the expertise and care provided by the bush.

and

I would like protected areas to be managed according to one of the (quite similar) contemporary carrying capacity-related frameworks, including limits of acceptable change and visitor experience and resource protection. This will require managers to formulate specific management objectives for desired resource and experiential conditions, including quantitative indicators and standards of quality. Formulation of management objectives and associated indicators and standards of quality will be based on a program of research on the relationship between visitor use and resource and social impacts, societal norms for the protected areas conditions, and a program of public involvement. Indicator variables derived from this process will be monitored on a regular basis to determine if park conditions are within specified standards. In some cases, computer simulation models of visitor use and related impacts will be used for monitoring purposes. When monitoring suggests that visitor impacts are violating specified standards of quality, then managers will adopt and implement a series of management actions (use limits, public education, rules and regulations, etc.)
designed to reduce visitor impacts. Managers will use professional handbooks jointly developed by the agencies and academics to guide this process.

Industry Reference Group

There were nine responses to the first round of Delphi questions: three from Queensland, one from the federal agency Parks Australia, and one from each state except New South Wales (did not return the questionnaire) and Northern Territory (did not participate). The Queensland designee broadened participation to the Wet Tropics Management Authority and Queensland Environmental Protection Agency, resulting in two volunteer surveys responses included in the analysis. This section details the scaled responses to initial inquiries about the use of protected areas (PA) impact management tools, and then provides an overview of the text responses to more detailed questions about actual in-park practices. Details of verbatim comments for Round One of the Delphi are provided in Appendix I and J.

Awareness and Use of Impact Management Tools

IRG members were asked to indicate the extent to which, as parks management agency representatives, they were familiar with 14 different tools - concepts, frameworks, models, and processes - for managing and planning for sustaining protected areas. IRG members were also asked the extent to which each particular model, framework, or process was used in their agency. The results are presented below in Table 3.

Table 3: Industry Reference Group responses to familiarity and use of various protected area models, frameworks, and processes

<table>
<thead>
<tr>
<th>Tool</th>
<th>Familiarity Average</th>
<th>Rank</th>
<th>Frequency of Use Average</th>
<th>Rank</th>
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<td>3.11</td>
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</table>

† SA DEH used a different definition of satisfaction

Familiarity scale ranges from 1 = ‘never heard of it’ to 5 = ‘very familiar’ and frequency of use scale ranges from 1 = ‘do not use’ to 5 = ‘broad application across the agency’.

The Recreation Opportunity Spectrum framework, Limits of Acceptable Change, carrying capacity concept, and Aboriginal perspectives show both the highest levels of familiarity and application. However, the significantly lower average scores for application show that familiarity often does not translate into usage. Of the North American agency-generated models, VIM shows the greatest attention and adoption rates. The Tourism Futures Simulator, input-output economic models (I/O), contingent valuation methods (CVM), and VERP consistently perform at the bottom level of the rankings. The low scorings for economic models are likely to reflect the composition of the IRG, more so than any disavowal of the methods in principle. The application of several tools is tied to states: RB-Sim in Victoria, and TOMM in South Australia. Other tools perform at the mid-range, and frequency of application is always less than familiarity.

Figure 1 presents a graphic plot of data averages, where proximity of tools indicates similar aggregated assessments. Three distinct clusters of tools become more visible:

1. High familiarity/moderate use (n = 4) ROS, LAC, carrying capacity, Aboriginal perspectives
2. Low familiarity/infrequent use (n = 4) Tourism Futures Simulator, RB-Sim, I/O models
3. Moderate familiarity/infrequent use (n = 7) All other tools
Results are almost identical when respondents are asked to identify the three most useful impact management/planning tools; the top mentions, with the number of times each tool was specified are ROS (7), LAC (6), Aboriginal perspectives (4), carrying capacity (3), satisfaction (3), and TOMM (2). Likewise, the least useful tools, with number of mentions are I/O models (5), CVM (4), carrying capacity (4), Tourism Futures Simulator (3), RBSim (3) and travel cost (3). The split in opinion regarding carrying capacity - i.e. the fact that it is listed in both lists - is an interesting phenomenon. The tools that have been fine-tuned for special circumstances or ‘rejected’ by the various agencies include:

- ROS - urban areas are problematic.
- VIM – limited utility when there is great complexity.
- Satisfaction models – reasons not specified.
- ‘Any tools that result in management by numbers, rather than impact’.

Several agencies regularly use a variant of ROS - the Wet Tropics Management Authority (settings-based approach specifies desired use levels), Queensland Parks (recreation value), South Australia (broad conceptualisation), Tasmania, and Western Australia’s modification called the Visitor Planning Framework. Tasmania and Western Australia’s CALM also apply an LAC-based framework, labelled a ‘subjective’ tool by another panellist.

**Additional Tourism Impact Management Tools Contributed by IRG**

Respondents added at least nine additional tools for planning, managing impacts or sustaining visitor use, with quotes from practitioners:

- Indicators of sound practice: ‘useful but difficult to get operational acceptance’; ‘have moved away from indicators to rapid assessment because former is too time/resource intensive’.
- Zoning: ‘useful, but scale is problematic when want homogeneity’. Tasmania has a Reserve Standards Framework that sets out the type of use that is undertaken at a particular site/zone.
- Levels of Service (LOS; Victoria): An analysis of the gap between market demand and service delivery. ‘LOS is good for identification of strategic risk’.
- Environmental Management System (Victoria): a values risk/impact assessment matrix
- Quality Plan for Works (Victoria).
- Facility standards (Queensland).
- Comprehensive Adequate Representative [CAR] Reserve System (CALM) (Note: relevance questioned given this relates only to ecological values).
- ‘Reserve activity assessment: an approval process for most management’.
- Landscape classification system: standardises regional allocation of visitor facilities, signage and carrying capacity.
• Australia standard track classification scheme.

Most respondents emphasised that application of the tools occurs within a complex context, where controllable factors include: management plans, strong policy formulation, regulations, permits, research and visitor surveys, (track and campsite) monitoring, limiting visitor numbers, marketing, indigenous consultation, operator licensing, State government requirements, and visitor and operator codes of conduct.

Environmental Impact Management Tools
Many IRG members did not differentiate between tourism/recreation impact models and environmental models, reflecting again the composition (and biases) of the group. ROS, LAC and indicators again received many mentions. Unique tools mentioned by agency representatives, within the context of management plans, include:
• Victoria’s Environmental Information System, a subset of their Environmental Management System.
• Multiple Use Management Planning (MUMP; not used at present due to differing inter-agency perceptions).
• Ranger and community reports.
• Aerial photography at visitor nodes.
• Photographic history.
• Recovery plans for threatened species.
• Scientific advisory committees.

Barriers to Adoption of Tools
In the second Delphi round, few panellists changed their responses as a function of other panellist comments, and there was little content added whereby one comment spurred tangential thinking. Participants appeared content that the information provided was an accurate snapshot of the state-of-the-art at present. When presented the summary data about general low adoption rates for the major impact management tools, despite moderate familiarity, the following reasons were generated to explain the varying Australian and overseas situations:

Australia
• More ground-focused; models are for academics.
• Lack of examples of successful full-cycle implementation, moving beyond the planning state.
• Insufficient resources for thorough implementation and quality data collection.
• Lack of expertise in the understanding of technical complexities involved in identifying, developing and negotiating what indicators and standards are to be adopted.
• Greater number of jurisdictional agencies responsible for PA management, so there has been a historic lack of discussion between agencies (until now).
• Manages largely a largely urban parks network, while the tools have evolved for application in rural or remote PAs.

Overseas
• Far greater federal funds allocated to investigating, modifying and implementing the management tools via Universities, National Parks and the federal Forest Service. The expectation was that adoption of PA impact management tools by individual states was far lower, when compared with national agencies.
• Federal land management agencies have greater resources and stronger links with park management and biological sciences, leading to centralised planning teams and thus reflected in policy.
• Presence of a larger academic force involved in researching and teaching about PA management leads to ‘quantum of expertise.’
• Application of tools is mandated and management decisions are required, in many instances, to be legally defensible.

One panellist brought forward an important point that while Australia may lag in application of PA impact management tools, the country leads in incorporation of Aboriginal (i.e. indigenous) perspectives, as evidenced by the move toward co-management and actual land and legal transfers.

Factors Facilitating Adoptions of Tools
When asked about requirements to embrace tools for PA impact management, as expected comments about lack of funds and paucity of skilled staff dominated. In addition, the following features of any prominent impact management tools were termed desirable by agency professionals:
Ease of application, recognising staff time constraints
• Cost-effectiveness.
• Research dollar support.
• Greater confidence with regard to accuracy and benefits of various tools, as obtained through documentation of case study results.
• Partnerships with post-graduate programs to test models.
• Training, and train-the-trainer programs too build a network of skilled users.
• Access to a website of proforma for models.

One caution was made about complex agency decision-making occurring at a multiplicity of levels as an impediment to use of impact management tools, with a notation that current standard procedures would need to change.

Most agency panellists, when asked to choose a preferred next step, pressured for more research-based information on how-to adapt existing PA impact management models for local conditions. A minority asked for universal standardisation so, that there was agreement among all PA units in Australia. This preference emerged particularly in reference to how zoning is applied to ROS, where varying agencies are now never comparing the same units or sometimes difficult to separate internal from external threats. Representatives from the Wet Tropics and the ACT indicated most threats are external and unrelated to visitation (e.g. urbanisation, 2003 bushfires) while representatives from Queensland indicated the majority of threats were internal. In one case, the response was somewhat contradictory where the South Australia representative indicated that very few threats were ‘caused’ by visitation but then from Queensland indicated the majority of threats were internal. In one case, the response was somewhat contradictory where the South Australia representative indicated that very few threats were ‘caused’ by visitation but then acknowledged that pressures to develop facilities within parks to accommodate visitors was an ongoing concern.

The majority of respondents indicated that their agencies were currently working on addressing the list of threats through various planning and management processes, but were less confident that the threats had actually been ameliorated.

Protected Area Threats

One question asked respondents about threats to parks and protected areas with particular attention to how the threats were distributed between internal threats (where the agency has legal/management authority) and external threats (where the agency has little to no legal/management authority) and how these threats were distributed between threats by visitation and environmental threats unrelated to visitation. We were seeking to better understand the extent to which PA models and processes could actually address the threats being faced by park managers.

There was considerable variation in the types of responses concerning threats. One respondent cautioned that it is sometimes difficult to separate internal from external threats. Representatives from the Wet Tropics and the ACT indicated most threats are external and unrelated to visitation (e.g. urbanisation, 2003 bushfires) while representatives from Queensland indicated the majority of threats were internal. In one case, the response was somewhat contradictory where the South Australia representative indicated that very few threats were ‘caused’ by visitation but then acknowledged that pressures to develop facilities within parks to accommodate visitors was an ongoing concern.

The majority of respondents indicated that their agencies were currently working on addressing the list of threats through various planning and management processes, but were less confident that the threats had actually been ameliorated.

Future Directions

One question asked respondents to split financial allocations between development of new PA impact management models/tools or investments in training and extension regarding current PA models/tools. The responses (by percent) were as follows:


While recognising individual agency circumstances, seven of eight respondents wanted to put at least half of their resources into training and capacity building built around existing management tools. Further, there was broad support for academics to assist in this endeavour by applying and adapting various models to real-life situations, with thorough procedural documentation and performance assessment. Academic institutions would then host educational workshops and design training to present the findings and explain what worked well and what approaches were less adequate. Simple indicators to measure the site level impacts of tourism on the natural environment are also perceived to fit into impact management ‘best practices,’ but proponents differ on whether the indicators complement the evolution of tools or are a replacement for them.

Finally, some agencies suggested a more focused tool-specific direction:
• Work on the Levels of Service concept with interested agencies.
• Work on LAC evolution with interested agencies.
• Look at tools agencies have developed internally.

Feedback Session

One member of the project team travelled to the CAUTHE conference in Alice Springs in order to obtain feedback from academics and park managers on project findings to date. A place was secured on a late afternoon program as one of four concurrent special interest sessions, and this scheduling was published in the program and announced to the audience during the morning session. In addition, the co-PI talked to several uniformed park managers in attendance and invited them to the informal discussion. In actuality, there were only two Australian academic attendees, both of whom were involved in STCRC projects (economic models, adventure tourism impacts) and wanted to gauge their project momentum and scope, and a New Zealander from Lincoln University, an institution which was negotiating an STCRC agreement. Due to the small audience, the two-hour dialogue took the form of discussion with accompanying PowerPoint slides. The primary comments received are outlined below.

On seeing the conceptual map, the participants reacted similarly to the academic Delphi panel in querying the placement of an Aboriginal/indigenous perspective as separate from the ecological, social/cultural and economic
spheres. One individual recommended that Aboriginal input be categorised solely as a component of social systems, but conceptualisation of land and ‘country’ as integrative concepts in the Aboriginal paradigm - i.e. land and country transcend individual definition as an environmental, social or economic entities - the project team has resisted this solution. In foreshadowing of later comments made about the artificial separation of PA impacts from their source causes due to increased visitation in gateway communities, it was also recommended that the conceptual map be placed as an overlay to the tourist system. The feedback was intended to strengthen links of on-park impacts to the tourist generating system. The conceptual map was commended for utilising the same formulation as triple bottom-line approaches.

A caution was made about treating parks impacts as a uni-dimensional phenomena. A matrix where management regimes and visitation levels are specified was suggested (Figure 2).

![Figure 2: Management regimes and visitation levels matrix](image)

Obviously, the set of parks in each individual cell provide insight into various types of causal chains related to impacts, with those PA units with a weak management regime are hypothesised to experience more significant impacts. In addition, assessment of visitation levels at which impacts are observed or become significant is also a critical clarifying factor in understanding how to develop impact mitigation policy. Researchers also need to identify when a critical mass of high density, high impact visitation occurs.

All attendees stressed the need for links between any impact model and a large number of other tourism and PA models. It was thought that the field needs to move to a level of sophistication where we observe the influence of variables from one complex model on variables of another complex model. Rather than integrating a large number of models, participants stated a belief that the next advance in impact modelling was to link two complex models. The priority model was thought to be demand models addressing the nature of tourist flows. In essence, the idea proposed was to refine demand modelling as an antecedent to tourism impacts in the parks, rather than focusing on more complete articulation of the complete causal chain of direct and indirect PA impacts from tourism. To quote: ‘PAs suffer impacts because tourism is driven by price and volume factors.’ The project researchers were cautioned that these relationships were likely to be nonlinear. For example, early visitors to a nature-based locale are hypothesised to have the greatest impact and change potential, compared with incrementally more visitors after a pattern of use has already been established.

The gap between academics and practitioners was confirmed, with the notation the topics likely to be of interest to researchers was not equivalent to the toolkit approach that park agency staff were requesting. Selection of a standard approach used nationally was considered unrealistic because models had to be modified and adapted to meet unique local conditions. However, at most, attendees thought the effectiveness and utility of just two to three major impact tools should be demonstrated, based on demonstrated utility to date. Academics would be likely to dominate in the task of model assessment. Training and workshops would involve teaching agency staff about process, outcomes and available tools, as well as how to make data collection decisions. One individual contributed an impression that in contrast to a focus on impacts, parks staff training on how to collect ‘scorecard data’ to showcase the tradeoffs of tourism should instead be a priority. The emergence of an Extension function in Australia to take responsibility for such outreach tasks was considered a high priority. In the interim, the success of parks-university team created in other countries to undertake such research was highlighted.

The representative from New Zealand highlighted contributions of Lincoln University’s research program on tourism indicators, developed in partnership with other public organisations and the private sector. Case studies, both from park and non-park settings, are available on the web at www.lincoln.ac.nz showcasing activity and site-specific impact models related to, for example, recreational caving or secondary effects of tourism visitation on specific bird species. A Tourism Planning Toolkit is also available online. One of the key observations of the summary document is reported:

Watching an abundant colony of Titi (Mutton bird, Puffinus griseus) from well designed, purpose built facilities outside of breeding season would have little discernible impact on the bird population. In contrast, uncontrolled bird watching during the breeding season of the fragile Tora (Northern Royal Albatross, Diomedea epomophora sanfordi) may cause extensive disturbance and long term damage to the population. Similarly, tourist activities often result in unintentional ‘downstream’ impacts. An example, being the camper who increases the risk of fire or exotic species introduction which in turn disrupts local vegetation or wildlife.

Finally, those attending suggested working most closely with the Parks Forum in order to custom design a training and outreach process that meets agency needs.
Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

This study reviewed various models, frameworks, and processes for protected areas management in Australia. Australian agencies appear to be less familiar and use protected area management tools less than their North American counterparts. Some of the differences are likely accounted for by a much stronger federal role in protected areas in the U.S., and stronger historical links of American universities with land management agencies. However, the level of sophistication in PA model use worldwide is generally low, including in North America.

The academic panelists indicated many of the PA models and frameworks were developed for specific applications or agencies in response to legislative mandates or agency pressures. The most useful models would be flexible or adaptable to meet disparate needs and account for a variety of paradigms and values. No single PA model has gained ascendancy in theory or practice and the current situation could be accurately described as ‘pluralist’ and ‘fragmented’. In Australia, model integration or new model development would appear to be a lesser need than simply obtaining agency commitment to trial some of the existing models or frameworks for protected areas management. And yet, the lack of familiarity and perceived complexity of existing models and frameworks, combined with limited agency resources, suggest that increased adoption in Australia will not occur easily or soon. As indicated by our panelists, the benefits of model or framework adoption to agencies must be clear and compelling, but the degradation of resource quality and recreation experiences in many Australian protected areas may not have reached the critical pressure thresholds to warrant investment in the PA management processes.

An additional challenge to model adoption within Australia is the diversity of protected area designations, jurisdictions, and management authorities. Protected areas in Australia may be under the authority of various governments (national, state or territory, local), co-management arrangements, or private organisations with different protection schemes ranging from national parks to local council reserves. The approximately 77.5 million hectares of terrestrial protected areas (10% of land) and 64.6 million hectares of marine protected areas in Australia contain over 56 different terrestrial protected area designations and 17 different marine designations, representing all six IUCN terrestrial classifications and four out of six IUCN marine classifications (Worboys et al. 2005). The historical evolution of protected areas as state responsibilities with much later national involvement has resulted in a plethora of both state and commonwealth legislation, often with disparate protected areas terminology, if not purpose. One prime example of this is the absence of legislated national wilderness, although wilderness is a component of protected area planning in particular states (Buckley 2000).

Several important trends will likely influence future protected area models and frameworks:
1. Movement towards a systems view of protected areas with a focus on linkages.
2. The recognition and inclusion of indigenous perspectives in protected areas management.
3. More flexible protected area regulatory schemes to enfranchise local community interests.
4. Rapidly increasing emphasis on performance reporting and accountability for protected area agencies.

A systems view recognises the contribution of each protected area to the conservation of ecological and cultural assets in a larger system, in contrast to the historical, independent enclave perspective of parks and protected areas in Australia. In North America, the systems approach has taken the form of ‘ecosystem management’ as a potential unifying force in protected areas management. Arguably, as a systems view becomes the dominant paradigm, indicators of PA resource integrity and visitor experience will need to be broadened to include system-wide measures in addition to individual PA measures.

The recognition of the potential contribution of traditional land owners to protected areas management has been slow worldwide but is gaining momentum, particularly in Australia. The inclusion of Aboriginal and indigenous peoples around the world in protected areas management appears to be more than an act of political reconciliation - it is also pragmatic practice to harness the historically marginalised traditional ecological knowledge necessary to restore native flora and fauna. Australia’s significant contribution to park management models worldwide may be to offer insight and practical feedback about the integration of Aboriginal perspectives into land management.

Many of the PA models and frameworks contain a significant community involvement or consultation component. Arguably, the community consultation component of protected areas management in Australia has been less than exemplary. Protected areas in Australia receive protection as much from their relative isolation and Australia’s lower population as from the express consent of the people. If the Australian continent is to move closer to achieving broader conservation biology goals, it will require considerably more area than the 10% of land currently allocated to some form of protected status. Achieving protected status for linkage or ‘matrix’ lands between the current protected enclaves will require significant and meaningful community consultation because these are no longer ‘empty’ lands - they are currently being utilised for primary industries and to a lesser extent, human occupation. The increased adoption of PA models and frameworks in Australia would necessarily expand opportunities for community consultation but it would also require PA management agencies to embrace greater transparency in their operations and decision-making.
Australia’s image in the international tourism marketplace is anchored by iconic protected areas and associated wildlife, attractions that face expanded visitation. The International Visitor Survey’s finding that the strongest influence on the decision to visit Australia is ‘to experience Australia’s nature and wildlife’ (Commonwealth of Australia 2003) is not expected to shift. In fact, many states are adding to the destination mix through eco-, adventure and cultural tourism products based in a wider variety of parks and their peripheral areas as a strategy for capturing repeat visitation and keeping the Australian parks experience dynamic. Parks Victoria, for example, organises much of its’ planning around the demand-service provision gap. The competition with New Zealand for the nature-based market further spurs public policies and industry investments that seek to increase Australia’s competitive advantages in park-centred tourism. Likewise, domestic tourism patterns reflect the same trends towards increasing pressures on protected areas currently positioned as part of regional touristorcircuits or located near urban centres. Admittedly, many park units, due to remoteness or lack of distinctive features, are unlikely to ever receive significant visitation. But managers from the set of protected areas that see moderate or increasing visitation figures are likely to, with resource support, be receptive toward refinement of tools that offer expanded options for identification, control, mitigation and monitoring of tourism impacts. An ongoing link of tourism plans generated in gateway communities near the parks as input to parks planning processes is imperative as an ‘early warning system’ for projected visitation surges or shifts that would alter the status quo in wildlands participation.

Based on the results of this research and current trends in protected areas, we make the following recommendations for protected areas management in Australia:

Recommendation 1
There is Australian agency interest to trial existing models, especially ROS, LAC, and the carrying capacity concept, documenting their use and application, and evaluating their utility. It is clear that while agencies have interest in the models, more coordination and training is needed. To capitalise on this interest, we suggest the next logical step for Sustainable Tourism CRC would be to encourage a number of academic/agency partnerships to implement the models in a variety of protected areas to build a significant case history of the methods in Australia. An analysis and inventory of academic and agency capacities to engage in such trials would be the first step in identifying potential partnership opportunities.

The recommendation to trial different models in Australia to build a case history is based on several factors: (a) as this study concluded, there is no consensus best method for protected areas management, and even if there were, the state-based, decentralised nature of protected areas management in Australia would likely inhibit a top-down approach to implementation of any framework, model, or process, (b) the view that innovation in protected areas management will likely emerge as result of adoption and diffusion processes. Not all Australian PA agencies have the same level of expertise, resources, and external pressures. Some Australian PA agencies will likely emerge as innovators and early adopters of PA frameworks or processes if provided with the support to develop academic/agency partnerships on a trial basis. If the trials are successful, diffusion to other settings and agencies would be enhanced with the knowledge that the process works in Australia and is not just another import that is ill-suited to the particular demands of Australia. PA agencies in Australia (and worldwide) are generally conservative organisations that resist change. Arguably, the adoption of successfully trialled frameworks, models, or processes will be faster if the methods are perceived as Australian solutions.

Recommendation 2
Independent of developing a more extensive case study history, there would be considerable benefit to developing and implementing a national training initiative to achieve higher levels of agency awareness and familiarity with the various protected area models and frameworks. The extension and outreach model as practiced overseas appears to offer some insight into long-term capacity building strategies. The U.S. Cooperative Extension Service, National Park Service Cooperative Park Studies units, and the Forest Service network of Research and Experiment Stations, in particular, offer some lessons.

Precursors to implementation of a training agenda might be to convene a conclave of agency-academic representatives, and for Australian universities to host leading international researchers working on PA impact management models.

In the first instance, a multi-day conclave would serve to assemble relevant parties and discuss issues of interest such as gaps and overlap in current practices, training logistics, and dissemination of the latest research. The word ‘conclave’ is specifically chosen to emphasise the solution-driven participatory process, rather than a series of expert speakers. The conclave would also be distinctive in addressing opportunities associated with the full set of PA impact tools, rather than the isolated approach (e.g. state-of-the art of LAC alone) that is the norm. TAPAF plays a potential leadership role on this initiative.

The reality is that much of the cutting-edge thinking on PA impact management models is coming from overseas where there is ongoing federal level investment and policy consolidation, as well as a stronger tradition of University-agency partnerships. To avoid retracing the steps this research has taken and to build on relevant initiatives rather than setting out in a distinctly independent direction, it is imperative to bring some of the human expertise directly to the Australian setting. One outcome of the Delphi contacts was a repeated theme of the eagerness of some top-tier
professionals to establish an on-site link with Australian academic colleagues and relevant agencies. These offers should not be bypassed or delayed.

It is proposed that national training opportunities be offered in several Australian states at least twice per year. Initially, in order to capture more participants, such workshops could be run in conjunction with existing training workshops focusing on high priority issues such as risk management. It is imperative that the workshops be developed to showcase the strategic use of a variety of management tools to address real problems. The sessions should be highly interactive and practical, with managers working in groups on relevant scenarios and learning from each other. Where possible field trips to sites where management tools have been applied successfully should be incorporated into the workshops and managers should be encouraged to play a lead role in discussing the use, benefits and pitfalls of the approach they applied. Workshops could also provide a forum for discussing the limitations of some tools that might be commonly considered outdated or superseded in academia but are still being used in Protected Areas, and vice versa to educate academics on why practitioners might perceive these tools as more useful than alternatives. Leading international researchers already involved in extension work on the topic of protected area management tools should be encouraged to take part in the design of such workshops and where possible in conducting the workshops.

In addition to formal workshops, it is proposed a website on PA management tools be developed and a CD of materials be provided to each workshop participant. The CD could contain extensive information on key management tools. This could include standardised text, diagrams, pictures, and video clips of managers discussing the application and researchers critiquing the benefits and future directions. The CD could also include a series of worksheets, similar to those used by Lime et al. (2004) and Anderson et al. (1998) in their handbooks for recreation resource managers. Such worksheets guide managers through key steps such as articulating the problem and its cause; identifying relevant strategies and management tactics; and implementing the selected management approach. If such worksheets were developed using an interactive media, such as a CD, it would be possible to click on various sources for help. For example, you could ask another manager for advice on writing objectives, or go to a virtual filing cabinet to look at the specifics of other parks that had similar problems and used the management tool you are interested in. It is proposed that the more detailed and complex information, including most graphics and video clips be incorporated on a CD to be given to workshop participants, who would also receive a demonstration of its use.

Simple information that requires regular updating would be incorporated on a website that all people could access. The website should include a discussion site where managers, academics, or university students could engage in consultation with other interested people. Such a system would allow for the fact that many protected area managers in Australia work in isolated locations where there are few people to discuss issues with, and where the ability to download interactive components from an internet site may be poor.

**Recommendation 3**

There appears to be little agency interest in developing new protected area models and frameworks in Australia, especially since the agencies lack the resources to implement them. However, it would be desirable to standardise some of the existing PA management processes in Australia under a common framework and nomenclature. A more in-depth review of agency procedures across the states and territories could lead to suggestions for standardisation across agencies. An important benefit to standardisation would be the ability of agency employees to transfer knowledge between agencies through increased mobility. The conclave proposed above could also serve as starting point to address the potential and hazards of standardisation.

Responses from industry Delphi participants provide some indications regarding commonly used tools and issues of standardisation. For example, most agencies are using some type of ROS or zoning system. However, because each organised has modified the number of classes or dimensions within the classes, there is a lack of comparability between states. The system has certainly been applied in many different ecosystems worldwide by a variety of different agencies, so it seems some type of standardised system could be applied to all protected areas in Australia. Level of Service approaches also seemed to be popular among states. Other commonly mentioned tools included economic modelling, LAC, carrying capacity and adaptive management. Several panellists referred to ‘ad-hoc’ approaches, ‘lack of distinction between tools’ and lack of discussion between academics and practitioners, and between agency practitioners. It would seem logical then that any further discussion or training limits the number of approaches discussed and focuses on better defining and standardising those tools commonly used in Australia. For example, when people refer to ‘manage adaptively’ are they actually talking about adaptive management, or merely modifying strategies that weren’t successful in meeting objectives, a common step in a number of processes? In retrospect it would seem wiser to group similar tools together for the purpose of further discussion or training and refer to them by more generic titles. For example LAC, VIM and VERP could be referred to as ‘indicator-based approaches’.

**Recommendation 4**

Linkages with Aboriginal approaches to land management emerged as an Australian agency priority, while at the same time the international academic panel cited the integration of indigenous and cross-cultural approaches as one of weaknesses in the current set of tools available. It appears Australia has more experience with, on-the-ground transitions to, and trials of Aboriginal involvement in park management, so that a greater understanding of traditional
approaches to environmental impact in parks potentially offers a significant contribution to this topic area. Although extremely difficult, this topic is proposed as a priority research area in the next project phases.

Most research in the area of Indigenous management of Protected Areas has focused on the strengths and challenges of cooperative management. There has also been some research on the social impacts on Aboriginal communities following cooperative management arrangements. However, there is a need to examine the issue of culturally sensitive management of environmental impacts and to gather feedback from Aboriginal stakeholders regarding the appropriateness of incorporating traditional knowledge and respect of Aboriginal culture into key visitor impact management tools.

**Recommendation 5**

The next phases of this project need recurrent and formal linkages with CRC projects on both destination impacts (Destination Theme), and establishment of indicators. Although integration of environmental, socio-cultural and economic impacts was described as unlikely to occur in the near-term, there is still a need for a systems perspective. Projected tourism growth at the community level as it translates to increased park visits is perhaps a more over-riding concern. Likewise, the feedback loop between indicator performance and planning/management shifts needs be strengthened.
## APPENDIX A: MATRIX OF SELECTED PROTECTED AREA MODELS, FRAMEWORKS, CONCEPTS AND PROCESSES.

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<th>NAME</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
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<tr>
<td><strong>Recreation Tools</strong></td>
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<tr>
<td>Satisfaction approach</td>
<td>Can reveal important information on people’s preferences for public goods. Captures indirect effects of externalities on individuals’ utility, even if no direct effects.</td>
<td>Research shows visitor density &amp; satisfaction are not related or of limited relationship, thus this approach has weaknesses.</td>
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<td>Application Scale: N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recreation Opportunity Spectrum (ROS)</strong></td>
<td>Practical process that forces managers to consider a range of recreation opportunities for the public. Clear divisions within classes based on environmental, social and managerial conditions.</td>
<td>Difficulties in integrating all dimensions. Doesn’t consider demand information (user expectations, needs &amp; satisfaction). Criteria may be perceived differently by managers and visitors.</td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Regional</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Limits of Acceptable Change (LAC)</strong></td>
<td>Based on defined limits of acceptable change for each opportunity class, with indicators for monitoring ecological &amp; social conditions. Impacts need to be managed when standards breached.</td>
<td>Focus on issues &amp; concerns may result in lack of strategic &amp; tactical direction on management topics where there are no current issues or concerns.</td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Specific Area - Case Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Visitor Impact Management (VIM)</strong></td>
<td>Good balance of scientific &amp; judgmental issues. Stresses need to understand causal factors when identifying management strategies. Handles time &amp; space variations.</td>
<td>Could make use of ROS but doesn’t. Written to address current conditions of impact, rather than to assess potential impacts.</td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Visitor Activity Management Process (VAMP)</strong></td>
<td>Decision-making process based on a hierarchy. Benefits from structured thinking needed to analyse opportunity &amp; impact. Combines social sciences and marketing principles to focus on visitor opps.</td>
<td>Well developed at service planning level, but not effective at management planning level (‘opportunities for experience’ definition has not been built into management plans or into the zoning).</td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Visitor Experience Resource Protection (VERP)</strong></td>
<td>Resource analysis guided by statements of sig. &amp; sensitivity. Visitor opportunity analysis guided by statements defining important elements of visitor experience. Management focuses on zoning.</td>
<td>Requires further testing in different environments. ‘Experience’ not defined &amp; indicators absent beyond examples for Arches N.P. Will &amp; ability to monitor sufficiently to provide data to guide actions must be tested.</td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification: Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applic. Scale: Regional</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RBSIM &amp; related simulation models</strong></td>
<td>Allows park managers to explore policy alternatives via software program. Excellent for modelling recreation encounters &amp; conflicts. Simple to use.</td>
<td>Types of simulations that can be built are constrained. If a unique situation arises, may require software developer to make custom extensions to the software for the specific application.</td>
</tr>
<tr>
<td>Classification: Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application Scale: Site &amp; Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meanings based approaches</strong></td>
<td>Provides insights into how people value an area. Can identify developing concerns which can be researched quantitatively. Lowers generalisations &amp; provides better levels of validity to gathered data.</td>
<td>Type of knowledge not widely accepted. Some feel it is of minimal value, and prefer prescriptive and predictive information.</td>
</tr>
<tr>
<td>Classification: Concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application Scale: N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Natural Resource Management Tools

<table>
<thead>
<tr>
<th>Name</th>
<th>Classification</th>
<th>Application Scale</th>
<th>Description</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Management</td>
<td>Concept</td>
<td>Park/ Resource Unit</td>
<td>Allows managers to proceed responsibly in the face of uncertainty. Provides systematic rigorous approach to learning from outcomes of management actions, applying change and improving management.</td>
<td>Unclear, inconsistent definition of adaptive management &amp; how it should be implemented. Can encourage poor planning policies and potentially lead to decreased funding for strategic research, costly mistakes &amp; dubious data.</td>
</tr>
<tr>
<td>Social Impact Assessment</td>
<td>Framework</td>
<td>All Levels</td>
<td>Provides systematic and recognised approach for assessing potential impacts to individuals and communities. Forces managers to consider vast range of stakeholders.</td>
<td>Social impacts are very complex, variable, &amp; differ by cultural, ethnic, &amp; other social characteristics of the affected populations. Impacts are difficult to assess &amp; secondary impacts, may be difficult to identify.</td>
</tr>
<tr>
<td>Human Ecosystem Model/Framework</td>
<td>Framework/Model</td>
<td>All</td>
<td>A systems based approach that can be used as a basis for monitoring social impacts directly tied into the activities of natural resource agencies.</td>
<td>Complexity of integrating natural &amp; human ecosystems. Dependent upon accessible secondary data. Selection of indicators that can be measured accurately is difficult &amp; value laden.</td>
</tr>
<tr>
<td>Tourism Futures Simulator</td>
<td>Framework/Model</td>
<td>Regional</td>
<td>Treats tourism as a system; includes positive &amp; negative feedbacks; helps engage industry in learning systems view of their industry; can deal with time delay; enables scenarios to be quantitatively evaluated &amp; compared; links directly to monitoring activities.</td>
<td>Time required to build a model; over-emphasis of industry in model development; &amp; tendency to believe the model results as predictions rather than scenarios; ability of industry to use the model; and requirement of an academic partner to update &amp; manage the model.</td>
</tr>
<tr>
<td>Carrying Capacity - &amp; other related habitat models</td>
<td>Concept</td>
<td>All Levels</td>
<td>Simplicity. Reduces need for complete impact analysis in decision making. Assists managers to think in a structured way about heritage use problems &amp; use as a community awareness &amp; education tool.</td>
<td>Assumes that community values &amp; preferences have been predetermined &amp; clearly enunciated &amp; that they are unlikely to change over time. Quantifies subjective data. Assumes direct relationship between use and impact.</td>
</tr>
<tr>
<td>Ecological Economics</td>
<td>Concept</td>
<td>Regional</td>
<td>Has potential for shifting environmental policy outcomes based on full-cost accounting principles.</td>
<td>Has not gained ascendancy as dominant economic paradigm for private &amp; governmental choice.</td>
</tr>
<tr>
<td>Revealed Preference Techniques (eg. Travel Cost Method TCM)</td>
<td>Technique</td>
<td>All Levels</td>
<td>Based on actual market behaviour - what people actually do - rather than stated willingness to pay. Relatively inexpensive to apply; results easy to interpret &amp; explain.</td>
<td>Can’t be used to predict future impacts. TCM only applicable if consumption of the public good entails costs. Time is critical to the evaluation but hard to observe.</td>
</tr>
<tr>
<td>Stated Preference Techniques (eg. CVM, Choice Mod, IMPLAN)</td>
<td>Technique</td>
<td>Park or Site</td>
<td>Statistically strong due to the limited number of assumptions. Can be used to measure non-use values and predict impact of future changes. Individuals are not asked to value the public good directly.</td>
<td>The complexity involved in developing, implementing, &amp; interpreting results Hypothetical bias can be an issue (e.g. With CVM). Results for willingness to pay often depend on its position in the survey sequence.</td>
</tr>
<tr>
<td>Caring for Country</td>
<td>Philosophy or Lifeway</td>
<td>Local</td>
<td>Knowledge developed over years of learning; ecological, social &amp; spiritual relationship of care.</td>
<td>Relies on local knowledge, which can’t be generalised. Can be difficult for non-indigenous people to understand/adopt and integrate with ‘Western’ frameworks or models.</td>
</tr>
</tbody>
</table>
APPENDIX B: GUIDELINES FOR SELECTING AN APPROPRIATE MANAGEMENT TOOL

<table>
<thead>
<tr>
<th>Primary Issue of Concern</th>
<th>Level 1 Decision Factors</th>
<th>Level 2 Decision Factors</th>
<th>Appropriate Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern over environmental impact caused by visitor use (e.g. trail widening, vegetation impact)</td>
<td>Requires zoning / ROS information</td>
<td>Zones are resource related and not determined by existing facilities. Quality of resource and quality of visitor opportunities are drivers. Suitable for all ROS classes</td>
<td>VERP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Particularly interested in existing impacts in a wilderness setting.</td>
<td>LAC</td>
</tr>
<tr>
<td>Does not require zoning / ROS information</td>
<td>Interested in current impacts rather than potential impact; emphasis understanding causal factors.</td>
<td>VIM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Particularly interested in applying marketing principles to focus on visitor opportunities.</td>
<td>VAMP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Particularly interested in understanding key benefits and impacts of current tourism operations and assessing emerging issues and future options.</td>
<td>TOMM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Particularly interested in potential environmental impacts following a change in environmental conditions</td>
<td>Ecological Models</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change needs to be made but currently insufficient data or finances to implement other options</td>
<td>Adaptive Management</td>
<td></td>
</tr>
<tr>
<td>Concern over social impacts caused by visitor use (e.g. perceived crowding, community anger)</td>
<td>Interest focused solely on social impacts</td>
<td>Concern focused on potential impacts to quality of life of individuals and/or communities. Key interest primary, rather than secondary impacts.</td>
<td>Social Impact Assessment</td>
</tr>
<tr>
<td></td>
<td>Interested in both social and environmental impacts</td>
<td>See above section for criteria to differentiate methods</td>
<td>LAC, VIM, VAMP, VERP, TOMM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concern focused on traditional Aboriginal use of area, integrating TEK, and improving conditions for current Aboriginal stakeholders.</td>
<td>Indigenous Framework (e.g. Caring for Country)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interest in viewing social impacts in an ecosystem framework. Requires availability of both primary and secondary information regarding impacts.</td>
<td>Human Ecosystem Framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change needs to be made but currently insufficient data or finances to implement other options</td>
<td>Adaptive Management</td>
</tr>
<tr>
<td>Providing diversity of recreation opportunities</td>
<td>Interested in regional or park specific recreation opportunities</td>
<td>Have established visitors and managers perceive environmental, social and managerial conditions similarly.</td>
<td>Recreation opportunity spectrum</td>
</tr>
<tr>
<td>Interest in visitor satisfaction and how visitors value parks</td>
<td>Concern primarily satisfaction (e.g. with facilities, management)</td>
<td>Concern regarding satisfaction not related to visitor density.</td>
<td>Satisfaction Approach</td>
</tr>
<tr>
<td>Interest extends beyond satisfaction measures</td>
<td>Focus on underlying values (e.g. sense of place)</td>
<td>Meanings-based Approach</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>Focus on benefits of experience (e.g. health, community, economic)</td>
<td>Benefits-based Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interested in economic issues</td>
<td>Interest in current economic value</td>
<td>Availability of software and human resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Revealed Preference Technique (e.g. Travel Cost Method). Stated Preference Techniques such as CVM</td>
<td></td>
</tr>
<tr>
<td>Interested in economic impact of future changes</td>
<td>Availability of software and human resources</td>
<td>Stated Preference Technique (e.g. CVM Choice Modelling; IMPLAN. Combined SP/RP methods)</td>
<td></td>
</tr>
<tr>
<td>Interested in understanding how economic, social and environmental systems impact on each other</td>
<td>Want to take a policy oriented perspective</td>
<td>Ecological Economic Model</td>
<td></td>
</tr>
<tr>
<td>Interested in predicting likely effects of a particular change on tourism behaviour</td>
<td>Interested in consequences to visitation following a common or specific change</td>
<td>Requires software availability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RBSim</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If expertise not available, may require partnership with academic institute</td>
<td>Choice Modelling (or other stated preference technique)</td>
<td></td>
</tr>
<tr>
<td>Interested in a systems view of tourism</td>
<td>Interest/Availability of industry and academic partners</td>
<td>Tourism Futures Simulator</td>
<td></td>
</tr>
</tbody>
</table>

Note: Time and available finances and current agency expertise are assumed to also be major factors in the decision-making process. While we have attempted to define guidelines for using particular tools, the actual decision is multi-faceted and often driven by agency requirements, tradition and individual preference.
APPENDIX C: ACADEMIC DELPHI PARTICIPANTS

**Dr Dorothy Anderson**
Dr Anderson is a Professor of Recreation Resources Management at the University of Minnesota, St. Paul, Minnesota.

**Dr William (Bill) Borrie**
Dr Borrie is Associate Professor of Park and Recreation Management at the University of Montana, Missoula, Montana.

**Dr Bill Carter**
Dr Carter is a Senior Lecturer in Environmental Tourism at the University of Queensland, Brisbane, Queensland.

**Dr John Hunt**
Dr Hunt is Emeritus Professor and former Head of University of Idaho’s Department of Resource Recreation, Moscow, Idaho.

**Dr Steve McCool**
Dr McCool is Professor of Wildland Recreation Management at the University of Montana, Missoula, Montana.

**Dr Robert (Bob) Manning**
Dr Manning is Professor and Chair of the Recreation Management Program at the University of Vermont, Burlington, Vermont.

**Dr Alan Watson**
Dr Watson is a Research Social Scientist with the Aldo Leopold Research Institute in Missoula, Montana.

**Dr Stephen Wearing**
Dr Wearing is Associate Professor of Leisure and Tourism Studies at the University of Technology Sydney, Sydney, New South Wales.
## APPENDIX D: MATRIX OF SELECTED PA MODELS, FRAMEWORKS, CONCEPTS, AND PROCESSES PROVIDED TO DELPHI PARTICIPANTS

### Recreation

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Satisfaction approach / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Developed by R.B Alldredge (1973)</td>
</tr>
<tr>
<td>Definition</td>
<td>The satisfaction approach is based on the economic model of marginal utility input – output. That is, the model is based on the assumed inverse relationship between use density and visitor satisfaction, i.e., increasing numbers of users would result in diminishing satisfaction for each individual user.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>N/A</td>
</tr>
<tr>
<td>Strengths</td>
<td>Not based on observed behaviour. It is able to reveal important information on people’s preferences for public goods. The life satisfaction approach captures indirect effects of externalities on individuals’ utility through effects on health and the like, even if there are no direct effects.</td>
</tr>
<tr>
<td>Limits</td>
<td>Research has shown that the relationship between visitor density and satisfaction are not related or of limited relationship, therefore this approach has its weaknesses.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>N/A</td>
</tr>
<tr>
<td>Output Variables</td>
<td>Valuation of public goods. Measure of satisfaction with public goods.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Recreation Opportunity Spectrum (ROS) / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Developed by researchers for U.S. Forest Service (Clark &amp; Stankey 1979; Driver et al. 1987)</td>
</tr>
<tr>
<td>Definition</td>
<td>ROS was developed to identify and determine the diversity of recreation opportunities for a natural area, based on the idea that the quality of the visitors’ experience is best assured by providing diversity and helping visitors to find the settings providing the experiences they are seeking. Incorporated into LAC system and can be used with VIM.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Regional</td>
</tr>
<tr>
<td>Strengths</td>
<td>It is a practical process with principles that force managers to rationalise management from 3 perspectives; and to protect resources, opportunities for public use and the organisations ability to meet present conditions. It links supply with demand and can be readily integrated with other processes. Ensures range of recreation opportunities can be provided to the public.</td>
</tr>
<tr>
<td>Limits</td>
<td>Its setting and their criteria must be accepted in total by managers before any options or decisions can be made. ROS maps need to be related to the physical and biophysical characteristics of each area. Difficulties in integrating all dimensions. No consideration of lack of demand information (e.g. user expectations, needs and satisfaction)</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Access, remoteness, visual characteristics, site management, visitor management, social encounters, visitor impacts</td>
</tr>
<tr>
<td>Output Variables</td>
<td>The end product is a definition of the opportunity for experience expected in each setting, the indicators of the experience, and the parameters and the guidelines for management.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Limits of Acceptable Change (LAC) / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Developed by researchers for U.S. Forest Service (Stankey et al. 1985)</td>
</tr>
<tr>
<td>Definition</td>
<td>The process identifies appropriate and acceptable resources and social conditions and the actions needed to protect or achieve those conditions. Its premise is suggests that change is an inevitable consequence of resource use and that a framework is required to tackle resource management problems from the perspective of the extent to which change is acceptable. Based on concepts of ROS and a means of analysis and synthesis.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Specific Area - Case Study</td>
</tr>
<tr>
<td>Strengths</td>
<td>It is a tactical plan for the area based on defined limits of acceptable change for each opportunity class, with indicators of change that can be used to monitor ecological and social conditions. Management need only intervene and address impacts when the LAC identified the need; that is when acceptable standards are breached.</td>
</tr>
<tr>
<td>Limits</td>
<td>Although the process recognises fundamental values and goals, it focuses on issues and concerns that guide subsequent data collection and analysis. Strategic and tactical direction may not be provided on management topics where there are no current issues or concerns.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Resource: trail conditions, campsite conditions, water quality, air quality, wildlife population, range condition and threatened/endangered species. Social: Solitude while travelling, campsite solitude, conflicts between visitors, conflicting travel methods, conflicts with party size, noise.</td>
</tr>
<tr>
<td>Output Variables</td>
<td>Standards describe acceptable and appropriate conditions for each indicator in each opportunity class</td>
</tr>
<tr>
<td>Name / Class</td>
<td>Visitor Impact Management (VIM) / Framework</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Source</td>
<td>Developed by researchers for National Parks and Conservation Association (Graefe et al. 1990)</td>
</tr>
<tr>
<td>Definition</td>
<td>Similar to LAC Developed as an alternative to carrying capacity; however, it is intended to be simpler, narrowing the focus to visitor impacts rather than broader concerns with opportunity classes. Its purpose is developing strategies to keep visitor impacts within acceptable levels.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Park</td>
</tr>
<tr>
<td>Strengths</td>
<td>Process provides for a balanced use of scientific and judgmental considerations. It places heavy emphasis on understanding causal factors to identify management strategies. It not only covers the two critical dimensions of the state of the resource and the quality of the visitor experience, but it is flexible enough to handle variations over time and space.</td>
</tr>
<tr>
<td>Limits</td>
<td>The process does not make use of ROS, although it could. It is written to address current conditions of impact, rather than to assess potential impacts.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Physical Impacts (seven indicators); Biological Impacts (nine indicators); Social Impacts (six indicators)</td>
</tr>
<tr>
<td>Output Variables</td>
<td>The process addresses three basic issues; problem conditions, potential causal factors and potential management strategies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Visitor Activity Management Process (VAMP) / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Created by Parks Canada, Incorporates principles of ROS. The framework will benefit from and can easily incorporate the principles of LAC, VIM &amp; VERP.</td>
</tr>
<tr>
<td>Definition</td>
<td>VAMP is one element of a broader, integrated planning and management process. It is part of a whole-of-park approach to management. Other parts include a national park management planning process and a natural resources management process. VAMP employs an overt marketing approach to integrate visitors’ requirements with the resource opportunities provided by a given area. It also provides a flexible framework for integrating social and natural science data, therefore seeing ecological data and social science data as compatible.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Park</td>
</tr>
<tr>
<td>Strengths</td>
<td>Comprehensive decision-making process based on a hierarchy. It benefits from the structured thinking required to analyse both opportunity and impact. It combines social sciences principles with those of marketing to focus on visitor opportunities.</td>
</tr>
<tr>
<td>Limits</td>
<td>Although well developed at the service planning level, VAMP does not yet have the clout it should have at the management planning level, mainly because the 'opportunities for experience' definition has not been built into management plans or into the zoning.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Visitor activity profiles; stakeholder profiles; interpretation theme presentation; resource values, constraints and sensitivities; existing legislation, policy, management direction, plans; current offer of services and facilities at all stages of trip cycle; regional activity/ service offer; satisfaction with service offer.</td>
</tr>
<tr>
<td>Output Variables</td>
<td>Management plan decisions relate to the selection and creation of opportunities for visitors to experience the park’s heritage settings through appropriate educational and recreational activities. Decisions about managing and delivering support services for each activity are reflected in the service plan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Visitor Experience Resource Protection (VERP) / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Created by the U.S National Parks Service as a means of addressing carrying capacity concerns in their national parks. It is an amalgamation of general management planning, VIM and LAC.</td>
</tr>
<tr>
<td>Definition</td>
<td>Integral to this process is determining the appropriate range of visitor experiences for a chosen area. Zoning is a focus. An important premise underlying VERP is that zoning should be resource related &amp; not determined by the location of existing facilities. Process deals with carrying capacity in terms of the quality of the resources &amp; the quality of the visitor exp.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Park</td>
</tr>
<tr>
<td>Strengths</td>
<td>It guides resource analysis through the use of statements of significance and sensitivity, and visitor opportunity analysis is guided by statements defining important elements of the visitor experience. Zoning is the focus for management.</td>
</tr>
<tr>
<td>Limits</td>
<td>More work is required test approach in different environs. ‘Experience not defined, indicators absent beyond Arches NP example. Will &amp; ability to monitor sufficiently to provide data to guide actions must be tested.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Park purpose statements, statements of park significance, primary interpretation themes, resource values, constraints and sensitivities, visitor experience opportunities, resource attributes for visitor use and management zones.</td>
</tr>
<tr>
<td>Output Variables</td>
<td>It contains a prescription for desired future resources and social conditions, defining what levels of use are appropriate, where, when and why.</td>
</tr>
</tbody>
</table>
### Tourism Optimisation Management Model (TOMM) / Framework

**Source**
Developed in the 1990s by the Sydney-based consulting firm Mandis Roberts, to be applied to Kangaroo Island. It was developed specifically for tourism planning in natural areas and based on LAC.

**Definition**
TOMM’s objectives are – monitor and quantify the key benefits and impacts of tourism activity and assist in assessing emerging issues and alternative future options for sustainable tourism.

**Application Scale**
Regional

**Strengths**
The inclusion of the political and economic environments in which use of natural areas occurs and of stakeholders throughout planning.

**Limits**
The amount of information needed, given that it covers a breadth of tenures across a region as well as including market, economic and socio-cultural as well as biophysical information. Data management and manipulation require a significant level of resources. Locating and working with stakeholders across large areas and a complexity of issues is also resource-intensive. It is only an indicative view of tourism, so additional research may be required to qualify serious variations from the acceptable ranges.

**Input Variables**
- Economic (financial contribution to tourism activity),
- Market opportunities (key characteristics of the market and marketing activity),
- Experiential (the core visitor experience trying to be provided),
- Socio/economic (the quality of life of the local residents and indigenous people with a connection to the area) and,
- Environmental (the biophysical environment, from biodiversity to energy consumption)

**Output Variables**
Monitor and quantify the key benefits and impacts of tourism activity and assist in assessing emerging issues and alternative future options for sustainable tourism.

### RBSIM and related visitor simulation models e.g. extend & steady state simulation / Model

**Source**
Developed by Digital Land Systems Research in Melbourne in 1997 with Randy Gimblett, first used in Broken Arrow Canyon, Arizona.

**Definition**
RBSim is a computer program that simulates the behaviour of human recreators in high use natural environments. It is a computer model that allows exploration of the consequences of change to any one or more variable. It has a qualitative approach where it understands management scenarios using map graphics from GIS, and quantitative by understanding management consequences by generating user statistics during simulation.

**Application Scale**
Site & Park

**Strengths**
Explores alternatives by experimenting with different policy options. Excellent method for modelling recreation encounters and conflicts. Identifies locations where conflicts may occur. They are generally simpler to use and have high level tools for automating many of the steps required to build simulations.

**Limits**
They constrain the type of simulations that can be built and if a unique situation arises, the simulator may not support the functions required, or the developer of the software will have to make custom extensions to the software for the specific application.

**Input Variables**
The model predicts the behaviours of parks and wilderness visitors.
- Number of visitors.
- Number and kinds of vehicles.
- Facilities such as number of parking spaces.
- Road and trail width.
- Total capacity of facilities.

**Output Variables**
Identifies crowding issues, bottle necks and conflicts between user groups in environmental.

### Meaning Based Approach / Concept

**Source**
Developed by various researchers, including Mike Patterson, Alan Watson, Dan Williams and Joe Roggenbuck (1998).

**Definition**
Arnould and Price (1993) explain that this approach attempts to understand the wilderness experience in terms of the role that it plays in the broader context of the participant’s life. Borrie and Birzell (2001) suggest that what people are actually seeking from their recreation experience are stories which ultimately enrich their lives, i.e. satisfaction is not the result of positive comparison between desired and actual outcomes nor the actual multidimensional, multiphasic experience, but rather the extent to which the experience produced a fulfilling narrative that is consistent within the context of the participants life.

**Application Scale**
N/A

**Strengths**
Gives some knowledge of peoples wilderness and recreation values, giving meaning to experiences. Can identify developing concerns which can be researched quantitatively. Lowers generalisation & provides better levels of validity to gathered information.

**Limits**
Type of knowledge not widely accepted and of minimal value, prescriptive and predictive is considered best.

**Input Variables**
N/A

**Output Variables**
N/A
Natural Resource Management

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Adaptive Management / Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Developed in the early 1970s by C.S. Holling and co workers at University of British Columbia, and the International Institute for Applied Systems Analysis.</td>
</tr>
<tr>
<td>Definition</td>
<td>Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programmes. Its most effective from - 'active adaptive management' - employs management programmes that are designed to experimentally compare selected policies and practices, by evaluating alternative hypotheses about the system being managed.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Park / Resource Unit</td>
</tr>
<tr>
<td>Strengths</td>
<td>Adaptive management is a way for managers to proceed responsibly in the face of uncertainty. It is an alternative to either 'charging ahead blindly' or 'being paralysed by indecision'. It is therefore a formal systematic rigorous approach to learning from the outcomes of management actions, accommodating change and improving management.</td>
</tr>
<tr>
<td>Limits</td>
<td>Additional costs (for model development, layout, monitoring), designing powerful experiments, reluctance to experiment with high value, threatened ecosystems, maintaining continuity if funding, support, staff over the long term, logistics of collecting, storing, analysing data so that it is accessible over the long-term, regulatory and institutional inflexibility, pressure to alter plans or poor understanding of how to implement plans, fear of admitting uncertainty, making mistakes, trying new solutions, unclear, inconsistent definition of adaptive management and how it should be carried out. Can encourage poor planning policies.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>N/A</td>
</tr>
<tr>
<td>Output Variables</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Social

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Social Impact Assessment / Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Developed by many people over an extended period.</td>
</tr>
<tr>
<td>Definition</td>
<td>Systematic appraisal of the impacts on the day-to-day quality of life of persons and communities when the environment is affected by development or a policy change (Burdge 1994, p. 41). SIA is analysing, monitoring and managing the social consequences of development. (International Association for Impact Assessment)</td>
</tr>
<tr>
<td>Application Scale</td>
<td>All Levels</td>
</tr>
</tbody>
</table>
| Strengths    | • reduced impact on people.  
• enhanced benefits for those affected.  
• avoiding delays and obstruction.  
• lowering costs by timely actions.  
• better community and stakeholder relationships.  
• improved future proposals. Social impact assessment looks at impacts to lifestyle cultural, community amenity/quality of life, and health. |
| Limits       | Social impacts are very complex, variable, and differ by cultural, ethnic, and other social characteristics of the affected populations. Impacts are difficult to assess and secondary impacts, which can be significant, may be difficult to identify. |
| Input Variables | Public involvement to gather data generally through surveys and public meetings. |
| Output Variables | Population impacts; Community/institutional arrangements; Conflicts between local residents and newcomers; Individual and family level impacts; Community infrastructure needs (Burdge 1994, p.53) |

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Human Ecosystem / Model/Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Machlis, Force and Burch (1997)</td>
</tr>
<tr>
<td>Definition</td>
<td>The Human Ecosystem; as an organising concept in ecosystem management. The model can be employed as an organising framework for social impact assessment associated with ecosystem plans. It allows managers to assess the full range of possible impacts. For example, changes in land use (such as a shift from timbering to recreation) may impact a full range of social institutions in ways that ecosystem managers and citizens need to anticipate. The model could serve as an introduction to the human ecological sciences for current and future ecosystem managers.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>All Levels</td>
</tr>
<tr>
<td>Strengths</td>
<td>Could serve as a guide for the development of social indicators for ecosystem management. An extension of the application, is the use of the human ecosystem model as a basis for monitoring other programs directly tied into the activities of natural resource agencies. By collecting and learning from the data related to the model’s variables, management alternatives that meet local needs for sustenance and long-term requirements for sustainability may be devised</td>
</tr>
</tbody>
</table>
### Limits
Complexity of integrating natural and human ecosystems; dependent upon accessible secondary information; potential instability of measurement criteria. Selection of indicators value-laden. Choice of relevant indicator to be measured accurate difficult. Several indicators may be plausible candidates to monitor a specific socioeconomic characteristic.

### Input Variables
1. Critical resources (air, energy, flora, fauna, materials, nutrients, land, water).
2. Socio-economic Resources
3. Cultural Resources
   - Social system (e.g., social institutions, health, justice, faith, commerce, education, leisure, government sustenance, family, physiological cycles, institutional cycles, etc., cycles)
4. Social order (identify, social norms, hierarchy, wealth, knowledge)

### Output Variables
Provides framework for social impact assessments (SIAs) associated with ecosystem management plans. Can guide development of social indicators for ecosystem management. Can provide basis for monitoring other natural resource programs, serve as an introduction to the human ecological sciences for current and future ecosystem managers from a variety of disciplines.

### Environmental

<table>
<thead>
<tr>
<th>Name / Class</th>
<th>Carrying Capacity - and other related habitat models / Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Various sources - adapted from biological sciences</td>
</tr>
<tr>
<td>Definition</td>
<td>Maximum level of use an area can sustain as determined by natural factors. In the early 1960s the concept was applied to recreation, management, particularly wilderness. Management hope to be able to determine a visitor carrying capacity below which the natural environment could be sustained. Habitat models are specific biological models that relate to environmental variables to specific species ecology.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>All Levels</td>
</tr>
<tr>
<td>Strengths</td>
<td>Its apparent simplicity. Use as a best guess as to when some basic management decisions must be made without the benefit of a complete impact analysis. Use as a yardstick for regulations based on resource use controls and performance standards. Assistance in helping managers to think in a structured way about heritage use problems and use as a community awareness and education tool.</td>
</tr>
<tr>
<td>Limits</td>
<td>Is often determined before strategic objectives for planning are considered. Application of the concept assumes that community values and preferences have been predetermined and clearly enunciated and that they are unlikely to change over time. It requires a technical solution to a subjective question. Use levels only play a minor role in creating impact. One dimension of...</td>
</tr>
</tbody>
</table>
carrying capacity may not coincide with another. It may position management on an over-emphasis on constraints to use.

<table>
<thead>
<tr>
<th>Input Variables</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Variables</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Name / Class | Ecological Economics / Concept
---|------------------
**Source** | Developed by Costanza and Daly (1987a, 1987b)
**Definition** | EE is a policy-orientated perspective that addresses the interdependence and the coevolution between human economics and their natural ecosystems. EE is positive, in its development of understanding of the physical, biological and social structural and functional relations between economies and natural ecosystems. EE is also normative in addressing appropriate roles of human economies within natural ecosystems. Finally EE is prescriptive, in proposing institutions and behaviours compatible with sustainability norms. Its position as a discipline is on the boundary of economic and natural systems, focussing on impacts of each systems on the other.

### Application Scale
| Regional |

### Strengths
- Has potential for shifting environmental policy outcomes based on full-cost accounting principles.

### Limits
- Has not gained ascendency as dominant economic paradigm for private and governmental choice.

### Input Variables
<table>
<thead>
<tr>
<th>N/A</th>
</tr>
</thead>
</table>
### Output Variables
| N/A |

### Economic

### Name / Class | Travel Cost Method / Technique
---|------------------------
**Source** | developed by Clawson and Knetsch (1966), and many others
**Definition** | The simple travel cost method values a single site by observing how much people are willing to pay to visit a site. The model assumes that people will make repeated trips to a site until the marginal value of the last trip is just worth what they have to pay to get there.

### Application Scale
| All Levels |

### Strengths
- The travel cost method closely mimics the more conventional empirical techniques used by economists to estimate economic values based on market prices.
- The method is based on actual behaviour—what people actually do—rather than stated willingness to pay—what people say they would do in a hypothetical situation.
- The method is relatively inexpensive to apply.
- On-site surveys provide opportunities for large sample sizes, as visitors tend to be interested in participating.
- Results relatively easy to interpret and explain.

### Limits
- Only applicable if the consumption of the publicly provided good entails costs. The shadow price of time is critical to the evaluation of the public good, but inherently difficult to observe.

### Input Variables
<table>
<thead>
<tr>
<th>N/A</th>
</tr>
</thead>
</table>
### Output Variables
| N/A |

### Name / Class | Contingent Valuation Method / Technique
---|-----------------------------
**Source** | Various - obscure
**Definition** | CVM involves directly asking people, how much they are willing to pay for specific environmental services. It is a ‘stated preference’ technique because it asks people to directly state their values, rather than inferring values from actual choices, as the ‘revealed preference’ methods do. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is called ‘contingent’ valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the service.

### Application Scale
| Park or Site |

### Strengths
- Since it is not based on observed behaviour, the underlying assumptions are less restrictive and non-use values can – to some extent – be measured. Furthermore, individuals are not asked to value the public good directly, but to evaluate their general subjective well-being, life satisfaction or happiness.

### Limits
- Problems with validity, credibility and reliability in surveys due to possibility of strategic responses, willingness to pay is almost independent of the quantity of public good provided (insensitive to scale and scope) and willingness to pay often depends on its position in the survey sequence.

### Input Variables
<table>
<thead>
<tr>
<th>N/A</th>
</tr>
</thead>
</table>
### Output Variables
| N/A |
### Conjoint Analysis / Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Developed by researchers in mathematical psychology and marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Involves the measurement of the collective effects of two or more independent variables on the classification of a dependent variable. The stimulus is a combination of product-attribute. Various mixed and matched product attributes are put together and rated by the respondent.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>All Levels</td>
</tr>
<tr>
<td>Strengths</td>
<td>Can look at multiple changes</td>
</tr>
<tr>
<td>Limits</td>
<td>The complexity involved in developing, implementing, and interpreting results</td>
</tr>
<tr>
<td>Input Variables</td>
<td>N/A</td>
</tr>
<tr>
<td>Output Variables</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Input-Output Models e.g. IMPLAN / Model

<table>
<thead>
<tr>
<th>Source</th>
<th>University of Minnesota (IMPLAN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>IMPLAN is an economic impact assessment modelling system. IMPLAN allows the users to easily build economic models to estimate the impacts of economic changes. The software allows the user to develop local level input-output models that can estimate the economic impact of new firms moving into an area.</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Regional</td>
</tr>
<tr>
<td>Strengths</td>
<td>Can provide economic impact details for specific activity</td>
</tr>
<tr>
<td>Limits</td>
<td>Requires primary data that is expensive to gather.</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Visitor spending, length of stay, local SIC data</td>
</tr>
<tr>
<td>Output Variables</td>
<td>Economic data (e.g. Spending)</td>
</tr>
</tbody>
</table>

### Indigenous

<table>
<thead>
<tr>
<th>Source</th>
<th>Indigenous belonging to the land - the Dreaming (Australia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Indigenous people exist in a kinship relationship to the land and its flora and fauna. It involves an intensive relationship which is established through listening and learning from country for many lifetimes</td>
</tr>
<tr>
<td>Application Scale</td>
<td>Local</td>
</tr>
<tr>
<td>Strengths</td>
<td>Knowledge developed over years of learning, its and ecological, social and spiritual relationship of care</td>
</tr>
<tr>
<td>Limits</td>
<td>Requires local knowledge - difficult to generalise. It is difficult for non-indigenous people to understand or adopt. Hard in some cases to harmonise with ‘Western’ frameworks or models</td>
</tr>
<tr>
<td>Input Variables</td>
<td>N/A</td>
</tr>
<tr>
<td>Output Variables</td>
<td>N/A</td>
</tr>
</tbody>
</table>
APPENDIX E: CONCEPT MAP OF PROTECTED AREA FRAMEWORKS AND MODELS

**Economic**
- I-O Models
- Tourism Futures Simulator

**Ecological**
- Ecological Economics
- Ecological Footprint
- Carrying Capacity
- RBSIM
- LAC VERP VIM
- VAMP

**Social**
- Individual Satisfaction and Meanings
- System Wide
- Adaptive Management
- Human Ecosystem

**Sustained Protected Areas**

**Indigenous Worldviews**
## APPENDIX F: PARK DESIGNEES FOR CRC INDUSTRY REFERENCE GROUP

<table>
<thead>
<tr>
<th>State</th>
<th>Director</th>
<th>Designee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 South Australia</td>
<td>Greg Leaman (DEH)</td>
<td>Neville Byrne Program Manager, Tourism &amp; Recreation Planning and Policy</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:Leaman.Greg@saugov.sa.gov.au">Leaman.Greg@saugov.sa.gov.au</a>]</td>
<td>Department for Environment and Heritage GPO Box 1047, ADELAIDE SA 5001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phone: (08) 8124 4873 [<a href="mailto:byrne.neville@saugov.sa.gov.au">byrne.neville@saugov.sa.gov.au</a>]</td>
</tr>
<tr>
<td>2 Victoria</td>
<td>Mark Stone (Vic)</td>
<td>John Nankervis Levels of Service Two Project Manager [<a href="mailto:jnankerv@parks.vic.gov.au">jnankerv@parks.vic.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:mstone@parks.vic.gov.au">mstone@parks.vic.gov.au</a>]</td>
<td>per Kylie.Morffew [<a href="mailto:Kylie.Morffew@vu.edu.au">Kylie.Morffew@vu.edu.au</a>]</td>
</tr>
<tr>
<td>3 New South Wales</td>
<td>Tony Fleming (NSW)</td>
<td>Carla Rogers Regional Planner, Far South Coast Region [<a href="mailto:Carla.Rogers@environment.nsw.gov.au">Carla.Rogers@environment.nsw.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:linda.scott@npws.nsw.gov.au">linda.scott@npws.nsw.gov.au</a>]</td>
<td>Management Locked Bag 104, Bentley Delivery Centre [<a href="mailto:darylm@calm.wa.gov.au">darylm@calm.wa.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tel – (02) 4476 0843 [cc: to <a href="mailto:alison.ramsay@environment.nsw.gov.au">alison.ramsay@environment.nsw.gov.au</a>]</td>
</tr>
<tr>
<td>4 Western Australia</td>
<td>Jim Sharp (WA)</td>
<td>Daryl Moncrieff Planning Coordinator Department of Conservation &amp; Land Management Locked Bag 104, Bentley Delivery Centre [<a href="mailto:darylm@calm.wa.gov.au">darylm@calm.wa.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:jims@calm.wa.gov.au">jims@calm.wa.gov.au</a>]</td>
<td>Tel – (02) 4476 0843 [cc: to <a href="mailto:alison.ramsay@environment.nsw.gov.au">alison.ramsay@environment.nsw.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td>Sharon Bell is contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:sharonb@calm.wa.gov.au">sharonb@calm.wa.gov.au</a>]</td>
<td></td>
</tr>
<tr>
<td>5 Queensland</td>
<td>Alan Feely (Qld)</td>
<td>Brett Waring [<a href="mailto:brett.waring@epa.qld.gov.au">brett.waring@epa.qld.gov.au</a>] Phone: 3836 0196 (per Linda Warneke)</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:alan.feely@epa.qld.gov.au">alan.feely@epa.qld.gov.au</a>]</td>
<td>And - [<a href="mailto:pamela.harmonprice@epa.qld.gov.au">pamela.harmonprice@epa.qld.gov.au</a>] And - [<a href="mailto:campbell.clarke@epa.qld.gov.au">campbell.clarke@epa.qld.gov.au</a>]</td>
</tr>
<tr>
<td>6 Tasmania</td>
<td>Peter Mooney (Tas)</td>
<td>Stuart Lennox Manager, Policy and Planning Parks and Wildlife Service Dept of Tourism, Parks, Heritage &amp; Arts GPO Box 1751, Hobart 7001 Phone: (03) 6233 6463 [<a href="mailto:Stuart.Lennox@parks.tas.gov.au">Stuart.Lennox@parks.tas.gov.au</a>]</td>
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<td></td>
<td>[<a href="mailto:Peter.Mooney@parks.tas.gov.au">Peter.Mooney@parks.tas.gov.au</a>]</td>
<td></td>
</tr>
<tr>
<td>8 ACT</td>
<td>Maxine Cooper (ACT)</td>
<td>Rod Hillman Mgr, Education, Communications &amp; Recreation Environment ACT Phone: (02) 6207 6090 E-mail: <a href="mailto:rod.hillman@act.gov.au">rod.hillman@act.gov.au</a></td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:maxine.cooper@act.gov.au">maxine.cooper@act.gov.au</a>]</td>
<td></td>
</tr>
<tr>
<td>9 Commonwealth</td>
<td>Peter Cochrane</td>
<td>Meryl Triggs, Assistant Director, Policy Support and Tourism Parks Australia North GPO Box 1260, Darwin NT 0801 Ph: (08) 8920 1307 [<a href="mailto:Meryl.Triggs@deh.gov.au">Meryl.Triggs@deh.gov.au</a>]</td>
</tr>
<tr>
<td></td>
<td>[<a href="mailto:Peter.Cochrane@deh.gov.au">Peter.Cochrane@deh.gov.au</a>]</td>
<td></td>
</tr>
<tr>
<td>10 Tourism in</td>
<td>Review final committee structure and then assess for gaps in representation Rod Hillman (see above, #8)</td>
<td>Protected Areas Forum (TAPAF)</td>
</tr>
<tr>
<td></td>
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APPENDIX G: ACADEMIC DELPHI QUESTIONNAIRE AND RESPONSES (ROUND 1)

Protected Area Models
Academic Delphi

Introduction. Protected areas comprise a mosaic of different purposes, sizes, ownership, and levels of protection. Multiple classifications or typologies either exist (e.g., six IUCN categories) or are possible depending on the protected areas attribute emphasised (e.g., protected area purpose). Many protected areas are currently threatened by external, and in some cases, internal forces. Boundary and scale issues add to the complexity of managing protected areas for sustainable outcomes.

Can we model the sustainability of protected areas management? A model is an abstraction of reality designed to facilitate understanding. Models range in complexity from simple rules of thumb to complex mathematical models. Model effectiveness is evaluated in terms of the model’s ability to predict and explain the phenomenon of interest. For example, economic I-O models describe and predict relationships between revenue inflows and outflows within a predefined economic sector. A protected areas model should identify the variables that contribute to desired protected area outcomes and describe the relationship between the variables. Do such models exist for protected areas? Can we explain and predict the sustainability of a protected areas management regime? Sustainable protected area models suggest the possibility of deterministic relationships between ecological, social, and economic variables.

A framework is a looser structure for identifying constructs or variables and in some cases, is simply a process for identifying important variables for sustainable protected areas management. While some frameworks may explicitly identify important variables or classes of variables, frameworks fall short of explicitly identifying pre-determined relationships between variables. For example, Limits of Acceptable Change (LAC) is a framework or process for identifying protected area variables and discovering the relationship between the variables. In contrast to a model, the variables and relationships in a framework are often contextual and emergent, rather than pre-defined features. Some protected area frameworks suggest that actual sustainable outcomes for protected areas are also contextual and emergent.

A concept is a general or abstract idea. Carrying capacity is a concept that suggests a relationship between an organism and the attributes of the environment that sustain the organism.

1st Round Delphi Questions

Instructions - Please find attached a summary of our interpretation of the research literature on protected areas models. The summary consists of a matrix (Excel spreadsheet) describing the attributes of what we call concepts, frameworks, and models associated with protected areas. Also included is a concept diagram that locates the concepts, frameworks, and models within the three generally accepted domains of sustainability. In the questions below, we ask you to critique the matrix and diagram and answer several questions about research needs for protected areas. Please write your answers/comments in this Word Document and return it as an email attachment to Kirsty (Kirsty.Tumes@unisa.edu.au). 1st round responses are requested by 27 August 2004.

1. Do you agree with our definition of concepts, frameworks, and models as applied to protected areas?

2. Is the matrix complete and accurate? What is missing? What should be dropped, added, or is inaccurately classified?

3. Does our graphical diagram that maps the different concepts, frameworks, and models into ‘sustainability space’ make sense? What should be dropped, added, or is inaccurately mapped?

4. Currently, which protected areas models or frameworks represent best practice for managing protected areas?

5. Do you think it is possible or realistic to integrate ecological, economic, and social variables into a comprehensive, sustainability model for protected areas management?

6. What are the most critical future research needs for developing protected areas models?
**Question 1 - Do you agree with our definition of concepts, frameworks, and models as applied to protected areas?**

**Respondent #1**
Sustainability is a difficult concept to define, and cannot be simply assumed as an objective. Given that considerable effort and controversy surrounds the various specific definitions of sustainability, it may be advisable to avoid the term altogether. **Models** are sometimes limited by what can be measured. They hide many agendas/goals of research and the assumptions and implications are rarely fully acknowledge and explored. Models tend to be mechanistic and deterministic so they don't incorporate meanings, attachments and values. Deterministic models are controversial when visitor behaviour is the dependant variable, particularly when freedom or spiritual renewal are the objectives. Modelling complex relationships is a profoundly difficult undertaking. **Frameworks**, the emphasis here is appropriately on process. Frameworks provide a check on process. Public process is a crucial component of protected area management, and frameworks ensure explicit, open, and bounded public process. Definition of **concept** - is carrying capacity a good example - it has been used as both a framework and a model.

**Respondent #2**
Definitions seemed clear and understandable. I became a little confused when I went to the matrix and found ‘techniques’ and ‘philosophy or lifeway’ as classifications and wondered how they related to the three major classifications - concepts, frameworks, and models. You also used the word, ‘process’ in your introduction. I wasn’t sure how ‘process’ related to a technique, framework, etc

**Respondent #3**
Generally, Yes

**Respondent #4**
Not completely. I think you’re using the words ‘explain’ and ‘describe’ interchangeably. They’re not interchangeable. I don’t think in this context you want to say models ‘explain’. Sometimes model describe or suggest relationships between/among variables. In social sciences, describing is about as good as it gets. We don’t have a lot of models that actually ‘explain’ anything. Explain assumes you can say what’s the cause and what’s the effect. We generally don’t know. I would use the word ‘describe’ and stay away from ‘explain’ in your definition of models. What do you mean by the word ‘deterministic’? You have it underlined and I’m not sure what your definition is for it.

**Respondent #5**
Yes - see Getz paper for different model types.

**Respondent #6**
Concept definition is fuzzy, destined to failure due to the lack of specificity of the concept. Models Predict OR explain not predict AND explain.

**Respondent #7**
I am not sure that models exist for protected areas, as they are artefacts of particular cultures and societies. If a model is useful, it must also be universal and contextual. While I agree with your approach to defining what a model is, I think you could also view a model as describing a system, not necessarily predicting how it would operate when subject to a perturbation or some other kind of input. I have operational defined framework as something with a set of sequential steps or elements that assist a planner in ‘working through’ a particular issue or problem. The framework is thus both acontextual - in that the steps or elements are not subject to the particulars of a situation - and contextual in the sense that if does require planners to consider contextual variables. I have defined concept as a term whose definition helps clarify or promote understanding of a particular issue or question. For example, the concept of a recreation setting, helps planners understand what people seek when making choices about where to recreation, and how setting characteristics might influence production of experiences

**Respondent #8**
Generally, yes. But I have a few comments. Models are simplifications of reality. Frameworks do more (or should do more) than identify variables. They provide needed structure to a planning/management analysis. I don’t really know what ‘contextual’ and ‘emergent’ mean in the way you use these terms. Carrying capacity also suggests the possibility of limits of the number/type of organisms (humans) that can be sustained in an environment.
**Question 2 - Is the matrix complete and accurate? What is missing? What should be dropped, added, or is inaccurately classified?**

**Respondent #1**
A benefits based approach is an extension of the satisfaction approach and should be included and an approach. **ROS** - The output of ROS as a management approach has been the protection of ecological, social and managerial perspective. Two other strengths are that it can be incorporated in other planning approaches and that it has been widely implemented. **LAC** - It should be a process not a framework. It builds in some necessary planning process and provides direct guidance on how to achieve outcomes. Includes transactive planning. It's logical and predictable and iterative. It's time consuming and requires an expert. **VIM**; Has not been widely adopted. **VAMP**; It is unclear what a whole of park approach really is and how it differs from other approaches. **VERP**; The weakness of VERP is the reality and improbability of removing existing facilities. Ecological footprint/ Environmental economics: drop these they seem out of place. Indigenous - this can/ should be incorporated into most other frameworks. Shouldn't be viewed through the same context.

**Respondent #2**
Matrix appears to be very thorough, however it's hard for a reader who is not up-to-date with the models and concepts. Finally, I wondered where data collection techniques might fit and whether or not they would be relevant to your effort. Of course, there are the traditional data gathering techniques but is there a role of such processes as SWOT analysis and Appreciative Inquiry?

**Respondent #3**
It is accurate - its completeness is depend on the depth of the concepts/frameworks you wish to generate - there are derivations of some of the models listed such as the Tourism Opportunity Spectrum that are not included - it is then dependent on the importance of that concept in the scheme of your model (possibly not an issue as it might not be evaluated as important but it should be evaluated). The matrix has however covered the main concepts/frameworks that a currently in use or being generated.

**Respondent #4**
The matrix is a great first stab at understanding everything. **ROS**: You list Clarke and Stankey as the source. This is NOT the one adopted by the US Forest Service. That one was Bev Driver, Perry Brown and colleagues. You list 'regional' as the application scale, but it is generally applied or at least defined for forest level. **LAC**: It does not build on VERP. A key strength of LAC from a U.S. perspective is that it formalises public involvement in the planning and management of public lands. **VIM**: It is not similar to LAC. LAC is much broader in scope. VIM simply takes a piece of LAC (indicators and standards) and says if you don't have ROS zones in place and haven't gone thru LAC then you can at least go out and look at landscape and see what impacts you have, select what you think might be meaningful indicators, and monitor them and make adjustments in you management of them. You don't need to develop zones, inventory your resource or develop alternative management plans for addressing impact. **VIM**: You list 'park, I'd list forest, wilderness areas. **VERP**: While VERP is also modelled after LAC, the way in which public involvement happens and when it happens are not the same. It is most like LAC in that it too, says that the key to managing for social carrying capacity is knowing what the key indicators are for a given area based on the biophysical and social conditions one is trying to manage for in that area. **BBM**: I don't see it in the matrix. BBM extends the ROS concept to include on-site benefits and off-site benefits accruing to individuals, communities, and the environment as a result of the recreation opportunities provided on-site. It is an attempt to manage resources at the landscape level and to bring into play more than just recreational concerns. Other models under development - Sense of Place Model (SOP), Community - Agency Trust (CAT), Travel Simulation Model for social carrying capacity. The CAT model incorporates, BBM, SOP and social capital models. It's a more holistic representation of the landscape the agencies work in.

**Respondent #5**
Far from it! Where does management fit into the framework? The following areas are missing. Corporate management models; governance models, park management models including inventory, planning, development, resource management, recreation management, administration, monitoring; planning models; models for PA establishment; integrated conservation and development concepts; ecosystem management and landscape management concepts and approaches. Ecological footprint should not be in there. Questions individual satisfaction. The indigenous view should not be remote as there is a push for co-management, cooperative management.

**Respondent #6**
Under indigenous, look at kincentric ecology as a model. Kincentric ecology (humans intervening with respect, humans and nonhuman forms all parts of the systems.)
Respondent #7
No comment

Respondent #8
Some comments about each of the matrix rows:

The satisfaction approach is not very useful for lots of reasons. Please see pages 8-13 of my Studies in Outdoor Recreation book. I would not classify it as framework.

ROS was developed by Driver and associates as well as Clarke and Stankey. I would classify it as a model or concept, not a framework.

LAC is a useful framework. VERP actually builds on LAC rather than the reverse.

VIM is very similar to LAC/VERP. It was developed by academics under contract for the National Parks Conservation Association. It has seen little use.

I know very little about VAMP.

VERP is modelled after LAC and is a useful framework.

I don’t know anything about TOMM.

RBSim and other simulation models are computer based simulation models that can be used for several purposes, including understanding complex travel patterns, estimating maximum acceptable use levels in relationship to crowding-related standards of quality, and testing the potential effectiveness of alternative management practices. My group at the University of Vermont has used a commercial software package called Extend to develop simulation models of visitor use.

I don’t know much about meaning based approaches.

Adaptive management is a general concept that has been applied more directly in broader environmental management.

I don’t know much about Social Impact Assessment.

I don’t know much about Human Ecosystem Model/Framework.

I don’t know about Tourism Futures Simulator.

Carrying capacity is a useful concept. However, it has been made operational through frameworks like LAC/VERP.

I don’t know much about ecological footprint.

I know a little about ecological economics, but don’t understand its direct applicability to this project.

Economic travel cost method is a way to try to estimate the economic value of a non-market good/service (e.g. a park).

Conjoint valuation method is actually contingent valuation method. It too is a way to try to estimate the value of a non-market good/service.

Conjoint analysis is a statistical/research method to assess tradeoffs among competing attributes.

I don’t know much about input/output models.

I don’t know much about indigenous approaches.

Generally, the items (concepts, frameworks, models, etc.) included in the matrix strike me as kind of a miscellaneous collection of ideas. Perhaps I just don’t yet understand the purpose of this project.

Question 3 - Does our graphical diagram that maps the different concepts, frameworks, and models into the ‘sustainability space’ make sense? What should be dropped, added, or inaccurately mapped?

Respondent #1
• Should meanings overlap ecological? (since ‘natural’, and what is considered ‘natural’ is a social construction).
• Indigenous understandings seem marginalised.
• Sustainability might be an all-encompassing concept, rather than an exclusionary one.

Respondent #2
Generally, it made sense; although I wonder if there should be a fourth element - policy. So often, all the economic, ecological, and social sense in the world is overruled by policy. Granted, one hopes policy will evolve from good economic, ecological, and social science but more often than not policy and politics rules. Can this sphere be incorporated in some way?

Respondent #3
Yes - little hard to understand what it is going to contribute but yes it lays a ground work that makes sense and starts to provide a link to the sustainability initiative.

Respondent #4
I'm not sure I get all of your models. ROS is in the wrong space. ROS combines biophysical and social components of the physical setting. I don’t see how you can place it outside of the overlap between social and ecological. Why are Indigenous views outside of the three major circles? There should be a cultural circle to place indigenous views. Culture and ecology should overlap. Why are adaptive management and human ecosystems outside of the 3 main circles?
Where is the political area represented in the diagram? Ecology is the interaction of everything - including social. If you want to limit it and exclude social from it, I would call it 'biophysical' and not ecological. Need to include Social carrying capacity within the intersection of social and ecological. The map doesn't include sustained protected areas. The concept map is a good starting point but raises a number of questions. It's impossible to say if it is correct.

**Respondent #5**
Yes it makes sense, but incomplete. It needs to be mapped multidimensional or in layers with surrounding frameworks. PA's are social constructs and exist within a social-political-cultural-economic-global etc context.

**Respondent #6**
Indigenous views should not be on its own. It should be inclusive, encircling all the other parts of the diagram.

**Respondent #7**
You probably need to add Benefits Based Management, Doxey’s Irridex, Butler’s Tourism Area Life Cycle, as they all deal with some dimensions of protected areas and recreation. A more fundamental response is that this frequently cited model treats the three elements equally. Powerful arguments put forth, for example by Dryzek, speak to supremacy of the ecological space (the natural capital that ecological economists discuss) over the others.

**Respondent #8**
RBSim (and other simulation models) are simulation models, not carrying capacity frameworks (like LAC/VERP). Carrying capacity is more than an ecological concept. It has an equally important social component. Some people might object to singling out economics as its own ‘sphere’, suggesting that it is simply part of the social sphere.

**Question 4 - Currently, which protected areas models or frameworks represent best practice for managing protected areas?**

**Respondent #1**
Most of the frameworks are good practice, GIVEN appropriate resourcing, adequate research, and good public process. They were often developed to reflect and succeed within particular institutional and cultural contexts - there is value in ‘personalising’ the approach to specific place and time.

**Respondent #2**
Answer to this question is limited by my understanding of all the models or frameworks that are available. Nonetheless, given the limitations of what we have, I continue to like LAC or models that incorporate diverse and substantial constituency input into the decision making process.

**Respondent #3**
This is a hard one to answer - the question here is what they contribute to management in my option McArthur provides us with an evaluation. See diagram for this.

**Respondent #4**
No one answer to this question. It depends on what you are trying to protect or sustain.

**Respondent #5**
Is this international best practice? This is value ridden and paradigm ridden. Many of the concepts/models are old and are applied together in management e.g. LAC& ROS, so what is best practice. The more recent the better. Best practice for what aspect of PA management... establishment, recreation, management, tourism management, evaluation?

**Respondent #6**
You have to have a combination of both models and frameworks. LAC is good for specifying the level of recreation impacts that are acceptable and guide monitoring.

**Respondent #7**
Here, I would say that this depends on the specific issue being addressed, given that many frameworks are issue-based. In addition to this comment, there has been a resurgence in interest in the popular media, academia and in the U.S. judicial system in carrying capacity, with some powerful legal arguments to support this practice. Whether it is the best is subject to quite a bit of debate.

**Respondent #8**
I think LAC and VERP.
Question 5 - Do you think it is possible or realistic to integrate ecological, economic, and social variables into a comprehensive, sustainability model for protected areas management?

Respondent #1
Probably not.

Respondent #2
I'm troubled by the fact that it hasn't yet been done. It seems that with new approaches and technology and particularly, new and bright minds, it can be done.

Respondent #3
Possibly, but you need a simplistic model so that managers can understand it and also use it otherwise it has no value. Need models that change with the nature of outdoor recreation and enable the decision making process to be applied to daily management solutions. The shift towards visitor-based management frameworks and away from manager perceptions of what resource users want requires development approaches that accommodate the diversity of cultural user needs within management frameworks rather than objective science based approaches. This I feel is the future for this form of modelling.

Respondent #4
Yes, as long as the major conceptual terms (ecological, economic, social; sustainable, protected are clearly defined and understood within the parameters of their definitions.

Respondent #5
No/Yes It would be difficult because this is not what PAs are about and certainly not what management is about, at least in practice.

Respondent #6
Think it is both possible and realistic.

Respondent #7
I am not sure it is. If integration was easy to do, we would be doing it. There is another question of what it is we want to integrate? Scales? Types of knowledge? Research and public input? Administrative units? It is all very unclear at this point. I just gave a course on Integrated Protected Area Planning in South Africa for practicing planners. It was very challenging. I am not sure the ecologic, social and economic variables are necessarily what it is we want to integrate.

Respondent #8
It’s hard, but it must ultimately be done.

Question 6 - What are the most critical future research needs for developing protected areas models?

Respondent #1
There is an urgent need for research to better define the values and qualities of the protected area that are to be protected. For example, instead of generally seeking sustainable ecological conditions, there needs to be specific definition of what is 'natural', 'wild', 'biodiversity' or 'self-perpetuating', and why society should be pursuing these goals. Similarly, instead of generally seeking quality experience opportunities, there needs to be specific definition of what sorts of experiences are to be available and why. Lastly, economic objectives need to incorporate to whom the benefits (such as economic vitality) accrue, and through what economic mechanisms those goals will be transferred.

Respondent #2
There is always need for more information in all areas economic, social and ecological as they relate to sustained protected areas management, however, the bottom line remains how to best incorporate this information into a workable model. You seem to be headed in a very positive direction. Beyond this, I always find our understanding of the human and political systems to be lacking in insight and information.

Respondent #3
Overall a recognition of the variety of social valuing of protected areas (across users and cultures) into the development of an adaptable management model like COS which he proposed. Park managers need to conduct social sciences research to understand users preferences, needs and satisfaction of outdoor recreation. Additionally, the increasing emphasis placed by natural resource agencies on ensuring high levels of visitor satisfaction adds even greater importance to providing a more culturally diverse basis for policy and planning frameworks. Therefore understanding the types of experiences people seek and in what types of settings, is needed in order to provide quality experiences.
Respondent #4
We should be looking at threats outside of protected areas boundaries; urban/suburban development, water quality, air quality, farming. We also need better inventory of the biodiversity so we can better define research problems and research needs. We need more community level research. Need to understand how people value landscape and how those meanings they attach to places and the short term and long term benefits they derive from those landscapes. We need to understand how poverty and the lack of social justice threaten and degrade protected areas.

Respondent #5
Integrated landscape management with PAs as but one component. Tourism Management. Applying Adaptive Management to evaluation of management effectiveness. Overcoming corporate culture and PA dogma. The effectiveness of PA system and approach to conservation

Respondent #6
More work to define the values being protected and for whom. Movement towards understanding relationship/orientations towards these protected areas and how various things influence these relationships is going to move us towards our mandate much quicker.

Respondent #7
Integration is certainly one of these. Planning in a regional context is another high priority item. This is not research in the traditional sense though.

Respondent #8
More research and application.
How to formulate indicators and standards.
Effective and efficient monitoring techniques.
Assessment of the effectiveness of alternative management practices.
APPENDIX H: ACADEMIC DELPHI QUESTIONNAIRE AND RESPONSES (ROUND 2)

Protected Area Models
Academic Delphi Round 2

Comments to Delphi Participants. Your responses to the first round of questions have been recorded and summarised, and specific responses from all Delphi participants appear in the attachments. The wide variability of responses to the questions (we acknowledge this may be due to our poor questions) suggests consensus may not be reached on the original questions, no matter how many Delphi ‘rounds’ we engage. As per your participation agreement, the four questions below (Round 2) are the final questions for this Delphi process. Be sure to answer each italicised question; please type your responses directly within this form.

Round 2 Questions:

1) Please review our summary of Round 1 responses (Attachment 1) and the detailed responses from the other Delphi participants (Attachment 4). Please comment on your initial responses compared to the other Delphi participant responses. Think about:
   - Are you still satisfied with your original responses?
   - Do you want to modify or clarify any of your responses?
   - Do you have any response to comments other panellists made?

2) As a separate, but related part of this research project, we have been conducting an independent ‘agency’ Delphi process by contacting ten key individuals responsible for protected areas management at both the federal and state level in Australia. We can send a summary of those replies if you wish. Panel responses suggest:
   a) With the exception of ROS, LAC, carrying capacity, and Aboriginal perspectives, there is a general lack of awareness of many of the various protected areas models and frameworks we presented to you in Round 1. On a five-point scale where 1 = ‘never heard of it,’ and 5 = very familiar, the means for individual frameworks and models range from 1.8 (Tourism Futures Simulator) to 4.5 for the Recreation Opportunity Spectrum.
   b) Few frameworks/models are actually being used in practice in Australia. Even the tools in most widespread use - ROS, Aboriginal perspectives, carrying capacity, LAC, and satisfaction approaches - only average 2.1 to 3.1 on a 5-point scale (where 1 = do not use and 5 = broad application across the agency).

   There are many potential reasons why that is the case, ranging from the utility of the models to institutional constraints.

   - If you have experience working in the U.S., please comment on whether or not you feel results would be similar in the U.S. in terms of managerial awareness and adoption of PA models. Why or why not?
   - If you have Australian experience, please comment on any circumstances, settings, context or just plain differences you believe would contribute to the lack of awareness/adoption of these models by Australian PA managers.

3) This academic panel appears to see great complexity and intricate causal chains in PA impact models. Conversely, the agency practitioners generally use what is simple and cite working constraints such as funding, time and staffing demands.

   - Do you agree there is a perceptual gap between academics and agency practitioners? If there is a gap, should it be closed? How will PA impact model adoption and diffusion happen?
   - How will the evolution of PA impact models occur over time?

4) Pythia, the priestess of Apollo, resided at Delphi and had the ability to divine the future. Since the priestess is not available to us, we ask you to stand in her place.

   - Please provide at least a paragraph of sage wisdom on what will protected areas management for tourism impacts will look like 25 years from now… Describe as best you can, the conditions, institutions, and managerial practices associated with future protected areas management. We recognise this question is probably best answered after you receive the wine, but do your best. We note that Pythia’s answers about the future were often cryptic and subject to considerable (mis)interpretation. We expect no less from you. ☺ Thank you.
Delphi Responses - Round 2

Are you still satisfied with your original responses?

Respondent #1
I don't think my original responses were summarised very well. I thought my major points were not included. Generally it seemed there was a lot of disagreement within the responses of the group. You are right, consensus is not likely, mostly due to a mixture of ‘old-school’ commitment to institutionalised approaches and ‘new-school’ thinking about new solutions. There seems to be some protection of turf and ideas, and little forward thinking. I'm afraid many of the responses are aimed at justifying previously investigated solutions. Overall I am pretty comfortable with my responses. Reading the responses suggests a need for some continued dialogue and need for understanding of the application potential of some of the models and concepts mentioned.

Respondent #2
I am satisfied with the intent of my responses, although they could have been more comprehensive. Although you have me responding to question 2 as stating carrying capacity is a useful concept. Either you didn’t quote me correctly or I mistyped my response. The overwhelming evidence is that the notion of carrying capacity is not useful, never has been useful and never will be useful.

Respondent #3
I think it’s interesting but not surprising to find that each of us seems to share a core set of thoughts but we have very distinct ideas about what goes where in the matrix. I find the matrix interesting but I think it will take a great deal of effort if one wants the matrix to be historically and conceptually accurate. You cannot do that by committee.

Respondent #4
Yes

Respondent #5
Generally, yes

Respondent #6
Sustainability is a difficult concept to define, and cannot be simply assumed as an objective. Given that considerable effort and controversy surrounds the various specific definitions of sustainability, it may be advisable to avoid the term altogether. Models are sometimes limited by what can be measured. They hide many agendas/goals of research and the assumptions and implications are rarely fully acknowledge and explored. Models tend to be mechanistic and deterministic so they don’t incorporate meanings, attachments and values. Deterministic models are controversial when visitor behaviour is the dependant variable, particularly when freedom or spiritual renewal are the objectives. Modelling complex relationships is a profoundly difficult undertaking. Frameworks, the emphasis here is appropriately on process, Frameworks provide a check on process. Public process is a crucial component of protected area management, and frameworks ensure explicit, open, and bounded public process. Definition of concept - is carrying capacity a good example - it has been used as both a framework and a model.

Respondent #7
I’m generally satisfied with my answers and those of others. However, there are probably a few fundamental concepts or theories which you did not mention that may have some merit. At least, they may serve as foundations for present day frameworks or models that you have offered.
The first that comes to mind is Al Wager’s Recreation Spectrum. It was really very fundamental to the eventual development of ROS by Clarke and Stankey. He worked with Clarke and Stankey who were in Seattle and Missoula (I think). Al’s thesis was that there was no such thing as an average recreation site, opportunity, etc. no more than there was an average recreationist (The approach to outdoor recreation in those days was to try to provide some kind of experience [camping, for example] that was ‘average’ for the ‘average’ camper assuming that if we provided average experiences we’d satisfy the most people). Thus it became important to provide a range or ‘spectrum’ of recreation experiences to better meet the needs of the spectrum of recreationists. This way more people would be closer to satisfied and resources would be better and more efficiently managed.
The other framework (and I may be using your terminology incorrectly) that I remember as a root of ROS and other frameworks was the Outdoor Recreation Resources Review Commission (circa 1958-1962) recreation land classification system. The system was broad and limited in nature but recognised a series of recreation land types ranging from urban to wilderness that provided a range of experiences and comprised a variety of land characteristics. In retrospect, it was pretty simplistic but was one of the first efforts to recognise that recreation (land, people, etc.) needed to be managed in a variety of different ways. The outcome, of course, was better utilisation and protection of resources and optimisation of user satisfaction.
After ORRRC another more sophisticated system was devised by someone (USFS, Clawson, or someone else) but I can’t remember who. If I remember correctly (which is doubtful) it incorporated distance (remoteness) as further differentiating recreation land types.

The NPS also used to have a land classification system that called for different management strategies and uses. I can’t remember the details.

The recollection of the last concept I recall was triggered by your brief discussion on the indigenous philosophy or lifeway and the difficulty it presents for non-indigenous people to understand as well as ‘…to harmonise with ‘Western’ frameworks or models.’ It seems to me that the old concept of ‘Geography of Hope’ was a western concept that had some similarity to the indigenous philosophy. Essentially, it was that wilderness or protected areas were valuable to even those who never used or saw them and thus represented geography of hope that such lands exist and will be protected into perpetuity. Just knowing it is there is value or important enough to have and protect it.

Respondent #8
Yes, I am also supportive of much of what others have said. To me the issue is defining, make it reasonable and then continue on. The respondents provide advice to improve the definitions.

Do you want to modify or clarify any of your responses?

Respondent #1
No

Respondent #2
No

Respondent #3
I’m not sure if anything I would do would clarify or confuse.

Respondent #4
NO except to say that COS means (Cultural Opportunity Spectrum)

Respondent #5
I feel my responses are generally reflected in the new matrix.

Respondent #6
A benefits based approach is an extension of the satisfaction approach and should be included and an approach. ROS - The output of ROS as a management approach has been the protection of ecological, social and managerial perspective. Two other strengths are that it can be incorporated in other planning approaches and that it has been widely implemented. LAC - It should be a process not a framework. It builds in some necessary planning process and provides direct guidance on how to achieve outcomes. Includes transactive planning. It's logical and predictable and iterative. It's time consuming and requires an expert. VIM: Has not been widely adopted. VAMP: It is unclear what a whole of park approach really is and how it differs from other approaches. VERP: The weakness of VERP is the reality and improbability of removing existing facilities. Ecological footprint/ Environmental economics: drop these they seem out of place. Indigenous - this can/ should be incorporated into most other frameworks. Shouldn't be viewed through the same context.

Respondent #7
No comment

Respondent #8
Sustainability for PA’s should emphasise the ecological. That is a goal. Then the other dimensions need to fit it. So, collectively the landscape provides sustainable goods and services for humanity (taking a human bias perspective!)

Do you have any response to comments other panellists made?

Respondent #1
Respondent #1 suggest that LAC has a public involvement element, and I don't think that is true. Developers of this ‘framework’ call it that and clarify that it could happen without or with public involvement. Mostly it has been applied with a transactive element, but that element is not described in the basic LAC ‘how to’ guides. Respondent #1 also describes ROS as a management tool. I think it was designed as a planning tool. Respondent #4 implied there are two different ROS systems. I believe there is only one. Respondent #4 also tries to differentiate LAC and VERP and VIM too much. We tend to refer to them all now as ‘indicator-based’ approaches, they really aren't very different. I wouldn't
add BBM, SOP or CAT or travel simulation to the list of potential models. Conceptual approaches to sense of place and trust are still in the development stage and don’t provide a broad enough framework to help here.

Respondent #2
There seems to be a perception that processes/frameworks/models, such as LAC, VERP, TOMM and so on are methods of establishing carrying capacities. They are not. LAC was developed in response to failures of carrying capacity. TOMM and VERP are derivatives of LAC. Carrying capacity is not a model or framework or process. It is a theory of the relationship between use level and impact, both social and biophysical. It is also a theory that is fundamentally and fatally flawed. Processes such as LAC provide managers with a way of working through the concerns underlying the interest in carrying capacity and are helpful because they force explicitness in all the value decisions and provide a reasonable mechanism to structure public engagement in those decisions. Transactive planning is not intrinsic to LAC, but because it was used in the first application of LAC it is often viewed as part of LAC. I strongly believe in public engagement as structured by transactive planning and LAC. LAC, VERP, VIM and TOMM are not the same process although there are elements that are similar in each.

Respondent #3
I think it’s interesting but not surprising to find that each of us seems to share a core set of thoughts but we have very distinct ideas about what goes where in the matrix. I find the matrix interesting but I think it will take a great deal of effort if one wants the matrix to be historically and conceptually accurate. You cannot do that by committee.

Respondent #4
No

Respondent #5
No

Respondent #6
- Should meanings overlap ecological? (since ‘natural’, and what is considered ‘natural’ is a social construction).
- Indigenous understandings seem marginalised.
- Sustainability might be an all-encompassing concept, rather than an exclusionary one.

Respondent #7
No comment

Respondent #8
No comment

If you have experience working in the US, please comment on whether or not you feel results would be similar in the US in terms of managerial awareness and adoption of PA models. Why or why not?

Respondent #1
The term protected area has no meaning. A protected area model could be something applied to a zoo, a country or city park, or wilderness. If you work within one of those circles, you will probably be most familiar with the system your policy guidelines suggest. The National Parks Service and Forest Service differ in the U.S. Who knows what state, country, city, private etc do? I would expect similar levels of knowledge and adoption of the concepts you list.

Respondent #2
I think the level of awareness might be somewhat higher for LAC and VERP. I know that workshops in Australia have been held on LAC and ROS, and a whole bunch have been conducted in the US on these systems. However, protected area agencies in the US are increasingly confronted with the lack of intellectual capacity to use these systems, both in terms of the number of personnel and their training. Because of reductions in personnel, many are returning to carrying capacity as a way of dealing with management problems. To demonstrate the lack of capacity, one manager told me that he considered carrying capacity and LAC but chose carrying capacity because he wouldn’t have to do any monitoring!

Respondent #3
I do not think the results would be the same in the U.S., at least not at the federal level. I’ve spent the better part of 30 years working with the U.S. Forest Service, the BLM, and the National Park Service in developing, refining and implementing ROS, LAC, VERP and Benefits Based Management. Both ROS and LAC are required planning frameworks for the U.S. Forest Service. The Forest Service uses these management tools for its national forest planning and for lands it manages which are part of the National Wilderness Preservation System. ROS is the required recreation planning framework for the BLM. VERP is used by the National Park Service but it’s not required. However, defining
experience zones and indicators and standards to monitor management objectives related to visitor experiences in zones is required. In essence, the key features of VERP are used.

About a month ago I finished a training session with Forest Service, National Park Service, BLM, and U.S. Fish and Wildlife Service managers. The training session was on monitoring visitor experience and resource quality using LAC and VERP. Managers who had been in the system awhile knew immediately what LAC and VERP meant and how to use them. Managers who were new to the agencies or who had recently transferred into a position where visitor planning and management was now the focus of their jobs, knew less or nothing about these frameworks. They knew less because many of them were trained as biologists, field foresters, or some other profession where human dimensions of natural resource management are not part of their formal education. For them frameworks such as LAC, ROS, VERP, BBM, and SCC are new and hard for them to get a hold of. So, while the agencies have adopted the models, many managers working for the agencies are unfamiliar with them. To get around this problem the agencies sponsor training workshops designed to give new managers a handle on these frameworks and refresh and update those who’ve been using them for some time. I think this training works fairly well. It’s offered several times a year in several different parts of the country so all managers have an opportunity to sign up for it and attend. It’s also offered as an interagency training workshop so managers from several agencies are in the same workshop, which makes for great opportunities to learn from one another what works when using these frameworks, how it works for different agencies, why it works, and who it works best for.

Respondent #4
Not enough experience of U.S.

Respondent #5
Yes, the situation is pretty similar. In fact, I have a graduate student who has just finished conducting a survey of managers of all U.S. National Park Service Wilderness areas (there are about 90 of them). Initial results show that, regarding the limits of acceptable change framework, 8.6% of managers reported they had never heard of it. 25.7% have heard of it, but don’t know much about it. 50% were very familiar with it, and 15.7% have used this framework in making carrying capacity decisions. Regarding the visitor experience and resource protection framework, the numbers were 5.6%, 22.5%, 60.6%, and 11.3% respectively. I think there are many reasons for this. Some of the frameworks are too abstract. I’m sure they resonate with academics, but frameworks are processes have to be pretty applied to work for agencies and the public. Some of the frameworks are obscure. They may be referenced in academic books and journals, but agency managers don’t follow this literature. And most of the frameworks, models and processes require a foundation of research to facilitate their implementation.

Respondent #6
Most of the frameworks are good practice, GIVEN appropriate resourcing, adequate research, and good public process. They were often developed to reflect and succeed within particular institutional and cultural contexts - there is value in ‘personalising’ the approach to specific place and time.

Respondent #7
Yes, I agree that U.S. knowledge and application of the frameworks/models would be similar to Australia. A lot of what you presented was developed by academics or researchers. How well the bridge to application (field workers) has been crossed is hard to judge. I am convinced, however, that the general level of management has become substantially more sophisticated through slow simulation of much of the research and theory developed since the 1960s - through training, conferences, publications, policy, etc. Why is it this way? I would suggest that much of the early, conceptual research in the U.S. was funded by the USFS. The funding dried up and things like the Recreation Research Units were dismantled or removed from university partnerships. Other land agencies invested next to nothing into ‘protected areas’ research. The NPS was particularly short sighted. It never invested anything into research except on the biological side. Most of the social science side of the Park Units was devoted to counting and describing visitors. Basic research that would have lead to a better understanding of user/resource interface was neglected. Also, there were few people and few venues for crossing the bridge from research to application.

Respondent #8
No comment
If you have Australian experience, please comment on any circumstances, settings, context or just plain differences you believe would contribute to the lack of awareness/adoption of these models by Australian PA Managers.

Respondent #1
No comment

Respondent #2
The models may not entirely fit the Australian political and social context, although in training sessions I held there, there didn’t seem to be much of a problem.

Respondent #3
No comment

Respondent #4
Have experience and believe that they are too complicated to use – if a model is developed it needs a supporting tool kit that allows its use including step by step actions - surveys that can be used - mechanisms to analysis and support people etc - US tends to do this by placing academics and park managers in close proximity in research stations and in parks and universities to allow the cross fertilisation.

Respondent #5
No comment

Respondent #6
No comment

Respondent #7
No comment

Respondent #8
I am surprised. We teach most of these. Are managers from different disciplines? Do the approaches get integrated without acknowledgement? Is management so at the operational level that there is no time to think? I really think however this reflects Australia’s PA paradigm of total protection, not multiple use. There has not been a champion for many of the tools.

Do you agree there is a perceptual gap between academics and agency practitioners?

Respondent #1
Probably, the big gap is a temporal one. An academic is teaching students and writing new concepts, improvements on things that were published last year. Managers are doing good if they find time to read study and test things that were published 5 to 10 years ago. We are often moving in completely different circles

Respondent #2
Yes. But that is as it should be. Academics have a responsibility to consider issues and challenges a decade down the road, where managers are confronted with the immediate and day to day. The gap between what exists and what is done is caused by other things. First, I believe we do not have the intellectual capital in protected areas that we need for today’s problems. Protected areas are often lacking the background, experience and familiarity with the social sciences and what they can offer. This is because protected areas are often defined as reservoirs of biodiversity and it takes biologists to provide stewardship. However, when it comes to issues such as the appropriate and acceptable conditions in the protected areas, interacting with constituencies, understanding and managing conflict and so on, biologists as a class simply do not have the conceptual background.

Respondent #3
I suspect there is a gap. I don’t know that I think it’s something that we ought to spend a great deal of time addressing.

Respondent #4
In Australia, yes

Respondent #5
No comment
 Respondent #6
No comment

Respondent #7
I agree. But, it’s been that way forever in this area as well as others.

Respondent #8
No, I think your interpretation is wrong. I think the academics are aware of the tools and are trying to integrate them. The agencies see the immediate, on-the-ground issues. This is typical of perspective. Looking at the same view from different locations and with different focal length binoculars.

If there is a gap should it be closed?

Respondent #1
Through planned technology transfer programs, we should continually strive to find ways to shorten this temporal gap.

Respondent #2
Of course it should. I think the first thing we need to do is to acknowledge the complexity of the job, and then figure out ways to deal with the complexity, ways other than the excessive reductionism that comes with attempting to identify a carrying or visitor capacity. I think academics should be honest and ethical about this and not sell theoretically invalid approaches to problem resolution.

Respondent #3
Not necessarily. Closing the gap closes diversity in management and management styles of applying these models. I think the diversity is needed. I think one of the great benefits of the models is that they can be interpreted in somewhat different ways. Recreation or visitor use occurs in a variety of settings. Settings consist of the biophysical, social, and managerial components. Those components change across the landscape. For these frameworks to work, they need to be flexible enough so they can be applied across the landscape. Often times it’s a particular manager’s ability to ‘flex’ the framework that allows it to be applied at all.
I also think if we spend our time trying to make all managers understand these frameworks in the same way, we’re not only wasting our time, we’re wasting valuable time and money that could be spent extending these models to meet ever increasing resource problems.

Respondent #4
Yes

Respondent #5
In some ways the gap is a natural and healthy one, and provides a sort of system of checks and balances. However, applied academics should probably have more empathy with the needs of managers and work to simplify their models.

Respondent #6
No comment

Respondent #7
Sure the gap should be closed.

Respondent #8
Of course, but not totally, I would hate to live in a world of one mind. It seems that training both ways could be useful.

How will PA impact model adoption and diffusion happened?

Respondent #1
Progressive managers and planners will read about an application somewhere else that fits their current need. Not everyone is aware of that need, but they are because they are revising plans, developing plans, or whatever. They will call the person at the site or the scientist who wrote about the application, working to understand how it fits the needs locally.
Respondent #2
It will happen a lot like other innovations happen: some individuals who are more willing to risk a new approach, will attempt to apply these frameworks. This can only be encouraged by having tolerant, enthusiastic and supportive supervisors and by ensuring the frameworks can be tested in small ways.

Respondent #3
The same way it always has. It takes a handful of managers who are seen as innovative and are well respected. These people try out the management tools academicians develop, they help define and further refine the models. When they attend meetings with their management colleagues they talk about what they’re doing and what works and doesn’t work. Some of those colleagues go back home and try out these new ideas/models to see how they work for them. If it works for them, they tell others who may also try them out. The innovators and early adopters need agency support to ‘stumble’ while they’re trying out new ideas. If the agency support is there, new ideas/models are likely to become institutionalised (or adopted). A number of years ago (early 1980s) I did a study of federal managers and how they learned and how they decided to use new management models. I believe it was something like 90+% who said they were only willing to try things that their colleagues had tried and had found successful. What that told me was never invent a management tool unless you’ve got a few managers working with you who have signed on to help develop and implement it.

Respondent #4
Through simple models supported by tool kit and training and education.

Respondent #5
More emphasis on applied research is needed. More progressive and highly educated managers are needed. And successful case studies are needed.

Respondent #6
No response

Respondent #7
I think it has closed to some degree. It has come about through numerous ways but one must remember that recreation and protected area management are still pretty young kids on the block of natural resource management. It has really been less than 50 years (closer to 40) that we have begun to develop these areas as professional, research based aspects of land management. I remember when there were literally no textbooks, no conferences, no professional positions, no students, no research money, no journals, etc. We’ve come a long way baby!

Respondent #8
Need to search for tools. I see action underway in the field fuelled by SoP reporting in NSW and Vic. Your project could provide some useful analysis, but its lack of comprehensiveness is not useful.

How will the evolution of PA impact models occur over time?

Respondent #1
Academic entities need to become less competitive and more cooperative. Greater commitment to the resource and future populations will evolve as resources become more scarce, and research funding becomes more difficult to find. We need to involve scientists in thinking through the impacts of various management decisions, in order to understand information needs and assist managers in making more science-based decisions.

Respondent #2
No response

Respondent #3
With managers and researchers working together.

Respondent #4
Very slowly I would suggest as I cannot see the required resources being available in Australia to achieve significant progress.

Respondent #5
Through all the normal channels: successful case studies, presentation by academics at professional meetings, publication in applied journals and research projects like your Delphi study.
Respondent #6
No response

Respondent #7
No response

Respondent #8
It seems we academics see the value of the tools, but PA managers do not. It seems as though we might need to do some integration to provide meaningful tools.

Other comments

Respondent #1
No response

Respondent #2
Since the late 80s, we have not had much innovation in PA stewardship, particularly with respect to managing recreational uses. What has happened to idea generation, intuitive insights and creative development and application? Of course, the scientific community, particularly in the US has also lost capacity, with many scientists retiring and not being replaced, or with changes in focus of applied research programs.

Respondent #3
No response

Respondent #4
Stephen commented on responses from IRG in Australia about the familiarity/use of the different models. ‘Not surprised we did an exercise with Urban and National Parks managers and they had no interest or understanding of the models generally with the exception of ROS.’

Respondent #5
My thoughts on this topic are probably more suggestive of how I’d like management of protected areas to look than how it might actually look. However, I know more about the former than the latter. I would like protected areas to be managed according to one of the (what I consider to be quite similar) contemporary carrying capacity-related frameworks, including limits of acceptable change and visitor experience and resource protection. This will require managers to formulate specific management objectives for desired resource and experiential conditions, including quantitative indicators and standards of quality. Formulation of management objectives and associated indicators and standards of quality will be based on a program of research on the relationship between visitor use and resource and social impacts, societal norms for the protected areas conditions, and a program of public involvement. Indicator variables derived from this process will be monitored on a regular basis to determine if park conditions are within specified standards. In some cases, computer simulation models of visitor use and related impacts will be used for monitoring purposes. When monitoring suggests that visitor impacts are violating specified standards of quality, then managers will adopt and implement a series of management actions (use limits, public education, rules and regulations, etc.) designed to reduce visitor impacts. Managers will use professional handbooks jointly developed by the agencies and academics to guide this process.

Respondent #6
No response

Respondent #7
I have always considered myself one of the world’s greatest optimists but of late I have been running hot and cold, or better yet, optimistic to pessimistic. Right now I’m sort of in the pessimistic mood. I’m not pleased with the way policy and politics is going. I am fearful of right wing fundamentalism and see these things as detrimental to the future of protected areas and natural resources. I see a rise of fundamentalism in the U.S. and Australia as well as much of the rest of the world. I do not think it bodes well for protected areas. I think the progress we made through the 80s and 90s will be curtailed in the future to such a degree that it will take another major swing to recover the setbacks of the next 10 years. I think our future rests with a tourism industry and tourist population (and other related user groups and industry folks) that messes its own nest to a point where it realises if it doesn’t clean up its act; it’s going to lose the very things it uses for fun or profit. I’m not sure resource managers will have much say in how this plays out. I thought we were close to getting there (a cleaner act) in the latter part of the 90s but I’m not so sure today. I guess I fear that things are going to get worse before the get better (drilling in special places, more snowmobiles in special places, less
roadless areas, etc.). I feel more polarised and threatened on these and many other important social, economic, cultural, and environmental issues than I have in my entire life.

Respondent #8
I see PA management driven by accountability! SoP reporting is the start! We will see formalised practices of adaptive management. With specialists working with field staff to modify practices. Resource assessment commissions (or equivalents) will look at landscapes where conservation and production will be integrated. It will be quickly realised that PAs are not the answer! Now I move to my ideal … There will be strict nature preserves to strict production areas and the myriad of possibilities between. IUCN categories will be outdated concepts as will be the concept of PAs as we see them now. They will exist, but their role will be different. There will be many community PAs, as government increasingly fails in its delivery of its conservation obligation and the protection of natural capital will return to where it belongs, with the people. Social capital will be protected and strengthened and amassed financial capital will be converted to social capital and natural capital. The city will pay for the expertise and care provided by the bush.
APPENDIX I: INDUSTRY REFERENCE GROUP QUESTIONNAIRE AND RESPONSES (ROUND 1)

DELPHI QUESTIONS FOR INDUSTRY REFERENCE GROUP (PART ONE)
Round One

Please insert your text responses within each question, and return to University of South Australia (Kirsty.Tumes@unisa.edu.au) by Tuesday 7 September.

A. Currently, what tools - including concepts, frameworks, models, and process - does the agency use to manage and plan for sustaining protected areas? Please specify particular frameworks by name if possible (e.g. Limits of Acceptable Change).

1a. What tools or management procedures does the agency use to manage visitor impacts?
1b. What has been the outcome of use? What is your evaluation of the usefulness of each planning / management tool used?
1c. Specify whether this use is specific to a park unit or applied system-wide.

2a. What tools or management procedures does the agency use to maintain and monitor ecological systems and biodiversity conservation?
2b. What has been the outcome of use? What is your evaluation of the usefulness of each planning / management tool used?
2c. Specify whether this use is specific to a park unit or applied system-wide.

B. Which concepts, frameworks, models and processes has the agency tried or examined, and then chosen not to use? Why are the tools not useful?

C. Please review the matrix immediately below, and then fill in the Table 1 in response to the questions listed.

<table>
<thead>
<tr>
<th>Tools</th>
<th>By Definition</th>
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</thead>
<tbody>
<tr>
<td>Satisfaction Approach</td>
<td>The satisfaction approach is based on the economic model of marginal utility input – output. That is the model is based on the assumed inverse relationship between use density and visitor satisfaction. That is the increasing numbers of users would result in diminishing satisfaction for each individual user.</td>
</tr>
<tr>
<td>Recreation Opportunity Spectrum (ROS)</td>
<td>ROS was developed for identifying and determining the diversity of recreation opportunities for a natural area, based on the idea that the quality of the visitors’ experience is best assured by providing diversity and helping visitors to find the settings providing the experiences they are seeking. Incorporated into LAC system and can be used with VIM.</td>
</tr>
<tr>
<td>Limits of Acceptable Change (LAC)</td>
<td>This process identifies appropriate and acceptable resources and social conditions and the actions needed to protect or achieve those conditions. Its premise is suggests that change is an inevitable consequence of resource use and that a framework is required to tackle resource management problems from the perspective of the extent to which change is acceptable. Based on concepts of ROS and a means of analysis and synthesis. Builds on VERP framework.</td>
</tr>
<tr>
<td>Visitor Impact Management (VIM)</td>
<td>Similar to LAC VIM was developed as an alternative to carrying capacity; however, it is intended to be simpler, narrowing the focus to visitor impacts rather than broader concerns with opportunity classes. Its purpose is developing strategies to keep visitor impacts within acceptable levels.</td>
</tr>
<tr>
<td>Visitor Activity Management Process (VAMP)</td>
<td>Vamp is one element of a broader, integrated planning and management process. It is part of a whole-of-park approach to management. Other parts include a national park management planning process and a natural resources management process. VAMP employs an overt marketing approach to integrate visitors’ requirements with the resource opportunities provided by a given area. It also provides a flexible framework for integrating social and natural science data, therefore seeing ecological data and social science data as compatible.</td>
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<tr>
<td>Visitor Experience Resource Protection</td>
<td>Integral to this process is determining the appropriate range of visitor experiences for a chosen area. Thus, zoning is a focus. VERP underpins management plans by</td>
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<tr>
<td>Model/Method</td>
<td>Description</td>
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<tr>
<td>(VERP)</td>
<td>Producing a series of zones for inclusion. An important premise underlying VERP is that zoning should be resource related and not determined by the location of existing facilities. It is a new process dealing with carrying capacity in terms of the quality of the resources and the quality of the visitor experience.</td>
</tr>
<tr>
<td>Tourism Optimisation Management Model (TOMM)</td>
<td>TOMM’s objectives are – monitor and quantify the key benefits and impacts of tourism activity and assist in assessing emerging issues and alternative future options for sustainable tourism.</td>
</tr>
<tr>
<td>Recreation Benefits Simulation (RB-Sim)</td>
<td>RB-Sim is a computer program that simulates the behaviour of human recreators in high use natural environments. It is a computer model that allows park management to explore the consequences of change to any one or more variable. It has a qualitative approach where it understands management scenarios using map graphics from GIS, and quantitative by understanding management consequences by generating user statistics during simulation.</td>
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<tr>
<td>Travel cost method</td>
<td>The simple travel cost method values a single site by observing how much people are willing to pay to visit a site. The model assumes that people will make repeated trips to a site until the marginal value of the last trip is just worth what they have to pay to get there.</td>
</tr>
<tr>
<td>Contingent Valuation Method (CVM)</td>
<td>CVM involves directly asking people, in a survey how much they are willing to pay for specific environmental services. It is referred to as ‘stated preference’ because it asks people to directly state their values, rather than inferring values from actual choices, as the ‘revealed preference’ methods do. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is called ‘contingent’ valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service.</td>
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<td>Input-Output models for estimation of economic impact</td>
<td>IMPLAN is an economic impact assessment modelling system. IMPLAN allows the users to easily build economic models to estimate the impacts of economic changes. The software allows the user to develop local level input-output models that can estimate the economic impact of new firms moving into an area.</td>
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<tr>
<td>Tourism Futures Simulator</td>
<td>TFS is a framework to assist tourism regions to develop and test future tourism options. It consists of procedures and tools to guide future planning and scenario testing. The TFS is a computer model, but it also helps define a process for engaging the industry in a system view of tourism.</td>
</tr>
<tr>
<td>Carrying Capacity</td>
<td>It is the maximum level of use an area can sustain as determined by natural factors such as food, shelter and water. In the early 1960s the concept was applied to recreation, especially wilderness management, so as wilderness conditions deteriorate in the face of rapidly escalating levels of use. Management hope to be able to determine a visitor carrying capacity below which the natural environment could be sustained. Habitat models are specific biological models that relate to environmental variables to specific species ecology.</td>
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<tr>
<td>Ecological Footprint</td>
<td>The ecological footprint methodology pioneered by Dr William Rees attempts to measure the impact of a specified population on the planet’s resources. The ecological footprint is defined as the area of land and water ecosystems required to produce the resources that the population consumes, and to assimilate the wastes that the population produces, wherever on Earth the relevant land/water may be located.</td>
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<tr>
<td>Aboriginal perspectives on resource management</td>
<td>Indigenous people exist in a kinship relationship to the land and its flora and fauna. It involves an intensive relationship which is established through listening and learning from country for many lifetimes.</td>
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(1) (second column) Using a 5-point scale, what is your level of familiarity with each of these concepts, frameworks, and models? 1 = Never heard of it; 2 = Heard of it but not familiar; 3 = Slight familiarity; 4 = Average working familiarity; and 5 = Very familiar.

(2) (third column) Using a 5-point scale, what is the extent of current agency usage of each tool? 1 = don’t use; 2 = used in 1 location or instance; 3 = used in a few (2-4) locations or instances; 4 = used in 5-8 locations or instances; and 5 = widespread (9+) application across the agency.

(3) (fourth column) Please rank the top three most useful protected areas management tools, regardless of whether the agency uses them or not. 1 = most useful tool; 2 = second most useful tool; and 3 = third most useful tool.

(4) (fifth column) Please place an X for each of the three least useful protected areas management tools.
TABLE 1

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<thead>
<tr>
<th>Concepts/Framework/Models</th>
<th>Question 1</th>
<th>Question 2</th>
<th>Question 3</th>
<th>Question 4</th>
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<td></td>
<td>Level of Familiarity (1 5)</td>
<td>Agency use at present (1 5)</td>
<td>Top 3 most useful (1, 2, 3)</td>
<td>Bottom 3 least useful (X, X, X)</td>
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D. Is there anything else you can think of that would be helpful to better manage visitor impacts (e.g. specific data, process, policy)?

Currently what tools - including concepts, frameworks, models and process - does the agency use to manage and plan for sustaining protected areas?

John Nankervis, Parks Victoria
Levels of service: Environmental Management System (values/risk assessment matrix approach); in the process of introducing LAC; Quality Plans for Works (includes values risk/impact assessment)

Brett Waring /Pamela Harmon-Price, EPA
No response

Wet Tropics Management Authority
Has a legislative management plan for the WHA based on zoning system and activities in the zones which may be allowed. Several strategies have been developed for tourism, walking and conservation as policies.

Robyn Smith QLD Parks
No response

Neville Byrne, SA, DEH
Use a broad concept of ROS to provide a range of in-park opportunities. Developing a level of service approach that identified priorities for development, based on the gap between current level of offer and desirable/demand level of offer, overlaid with a priority weighting for safety or environmental risk mediation. This system is required to provide financially sustainable development of tourism facilities.

Stuart Lennox, Parks & Wildlife Service, TAS
PWS operate an internal and external planning system. Internal - The management plan, as required under legislation is a statutory plan that details the PWS vision and management approach to a park or reserve. Tasmanian Reserve Management Code of Practice. The Code of Practice set out to specify appropriate standards and practices for new activities in any land based reserve that have been assessed and approved through reserve management planning. Reserve Standards Framework. This sets out the type of use that is undertaken at the site/zone and the standards that we must meet to ensure the safe delivery of that use. Reserve Activity Assessment. This is a process for the approval of most management activities on reserved lands. Limits of Acceptable Change PWS has used LAC to deal with specific issues at one or more specific sites. Recreation Opportunity Spectrum PWS uses ROS as part of management planning.
External Resource planning Development commission The RPDC provides independent advice on PWS response to public comment on management plans. Land Use Planning and Assessments PWS have to engage with the State system for planning as required under LUPAA. This effectively means that the PWS has to apply for Development and/or Building approvals through the relevant local council.

Meryl Triggs, DEH, NT
No response

Daryl Moncrieff, CALM

Rod Hillman, Environment, ACT
No comment

1a: What tools or management procedures does the agency use to manage visitor impacts?

John Nankervis, Parks Victoria
Levels of Service (LOS) Quality plans for Works Projects

Brett Waring /Pamela Harmon-Price, EPA
1) Visitor satisfaction/ importance monitoring; 2) Contingent valuation; 3) Sound practice indicators/ park folios/ rapid assessment/ park profiles; 4) carrying capacity; 5) LAC; 6) ROS-based classification scheme of nine settings based on physical, social and managerial attributes; 7) Zoning; 8) Australian standard track classification scheme; 9) Regulations and permits and research and resource monitoring are also used to manage visitor impacts.

Wet Tropics Management Authority
The tourism strategies set out a range of desired settings and levels of use for sites and walks. Generally based on ROS and sometimes include desired carrying capacity. QPWS is instituting a settings approach to site and walk management and monitoring. Classifications are on a scale of 1 to 9 for natural social and managerial settings (1 = very natural, 9 = urban) Settings are used to monitor sites and walks and maintain the desired visitor experience. Do limit numbers at particular times. Also been some attempt to influence marketing of visitor sites and particular areas to influence visitor behaviour, keep some sites low key and other well promoted. Extensive surveys of visitor numbers, behaviours, satisfaction, knowledge and opinions at sites throughout the WHA. Indigenous consultation is integral as well as track standards and facility standards.

Robyn Smith QLD Parks
Landscape classification system and recreation value, an extension of the ROS concept. No longer use the nature conservation, cultural heritage, forest product, ecotourism value modelling as used in Koombooloomba Ecotourism Project only because the agency hasn't caught up.

Neville Byrne, SA, DEH
Nothing systematic at this stage, more a reactive approach to observed or reported unacceptable impacts or risks. (Unacceptability is usually assessed locally or as part of a structured risk assessment program)

Stuart Lennox, Parks & Wildlife Service, TAS
A combination of the tools described above but the management plan, site plans, RAA, RSF and LAC are most relevant in terms of visitor impacts

Meryl Triggs, DEH, NT
Management plans are the key tools which outline how the park's natural and cultural resources are managed. None of the tools listed are currently being used in a formal manner, but the principles of many are applied. Visitor impacts are observed on a day-to-day basis by park rangers and more holistically through research and monitoring programs carried out in the parks under management plans. Also Quarterly visitor satisfaction surveys conducted by NTTC, and NT Parks. Traffic counters, pedestrian counters, ticket sales and to some extent tour operator permit systems are used to monitor number of visitors in the park. The Visitor Data System (VDS) based on the NSWPWS model has been introduced to two parks and may be extended to others. The EPBC Act requires reserves to be assigned to an IUCN
category. Zoning has been used in Parks Australia management plans to determine types of activities (including visitor use and developments) appropriate to categories within each park.

Daryl Moncrieff, CALM
Site management (hardening, directing use, develop facilities). Direct regulation of use (enforcement, zoning, restrictions on use intensity, restrictions on activities). Indirect Regulation of use (alter physical facilities, set eligibility requirements)

Rod Hillman, Environment, ACT
No response

1b: What has been the outcome of use? What is your evaluation of the usefulness of each planning/management tool used?

John Nankervis, Parks Victoria
Quality plans re works has been successful for major works; LOS has been successful in identifying strategic risks.

Brett Waring /Pamela Harmon-Price, EPA
1) Useful but not widely used; 2) Useful to address user pays issues; 3) Useful but difficult to get operational acceptance; 4) Useful but difficult to determine; 5) Useful but subjective; 6) Most useful mechanism; 7) Useful but scale is a problem in terms of homogeneity; 8) Very useful; 9) Vital components of effective visitor management.

Wet Tropics Management Authority
The permit system has been reasonably effective, although currently constrained. ROS has worked well in attempting to distribute different types of activities and opportunities throughout the WHA. Monitoring of settings has been done mainly at a planning level and not taken up well by rangers, whose main focus is visitor safety and maintenance of infrastructure. Visitor surveys have been very useful in identifying community attitudes, visitor numbers and behaviours at a range of sites at the WHA. The survey numbers can also be used to estimate the financial benefits of tourism.

Robyn Smith QLD Parks
LCS is very useful as a framework to standardise regional allocation of visitor facilities, signage and carrying capacity for commercial and group operator permits.

Neville Byrne, SA, DEH
The impact management response is reasonably satisfactory given the available resources to regularly monitor visitor impacts across a large public land estate.

Stuart Lennox, Parks & Wildlife Service, TAS
We measure our performance on several levels. Refer to website on Evaluation of Management Effectiveness. Refer to second Q on usefulness.

Meryl Triggs, DEH, NT
As mentioned above, Parks Australia does not use any of the tools listed in this study. The outcomes of the approaches that we employ (listed above) are used to adaptively manage visitors in accordance with management plans and to contribute to annual state of the park reporting. Not applicable as we do not formally use any of the tools in the study.

Daryl Moncrieff, CALM

Rod Hillman, Environment, ACT
No comment
1c: Specify whether this use is specific to a park unit or applied system-wide

**John Nankervis, Parks Victoria**
Both for above tools

**Brett Waring /Pamela Harmon-Price, EPA**
1) Both; 2) Both; 3) Both; 4) Site specific; 5) Site specific; 6) Both; 7) Both; 8) System –wide; NB Both means they apply it at a site level but it is used widely.

**Wet Tropics Management Authority**
System wide for the WTWHA

**Robyn Smith QLD Parks**
EPA policy - state wide. Recreation value is not yet accepted policy but it is the next step after LCS.

**Neville Byrne, SA, DEH**
State-wide

**Stuart Lennox, Parks & Wildlife Service, TAS**
System wide

**Meryl Triggs, DEH, NT**
Some of the methods we use are park specific (eg VDS), and research methods will depend on the prescriptions of individual management plans but we aim to have a common approach across the parks as much as possible.

**Daryl Moncrieff, CALM**
System Wide

**Rod Hillman, Environment, ACT**
No comment

2a: What tools or management procedures does the agency use to maintain and monitor ecological systems and biodiversity conservation?

**John Nankervis, Parks Victoria**
Environmental Information System (the Information arm of the Environmental Management System)

**Brett Waring /Pamela Harmon-Price, EPA**
Specific research and resource monitoring programs; Sound practice indicators/ park folios/ rapid assessment/ park profiles; Carrying Capacity; LAC; Maintaining landscape settings Most tools include ecological monitoring to maintain biodiversity and ecosystems. Distinction unclear.

**Wet Tropics Management Authority**
The authority is required to produce a State of the WT Tropics report each year and a six-yearly report for the WH body. Currently use numbers of endangered species, numbers of plant and animal species, numbers of weed species and feral animal species, areas of clearing, length of fragmentation corridors such as roads and power lines, areas under protected area status, area under grazing leases, area of rehabilitation, number of visitors

**Robyn Smith QLD Parks**
None that they know of; other than ranger reports, community reports and photographic history

**Neville Byrne, SA, DEH**
No comment

**Stuart Lennox, Parks & Wildlife Service, TAS**
A wide variety, these include track and campsite monitoring, aerial photography for visitor nodes, species specific monitoring, weeds and river bank erosion.

**Meryl Triggs, DEH, NT**
The priorities for scientific research, monitoring and surveying are specified in each park’s management plan. Research, surveys and monitoring are carried out through a variety of approaches including: park staff conducting some surveys
and monitoring; consultants to carry out specialist research and surveys under contracts; other people and organisations do research in the parks by obtaining a research permit; and collaborative research with other organisations. Recovery plans are used for threatened species listed under the EPBC Act. Scientific advisory committees have been established in some of the jointly managed parks where boards of management exist. These committees provide advice on research programs to Parks Australia and the boards of management. The results of research, monitoring and surveying are reported to boards of management. Boards may make decisions about research programs in accordance with management plans.

Daryl Moncrieff, CALM
All management plans have outcome-based assessment. Key performance indicators based on values of given area but include ecological criteria, social criteria and (sometimes) economic criteria. Audited by vesting authority (powers under the CALM Act) and reported to Minister for the Environment. Assessment criteria in Species and Threatened Ecological Communities Recovery Plans.

Rod Hillman, Environment, ACT
No comment

2b: What has been the outcome of use? What is your evaluation of the usefulness of each planning/management tool used?

John Nankervis, Parks Victoria
Greatly improved knowledge of the values of the park network, the risks to those values and priority works required, including an assessment of the success of any work.

Brett Waring /Pamela Harmon-Price, EPA
Sound practice indicators etc is useful but difficult to get operational acceptance. Carrying Capacity useful but challenging; LAC useful but subjective; Maintaining landscape settings is very useful provided settings are documented.

Wet Tropics Management Authority
Most of these reflect the state of the WHA rather than the actual health or condition of the ecosystems. Some attempts are being made to use aerial or satellite mapping to measure the health of the forest. Vegetation mapping from aerial photos has been a very useful exercise, but expensive and difficult to repeat for monitoring purposes.

Robyn Smith QLD Parks
Undoubtedly planning models are integral to the allocation and protection of forest values and uses. Managers need to catch up with the old DNR multiple-use forest planning modelling program (MUMP)

Neville Byrne, SA, DEH
The outcomes of research, monitoring and surveying programs are used to adaptively manage each park and identify future research needs (including providing direction for new management plans). The outcomes are also used to determine where funds need to be allocated to address pressures on the natural and cultural values of our parks (eg; weed and feral animals control programs, controlled burning regimes, protecting rock art sites). The outcomes also contribute to our annual state of the park reporting.

Stuart Lennox, Parks & Wildlife Service, TAS
In most cases these programs have established base line data and enabled the PWS to change management and policies to minimise/mitigate impacts. In terms of the application of LAC with regard to sensitive back country bushwalking and impacts, the PWS has developed a modified LAC to develop strategies for future management with key stakeholder groups.

Meryl Triggs, DEH, NT
The outcomes of research, monitoring and surveying programs are used to adaptively manage each park and identify future research needs (including providing direction for new management plans). The outcomes are also used to determine where funds need to be allocated to address pressures on the natural and cultural values of our parks (eg; weed and feral animals control programs, controlled burning regimes, protecting rock art sites). The outcomes also contribute to our annual state of the park reporting.

Daryl Moncrieff, CALM
Key Performance Assessment – essential/very useful. Guides management over 10 year period against values (ecological, social, economic) of specified area.
Rod Hillman, Environment, ACT
No comment

2c: Specify whether this use is specific to a park unit or applied system-wide

John Nankervis, Parks Victoria
Both

Brett Waring /Pamela Harmon-Price, EPA
Carrying capacity - site specific; LAC - site specific; Landscape classification Scheme - system-wide

Wet Tropics Management Authority
System wide for the WTWHA

Robyn Smith QLD Parks
Was to be state-wide but now defunct

Neville Byrne, SA, DEH
Management plans, developed in accordance with the EPBC Act, as a tool are applied system-wide

Stuart Lennox, Parks & Wildlife Service, TAS
Application has been system wide but on a specific site by site as the issues vary from site to site.

Meryl Triggs, DEH, NT
Management plans, developed in accordance with the EPBC Act, as a tool are applied system-wide.

Daryl Moncrieff, CALM
Based on area of management plan (could be park specific or regional incorporating a number of reserves)

Rod Hillman, Environment, ACT
No comment

Part 1 B

Which concepts, frameworks, models and processes has the agency tried or examined, and then chosen not to use? Why are the tools not useful?

John Nankervis, Parks Victoria
Looked at ROS as a management tool. Found it didn't add much to their management planning approach, especially not all that useful to our urban park network.

Brett Waring /Pamela Harmon-Price, EPA
Sound practice indicators Replaced by rapid assessment. Has not been adopted by new merged agency. Visitor impact management Useful for addressing specific issues but limited usefulness for more complex planning has led to disuse.

Wet Tropics Management Authority
Can't think of any we've tried not to use. The major problem with most of the systems is in the implementation. Generally staff do not have the time for detailed monitoring.

Robyn Smith QLD Parks
Multiple Use Management Planning (MUMP) modelling allowed the collation and comparison of data across a range of forest values to justify and make transport decision making in planning exercises on the estate. The models have been dropped because of cultural and individual differences between DNR & EPA. They have not been examined by EPA.

Neville Byrne, SA, DEH
No comment.
Stuart Lennox, Parks & Wildlife Service, TAS
Satisfaction

Meryl Triggs, DEH, NT
unable to answer this question in detail. Whilst staff are familiar with many of the tools listed in the survey, they have little information about their past application.

Daryl Moncrieff, CALM
Anything that manages by numbers, not impacts (e.g. carrying capacity)

Rod Hillman, Environment, ACT
No comment
APPENDIX J: INDUSTRY REFERENCE GROUP RESPONSES (ROUND 2)

Industry Reference Group
Round 2 Questions

1a: Are you still comfortable with your original responses?

**Campbell Clarke, QLD EPA**
Yes

**Daryl Moncrieff, WA/CALM**
Yes

**Meryl Triegs, DEH, NT**
No

**Pamela Harmon-Price, Brett Waring, QLD**
Happy with most responses except VERP in view of recent work on carrying capacity.

**Neville Byrne, SA DEH**
In the main yes, although I would probably revise my assessment of the use of Aboriginal Perceptions of resource management. In SA we are very familiar with the concept and practice of involving Aboriginal communities in planning, especially with the jointly managed parks. Hence there is a lot of consultation with Aboriginal communities during park planning. So our familiarity with using Aboriginal knowledge is very high (5), as is our use of this technique in consultation and co-operative planning (5).

**Stuart Lennox, Parks & wildlife Service, TAS**
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**Nankervis John, Parks Vic**
Yes

**Carla Rogers, New South Wales**
Yes

1b: Do you want to modify or clarify any of your responses?

**Campbell Clarke, QLD EPA**
I want to emphasise that, in addition to ROS etc, the Wet Tropics WHA is managed using a zoning system (subordinate legislation) which does underlie all tourism management and limits development and road access to areas specified on zoning maps which are an integral part of the Wet Tropics Management Plan 1998. The Plan also outlines permit requirements for specified activities. It is probably our most important tool for managing tourism, and then ROS, LAC etc come later to manage the visitors to areas specified under our legislative plan.

**Rod Hillman, Environment, ACT**
No

**Daryl Moncrieff, WA/CALM**
No

**Meryl Triegs, DEH, NT**
Yes – see tracked changes in separate table

**Pamela Harmon-Price, Brett Waring, QLD**
Would increase familiarity with VERP to 4 and frequency of usage to 2.
Neville Byrne, SA DEH
We also undertake considerable visitor satisfaction research (although it is more broadly based than solely on visitor density effects. Hence our familiarity is high (5) and our application is also high (5).
I would add Levels of Service (LOS) to the list of tools that we use, as this tool (a more detailed variation of ROS has been successfully used in a number of key parks to assist recreation & tourism planning. We are very familiar with this tool (5) and use it in several parks (3) to be expanded across the State. I suspect Parks Victoria would also respond highly to this tool.

Stuart Lennox, Parks & wildlife Service, TAS
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Nankervis John, Parks Vic
No

Carla Rogers, New South Wales
Only to emphasise that often the concepts that underpin tools are used and combined with concepts from other tools in an integrated approach to visitor/protected area management.
And up the use of VIM to a 3 as it has been used in a number of parks.

2: Are there any models or tools mentioned by other respondents that you would be interested in learning more about?

Campbell Clarke, QLD EPA
Not really

Rod Hillman, Environment, ACT
No

Daryl Moncrieff, WA/CALM
No

Meryl Triegs, DEH, NT
No

Pamela Harmon-Price, Brett Waring, QLD
No

Neville Byrne, SA DEH
I would be interested in learning more about how Agencies have used Carrying Capacity as a planning tool, as distinct from merely responding to capacity type impacts. Some Agencies are indicating they are using particular concepts (e.g. carrying capacity). I think that case studies (including costs of projects) that show the successful use of the various tools should be sought from those agencies purporting to use the technique so that these successes can be shared with others involved in this project.

Stuart Lennox, Parks & Wildlife Service, TAS
Always keen to learn more via comparative and critical analyses that includes examination of successful and unsuccessful applications and the reasons therefore. If you are interested, one of the PWS staff did one of LAC prior to the commencement of the BATR process and there is one that was done by Nilsen & Taylor (1997).


Nankervis John, Parks Victoria
In the main my knowledge is not that high for most of the models-Parks Victoria hasn’t been through a rigorous testing and assessment process for the selection of management models. We are however refining our Levels of Service Model to account for environmental value and risk from public use. We are also in the final stages of completing our Levels of Protection Framework-for the management and rating of environmental sensitive values. This will then be fed into the
development of a LAC framework, which will use LOS and LAC to provide a whole of network and whole of park management model.

Carla Rogers, New South Wales
No response

3a: Do you have insights as to why most models and tools for protected areas management are not used in Australia to the degree they are used in North America?

Campbell Clarke, QLD EPA
No idea

Rod Hillman, Environment, ACT
No

Daryl Moncrieff, WA/CALM
Tendency for Australian agencies to be more ground-focused, with models/frameworks viewed as belonging in the realm of academia. It is only over the last ten years that Australian agencies have become more professional throughout the ranks, which has enabled the acceptance of some models. Another reason is the presence of a ‘champion’ to push the cause of such tools. In WA, the role of two Americans familiar with these concepts (Richard Hammond and Wayne Schmidt) cannot be under-estimated.

Meryl Triegs, DEH, NT
I’m not familiar with the North American situation but perhaps the differences in Australia are due to the number of jurisdictional agencies responsible for protected area management. A lack of discussion (until now) between agencies about the pros and cons of tools may also be a contributing factor.

Pamela Harmon-Price, Brett Waring, QLD
Lot of effort required to apply some of these models. North America is perhaps more advanced in visitor management. Australia relies more on ad hoc approaches.

Neville Byrne, SA DEH
Far greater resources (i.e. Federal funds) are allocated to investigating, modifying and implementing the management tools (via Universities and the Federal National Parks & Forest Services. I doubt that State Agencies (as opposed to the NPS & FS) use these tools to a great extent without university assistance. There is a considerably larger academic force involved in researching & teaching protected area management; and hence this quantum of ‘expertise’ can focus on management tool development and testing, without worrying about the pressures of actually on-ground management crises.

Stuart Lennox, Parks & Wildlife Service, TAS
YES
  a) Because the application of many management frameworks in the US is mandated and management decisions are required in many instances to be legally defensible, thus the emphasis on scientifically rigorous definition of limits of acceptable change type standards and the ability to justify the imposition of restrictive management actions when standards are breached.
  b) I suspect there is a lack of expertise in the understanding an application of these techniques. In particular, the technical complexities involved in identifying, developing and negotiating what indicators and standards are to be adopted are not well understood and appreciated by many practitioners.  
  c) The lack of examples, from the US or elsewhere, of successful implementation. That is, not just the planning phase, but rather the full cycle of adaptive management (I have some further details in this regard).
  d) Insufficient resources
  e) Political influences

Nankervis John, Parks Victoria
General historical view is that ROS has poor press i.e. has been superseded. In our case we manage an extensive urban park network and ROS is more tailored to protected areas. We are developing a LAC based framework-hopefully picking the teeth out of it to meet our specific needs. I personally am not a huge rap for LAC but some Executives in Parks Victoria like it.
Carla Rogers, New South Wales
Main reason being that the NPS is a federal land management agency and resultant resource implications (greater resources)
Strong link (although weakening) with park management and biological sciences.
Systematic and comprehensive approach adopted by the US NPS to park planning, which is often reflected in policy.
Centralised planning teams applying models to local areas.
Some approaches, e.g. Aboriginal knowledge not adopted or utilised to same extent in US as compared to Australia.

3b: What would be required for your agency to embrace models and tools for protected areas management?

Campbell Clarke, QLD EPA
The main issue in the WT WHA has been lack of funds and resources to implement existing models and enforce them. There has been a lot of planning and surveys and use of models, but there are few staff to implement these models on the ground or to enforce appropriate visitor and tour operator behaviour.

Rod Hillman, Environment, ACT
Significantly increased resourcing. Currently we do not employ staff with experience and the required skills.

Daryl Moncrieff, WA/CALM
I think CALM is progressively moving to the adoption of useful tools and models. These are generally tested through post-graduate studies with a focus on management outcomes for CALM. This arrangement has been cultivated and formalised between CALM and all WA universities over the past five years.

Meryl Triegs, DEH, NT
For our agency to embrace these tools we would need to be confident of the accuracy and benefits. The tools would need to be easily used by park staff and be cost effective

Pamela Harmon-Price, Brett Waring, QLD
Case studies demonstrating the effectiveness of such tools. Support from research institutions such as the CRCST.

Neville Byrne, SA DEH
Tools that can be readily implemented by field staff with scarce financial and time resources. Demonstrated examples of how the tools can be used in the Australian protected area management environment of small budgets and heavy pressures on available staff.

Stuart Lennox, Parks & Wildlife Service, TAS
The question is too general. Which specific models and tools? It is difficult to provide a helpful response beyond making the observation that more resources would be a good step.

Nankervis John, Parks Victoria
I would say we have a good history of using models but more as a base for a decision-not the decision itself. Parks Victoria is like many organisations with decision making happening at all levels and not always with agreed methods etc. Corporate decisions making discipline is a challenge for all organs. And often the main barrier for the success in the use of models

Carla Rogers, New South Wales
Approach cost effective, simple to use and apply and to train others in application and for some results to be immediate so they can be clearly translated and used in on-going management.

3c: Are there any improvements to or changed characteristics of the models you would like to see that would improve application rates?

Campbell Clarke, QLD EPA
No answer
Rod Hillman, Environment, ACT
In ROS an agreed (by all Australian PAMs) zoning model. Each area seems to invent its own so we are never comparing apples with apples.

Daryl Moncrieff, WA/CALM
I think that models/frameworks should be adapted to local conditions. For example, the application of the ROS in WA takes into account statutory wilderness areas and buffers, local recreational activities (such as remote 4WDing), and partnerships with key stakeholders. As a consequence, it is different than that used in other states.

Meryl Triegs, DEH, NT
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Pamela Harmon-Price, Brett Waring, QLD
Most models and tools require some adaptation to suit specific circumstances.

Neville Byrne, SA DEH
Australian case studies of how these tools are effectively assisting in better protected area management would help greater adoption. Access to a website of proforma that can be used with these tools would also assist those with scare time.

Stuart Lennox, Parks & Wildlife Service, TAS
If people truly understand these frameworks/models, then they have sufficient capacity to adapt and fine tune them to suit their specific local context while retaining the critical elements that are fundamental to these processes. Nilsen & Taylor (1997) provide a neat rundown of these for several of the most commonly applied frameworks/models. In short, what one practitioner might consider an improvement may not be by another simply due to their specific management contexts. Again, some recommendations have already been made some years back by Nilsen & Taylor (1997) as the result of a workshop conducted in the US.

Nankervis John, Parks Victoria
As above I mentioned we are working toward the development of a values management model and will then bring together or LOS (Visitor framework) and LOP (values framework) into the one overall model (LAC) which will give us a better basis for impact identification and response.

Carla Rogers, New South Wales
I think to a large extent we have done this, that is, tailored models and/or borrowed concepts and combined them with others so they achieve requirements detailed in (b).
And reviewing the models and coming up with a model that meets the criteria outlined by Carla in her response to question 3b.

THREATS TO PARKS

4a: How are these threats divided between internal threats (where you have legal/ management authority) and external threats (where you have little to no legal/ management authority)? How are these threats divided between threats caused by visitation and environmental threats unrelated to visitation?

Campbell Clarke, QLD EPA
The major conservation issues identified for the Wet Tropics WHA come mostly from outside the Area.

Rod Hillman, Environment, ACT
Most threats are unrelated to visitation
Most threats are related to impact of urbanisation and 2003 bushfires

Daryl Moncrieff, WA/CALM
External threats are dealt with in three different ways - (1) CALM still has statutory responsibility for protection of wildlife off the conservation estate under the Wildlife Conservation Act (under review at present) (2) through government funded initiatives where there is no legal responsibility. Initiatives include the Salinity Action Plan, Land for Wildlife etc. (3) liaison/consultation with other government agencies such as the WA Planning Commission and the Department of the Environment with statutory authority. How are these threats divided between threats caused by visitation and environmental threats unrelated to visitation? They are not.
Meryl Triegs, DEH, NT
For many of the threats it is difficult to separate internal from external threats as protected areas are not (usually) islands separated from surrounding land. Big picture external threats such as climate change, sea level rise etc are out of our management authority. We prepare management plans for each Commonwealth reserve under the Environment Protection and Biodiversity Conservation Act which are long-term (up to seven years) integrated planning tools for addressing threats. Various research and tourism forums are means for us to collaborate with research institutions, Northern Territory Government agencies and industry representatives to address internal and external threats. The management plans for each Commonwealth reserve divide threats caused by visitation from environmental threats unrelated to visitation although it can be difficult to make a clear distinction for all threats.

Pamela Harmon-Price, Brett Waring, QLD
70% internal, 30% external
60% visitors, 40% environmental issues

Neville Byrne, SA DEH
Threats that affect protected area management in South Australia are reasonably EVENLY divided between external threats and internal threats.
Very few threats are specifically ‘caused’ by visitation (the exceptions being track erosion, site compaction, and some minor weed/disease spread) Rather managers ‘create’ threats by building facilities and expectations about use without having a long-term view of the capacity to manage these facilities and expectations. This said, for the internal threats, visitation (past and future expectations) is a major concern related to asset management and replacement (i.e. too many assets for the available budgets to manage). Track & site impacts are easily managed with proper design and attention to water flows. Environmental threats unrelated to visitation within parks are exceedingly limited.

Stuart Lennox, Parks & Wildlife Service, TAS
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Nankervis John, Parks Vic
Essential Parks Victoria works on internal threats but being part of government, which has numerous programs dealing with external, treats i.e. Good Neighbour programs for rabbits/foxes/dogs etc.
Don’t understand the question - it looks like to question itself defines the division? Parks Victoria at present focuses mostly on environmental threats in our Environmental Management. Visitation management - through Management Plans/Works Processes Quality Plans but not really in any scientific manner for visitors.

Carla Rogers, New South Wales
These are generally distinguished within a management plan, however all threats (both external and internal) will generally be identified as will the appropriate response/management strategy.

4b: Describe the mix of threats

Campbell Clarke, QLD EPA
Indirect threats come from:
- increased urban development and the need for more roads, water and other infrastructure.
- Pressures from tourism to open up new areas.
- Land clearing and agriculture surrounding the WHA.
- pollution of water ways.
Direct threats come from:
- weeds and feral animals.
- introduced diseases such as phytophthora and frog chytrid fungus.
- external fragmentation of different sections of the WHA by cleared farmlands and urban areas.
- internal fragmentation from powerlines and roads.
- changes to fire regimes.
- changes to water flows and water quality.
- climate change effects, especially on high altitude plants and animals.

Visitation and access to remote areas has been linked to spread of weeds, and possibly diseases. As well as to internal fragmentation. Tourism has also been identified as a means to educate people about conservation issues and to help address issues such as fragmentation through tree planting.
Rod Hillman, Environment, ACT
- Water quality (catchment issues).
- Impact of significant fire impacts (2003 bushfires).
- Urban expansion.
- Increased recreational use (quantity and use – mountain bikes etc).

Daryl Moncrieff, WA/CALM
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Meryl Triegs, DEH, NT
The mix of threats to protected areas that our agency must address are extensive, but the main ones are: invasive species (e.g. from yellow crazy ants on Christmas Island to cane toads in Kakadu, also feral animals such as foxes, camels, pigs, cats and weeds include exotic grasses, mimosa, and salvinia); loss of biodiversity; fires; loss of Aboriginal traditional knowledge and protection of cultural sites; growing pressure from increasing visitation and balancing protection of natural and cultural values with meeting visitor expectations; impacts of former and existing mine sites; sustainability of local Aboriginal communities and providing benefits and opportunities from tourism; and risk management and visitor safety (e.g. crocodiles in Kakadu, and the climb at Uluru).

Pamela Harmon-Price, Brett Waring, QLD
Weeds, ferals, water quality degradation, water extraction, run-off and spread of weeds from urban areas, unsustainable tourism and visitor levels, inappropriate visitor use, vandalism, public apathy.

Neville Byrne, SA DEH
External threats - poor wildfire preparation and control, environmental weeds (e.g. olives spread by birds), plant diseases (e.g. P.c.), pest animals, adjacent habitat destruction, and inappropriate landscape and development changes. Internal threats include limited resources, unsustainable asset responsibilities ($), internal plant disease and weed movements, high wildlife numbers.

Stuart Lennox, Parks & Wildlife Service, TAS
There are many threats (too many for a quick bit of feedback prior to Christmas). Two of the critical threats however are:
   a) Insufficient baseline resources to maintain the existing asset base.
   b) The need for the PWS to become proactive rather than reactive.
   c) The need for an agency/state wide strategy for balancing presentation of the states natural and cultural values via recreation/tourism with the protection and conservation of those same values, the very values that make Tasmania special and attract the visitors in the first place.

Nankervis John, Parks Vic
Would be too long – fractured areas with long boundaries next to urban and rural areas has the whole gambit of pressures and issues.

Carla Rogers, New South Wales
The Department is responsible for air and water quality, noise control, chemical and radiation regulation, biodiversity and threatened species, national parks and reserves, Aboriginal cultural heritage, historic sites and pest management, waste reduction and management. Therefore many threats are internal. External threats such as land settlement, agriculture, pests outside of park agency are generally dealt with through co-operative arrangements/ planning with the responsible agency and/or relevant stakeholders and landowners. As an example, co-operative wild dog and fox management plans are prepared by an interagency and stakeholder representative group.

4c: Is your agency’s planning and management focus adequately targeting the greatest threats?

Campbell Clarke, QLD EPA
Yes the WTMA is certainly focused on addressing the greatest threats.

Rod Hillman, Environment, ACT
Attempting to. Again a resourcing issue.
Yes. We undertake a threat analysis at the commencement of each plan. This takes into account the extent of the threat as well as our level of knowledge in mitigating that threat.

Our planning and management focus aims to target the greatest threats within the confines of what park budgets allow. At Uluru and Kakadu, Boards of Management (comprising a majority of Aboriginal members) oversee the preparation and implementation of management plans and cultural priorities can influence management of threats.

Targeting, yes. Adequate remedial action, No.

Not at this stage, really it is slowly improving as we establish planning tools to set limits and assess future impacts

Note: advances are being made on each of the threats identified above

It thinks so yes-have we succeeded – well that is another story!

More emphasis is being placed on monitoring and evaluation and with the results from this, would feel more informed to respond to this question.

An audit by the NSW Audit Office on ‘Managing Natural and Cultural Heritage in Parks and Reserves’ (2004) in NSW gave the department a ‘good practice tick’ for identifying strategic risks and focusing on threats in its plans and strategies, but also stated that we need to establish more measurable outcomes so that we can better measure whether we are achieving success in our management of the parks and reserves.

5a: What percent of financial resources would you allocate to development of new PA impact management models/tools? 0, 0, 25, 30, 50, 50, 50, 80, 20

0

0

50%

50%

50%

80%

75% Note: this should also incorporate workshops where practitioners with experience in applying these frameworks share their experiences and what they have learnt. While much knowledge exists and is developed in the academic world, there is a huge body of knowledge that is untapped and undocumented; and hence unrecognised by many, particularly by academics. Many of the questions in this current process/study illustrate this point. Sharing knowledge is the key! We can all learn from one another.

30%
Carla Rogers, New South Wales
80%

5b: What percent of financial resources would you allocate to training/extension regarding current PA models/tools?

Campbell Clarke, QLD EPA
100%

Rod Hillman, Environment, ACT
100%

Daryl Moncrieff, WA/CALM
50%

Meryl Triegs, DEH, NT
50%

Pamela Harmon-Price, Brett Waring, QLD
50%

Neville Byrne, SA DEH
20%

Stuart Lennox, Parks & Wildlife Service, TAS
75% Note: this should also incorporate workshops where practitioners with experience in applying these frameworks share their experiences and what they have learnt. While much knowledge exists and is developed in the academic world, there is a huge body of knowledge that is untapped and undocumented; and hence unrecognised by many, particularly by academics. Many of the questions in this current process/study illustrate this point. Sharing knowledge is the key! We can all learn from one another

Nankervis John, Parks Victoria
70%

Carla Rogers, New South Wales
20%

6. Comments

Campbell Clarke, QLD EPA
I think we have already allocated significant resources to developing tourism strategies and models for management and visitor surveys. The time has come to allocate resources to implement and enforce these strategies. I.e. some training and extension would be necessary. I pretty much feel that here in the Wet Tropics we have enough management tools available and need to do some on ground implementation to see how and if they work.

Rod Hillman, Environment, ACT
No comment

Daryl Moncrieff, WA/CALM
CALM has developed an excellent relationship with academia over the past five years through the Nature Based Tourism Research Reference Group and the CRC Sustainable Tourism. Research projects are field driven and assessed by a committee comprising representatives from all WA universities. The universities seek students to undertake these projects, with seeding money provided by CALM.

Meryl Triegs, DEH, NT
No comment
7: From your perspective, how could academia best help your agency become more effective in protected areas impact management? Do you have any suggested next action steps?

Campbell Clarke, QLD EPA
See above. And we still need some simple indicators (if they exist) to measure the impacts of tourism on the natural environment at the site level.

Rod Hillman, Environment, ACT
Development of a generally accepted tool so agencies can integrate management and make meaningful comparisons.

Daryl Moncrieff, WA/CALM
No comment

Meryl Triegs, DEH, NT
Academia could have a role in advancing both of the issues identified in Q4, i.e. developing, revising and adapting models and tools, and providing education and training to park agencies for using those tools.

Pamela Harmon-Price, Brett Waring, QLD
Academia could best help by applying various models to real-life situations then hosting workshops to present the findings and explain what worked well and what was less adequate

Neville Byrne, SA DEH
Use their existing resources to adapt and use the tools in a real-life situation to provide examples of how the tools can be used in the parks operating environment.

Stuart Lennox, Parks & Wildlife Service, TAS
I like this question, but need time to think it over.
General Comment: Advances are being made in the development and application of the levels of service concept. A number of agencies, in particular Tasmania PWS and Parks Vic have developed management frameworks built on this concept (TPWS – the Reserves Standards Framework and Parks Vic – Levels of Service). Indeed, other agencies are also interested in this emerging management concept/approach, eg. DEH SA, EPA QLD, and possibly CALM WA. An expanding working group has been established between Parks Vic, DEH SA and TPWS to share knowledge and developments in this exciting area (please come and see me for further details).

Nankervis John, Parks Victoria
Certainly help in the development of LAC to best fit Parks Victoria would help. We run on Output lines and our challenge is to bring both of the Output models together and visitor impact management is at the core of our issue. The other area (and I wonder if academia can help) is the challenge of having corporate decision making disciple where the application and effectiveness of models is often weakened by decisions happening irrespective of agreed approaches etc.
Carla Rogers, New South Wales
More assessment and perhaps theoretical contexting of tools that have been developed within agencies but that do not have same recognition or theoretical basis as tools identified. Evaluation of the effectiveness of applied tools. Essentially, if we are mostly aware of the tools but are not using them, I think there are good reasons. Have a closer look at what we are doing, why (i.e. why tools not being used) the effectiveness thereof and potential modification as opposed to wholesale adoption of tools developed elsewhere. I think many agencies are applying the principles or concepts of most tools identified. I believe that academia could best assist us by reviewing the models and coming up with a model that meets the criteria outlined by my response to question 3b.
REFERENCES


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review of visitor management models, frameworks and processes

AUTHORS

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