PROTECTED AREA VISITOR DATA COLLECTION AND MANAGEMENT: EMERGING ISSUES AND GAPS IN CURRENT AUSTRALIAN PRACTICES

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ABSTRACT

Protected area agencies are charged with the preservation, conservation and management of areas including wilderness, national parks and forests. These agencies are faced with increasing visitor numbers and decreasing budgets at a time where activities like tourism have to be managed alongside their traditional roles as natural resource managers. This paper reports on the outcomes of the first stage of a research project that seeks to guide a nationally consistent approach to visitor use data collection for protected area agencies. First, the paper provides a background literature review of approaches to visitor use data collection for protected area agencies. Second, the paper outlines the participatory action research approach used in the study where thirteen protected area agencies are collaborators in the research process. This approach ensures that the protected areas agencies data needs are central to the research outcomes and recognises the pragmatic organisational cultural issues associated with visitor data collection, management and use. The research process incorporates organisational networking at all levels from head office, regions, branches and individual parks involving management information systems, interviews, focus groups, presentations, briefings and follow-up contact. Third, the paper then presents the emergent themes that examine the issues and gaps in current visitor data collection, management and use systems. The paper concludes with discussion of the challenges to developing a national system of visitor data collection and use.

Keywords: protected area agencies, visitor use, data collection, participative action research, knowledge management

INTRODUCTION

Protected area agencies ('agencies') are charged with the preservation, conservation and management of areas including wilderness, national park and forests. Visitation to protected areas in Australia has increased dramatically during the past few decades (Wardell & Moore, 2004), and currently it is estimated that Australia's protected areas receive 100 million visits annually (Commonwealth Grants Commission, 2006). The increase in visitation has placed growing pressure on these natural and cultural resources and can be partly attributed to increasing numbers of domestic and, in particular, international visitors to key natural attractions (Tourism Research Australia., 2004). Monitoring is vital for effective protected area management and requires the systematic gathering, analysis and integration into management systems of data relating to both the natural environment and visitors over time. While

monitoring has historically focused on the physical and biological aspects of the environment, the systematic collection of visitor data has been an area generally overlooked by protected area managers who have relied instead on ad hoc approaches (ANZECC, 1996; Archer, Griffin, & Hayes, 2001; Muhar, Arnberger, & Brandenburg, 2002; Wardell & Moore, 2004). Australia's protected areas agencies, through the Sustainable Tourism Cooperative Research Centre (STCRC), have recognized that this situation needs to be remedied if they are to adequately plan for and manage visitor use over the coming decades. The need for such work was formally recognized through the establishment of a three-year research project through the STCRC *Sustainable Resources Steering Committee*, which aims to establish a nationally consistent method of visitor data collection across agencies and generally improve practices relating to visitor data. The first stage of this project was to review the adequacy of current collection, management and use of visitor data amongst all agencies in Australia. This paper presents findings on the key themes that emerged from this preliminary stage of the research. In particular, it highlights the most significant issues that emerged across the agencies and identifies major perceived gaps in the agencies' knowledge base relating to visitors.

BACKGROUND LITERATURE REVIEW

Without visitor data, protected area management and planning decisions are based on managers' perceptions and influenced by external financial and political pressures (Pitts & Smith, 1993). Recognition of the lack of a strategic, standardised and systematic approach to visitor monitoring among agencies has been long-recognised in Australia, dating back to at least the early 1980s (e.g. Sheppard (1982)). In response, there have been a number of recent reviews conducted of visitor monitoring practices. One of the first major reviews was carried out by the Victorian National Parks Service in 1996 for the Australia and New Zealand Environment and Conservation Council (ANZECC) Working Group on Benchmarking and Best Practice for National Parks. The resulting guidelines provided a range of standardised measurement and visitor data collection protocols (ANZECC, 1996). A few years later Archer, Griffin and Hayes (2001) undertook a review of visitor data collection practices among Australian agencies, with the intention of describing how the agencies were collecting, storing, analysing, reporting and using visitor data. This study revealed that practices varied widely between agencies and the ANZECC guidelines had been only very partially adopted. The Open Mind Research Group (OMRG) (2002) subsequently undertook a review of Australian and New Zealand agencies for Parks Victoria, in order to examine the extent to which the ANZECC standards had been applied. OMRG found that while the standards were regarded as philosophically appropriate they had limited application in most agencies. Apart from the predictable constraint of the resource implications of applying the standards, the other major constraints included the relative complexity of the standards and the difficulty of operationalising them. In response to these constraints, agencies had adopted their own or other standards, e.g. World Conservation Union (IUCN) (2006), that were perceived to better suit their particular systems.

One of the recommendations by OMRG (2002), to include measuring and incorporating other types of visitor data, is pertinent to this study. Two areas in particular identified themselves as important considerations in developing a national system of visitor use data: benchmarking and tourism specific data. First, benchmarking and best practice are concepts that have also become important and increasingly used in management across a range of tourism and leisure sectors, including protected area management. In Australia, CERM PI® from the University of South Australia has been prominent in undertaking benchmarking studies on service quality and operational indicators over the last decade in sectors such as protected areas (Crilley & Van Ruth, 2004), caravan and tourist parks (Bell, 2002; Hayllar, Crilley, & Bell, 2005), aquatic centres (Howat et al., 2002; Howat, Murray, & Crilley, 2005) and zoological/botanic gardens (Crilley, 2005; Crilley & Price, 2006). Second, given the increasing numbers and proportion of tourists visiting protected areas, it is essential to incorporate the collection of information required to plan for and market to tourists. The *Tourism White Paper* and the *Tourism White*

Paper Implementation Plan (Commonwealth Department of Industry Tourism and Resources, 2003, 2004) specifically identified the need to develop uniquely Australian and niche market experiences. This project offers the opportunity for agencies to collect core visitor indicator statistics that would provide a base to understand the experiences that visitors are seeking in a typology/hierarchy of areas, present psychographic analysis of this information and align the outcomes with the development of uniquely Australian niche market experiences. In effect, this type of information could be shared between protected areas agencies, with efficiency gains arising from not having to undertake this work for every individual protected area but rather being able to rely on data collected in comparable areas.

Common among the findings of all these reviews was the continued variability and inconsistency across the different agencies in terms of: terminology and measurement of visitor use and satisfaction data; frequency of assessment; representativeness of sampling; and integration of visitor data into management and planning decision-making. The reviews also highlighted how most visitor monitoring primarily focuses on measuring visitor numbers and satisfaction as performance indicators, with limited focus given to other types of visitor data such as spatial and temporal data on visitor activities, movements and distribution in protected areas, and visitor motivations, expectations and attitudes. The principle objective of a visitor data collection system is to produce reliable, current data which can be analysed and presented in a format that can guide decision making at all levels in an agency (ANZECC 1996; Wardell and Moore 2004). Cessford, Cockburn and Douglas (2002) argue that it is also vital to have a process for storage and frameworks to integrate visitor data into management decision making. The Commonwealth Grants Commission (2006) has reinforced this need to develop reliable and valid methods of collecting visitor data at a national level for the purposes of resource allocation.

To this end, Wardell and Moore's (2004, ii-v) review of visitor data collection provided 24 guiding principles on which to base future systems. As Wardell and Moore suggest, guiding principles for monitoring systems are relatively broad and have applicability to the elements of data collection, storage and application. Appendix 1 presents the guiding principles as a foundation for undertaking protected area agency reviews of visitor use data for this project. It is acknowledged that agencies in some states and territories have made significant recent advances in regards to a systematic and consistent approach to visitor data collection and use (Griffin & Vacaflores, 2004). That said, the variability and inconsistency in approaches toward visitor data collection and use across, and sometimes within, the various agencies makes it very difficult to determine, at the national level, the precise magnitude of visitation, identify visitation trends, or understand visitor markets for national parks and their associated needs. It is with this background in mind that the research was designed to assist in developing a nationally consistent system for collecting, benchmarking and managing visitor data for protected area management.

RESEARCH DESIGN
This project adopted a *participative action research* (PAR) methodology. According to Reason (1994), PAR is probably the most widely practiced participative research approach. PAR can be thought of as having three aims:
- To produce knowledge action directly useful to a group of people;
- To empower people at a deeper level by the process of constructing and using their own knowledge; and
- To value authentic commitment and processes of genuine collaboration.

In PAR research, therefore, the emphasis is on working with groups as co-researchers (Reason, 1994). Adopting the PAR methodology permits the use of diverse methods, and the preferred

way to communicate the practice of PAR is through the description of actual cases. Within this framework, it is recognized that any national system of data collection needs to engage with all organisational levels within agencies, and recognise that the structures and purposes for which data is collected may vary from agency to agency. The researchers needed to ensure that the agencies had a shared ownership of the knowledge created and that this knowledge could be effectively used within each agency at the levels and for the purposes intended. A crucial step in this process was the establishment of an Industry Reference Group (IRG). The role of the IRG was central to the research design and integral to developing cooperative knowledge management within and between agencies. In this sense, the IRG was central to the notion of PAR to encourage the agencies to work together in a collaborative environment. The research design has been closely informed by the IRG, which consists of representatives from seven of Australia's agencies of which four are industry partners of the STCRC. The research team also sought to gain the agencies' acceptance of the project through actively engaging with the Chief Executives through the Heads of Parks Agencies (HOPA) meetings and with operational staff in the field. It was essential to gain both the agreement of the HOPA group as to the importance of the project but also to understand how the agency personnel themselves view the operational aspects of visitor data and knowledge management.

The project has engaged the following agencies:
- NSW Department of Environment and Conservation (NSWDEC);
- WA Department of Environment and Conservation (WADEC);
- SA Department of Environment and Heritage (SADEH);
- Parks Victoria (PVIC):
- Tasmanian Parks and Wildlife Service (TasPWS);
- Northern Territory Parks and Wildlife Service (NTPWS)
- Northern Territory Tourism Commission (NTTC);
- Parks Australia North;
- Parks Australia South;
- Department of Territory and Municipal Services (formerly envACT)
- Queensland Parks and Wildlife Service (QPWS)
- Great Barrier Reef Marine Park Authority (GBRMPA)
- Wet Tropics Management Authority (WTMA)

The overall project approach consists of five main stages:
1. Scoping and review of current practice;
2. Draft technical report on the review outcomes with an opportunity for agency feedback;
3. Development of national core and supplementary indicators;
4. Inform the development of a data management and delivery system; and
5. Develop and implement a programme for the adoption of the recommended system e.g. through demonstration projects (validation through trial to be determined).

This paper reports on the key themes to emerge from Stage 1, which has involved a comprehensive review of visitor data collection, management and use by all of the agencies listed above. The outcome of Stage 1 will be the production of a *Draft Technical Report on Visitor Data Collection and Use* that documents the current practices in each of the agencies, provides a comparative overview of practices between the agencies and identifies key themes, primarily unresolved issues and unmet data needs, to emerge from the review.

The key methods used in Stage 1 were: a review of visitor data/management information systems; and interviews with key personnel involved in visitor research design, collection or use. Both these methods were guided by the literature reviewed in the previous section, the past experiences of the researchers involved, suggestions by the IRG, and Wardell and Moore's

(2004) guiding principles and practices as previously discussed (Appendix 1). The major components of these methods included:

- Consultation with the IRG and key head office personnel from each agency;
- An ongoing snowballing technique to establish relevant contacts within agencies;
- Semi-structured interviews with agency personnel who were identified through the above processes;
- E-mailing of the interview schedule to contacts prior to interviewing;
- A series of face-to-face, telephone and focus group interviews with agency contacts;
- Taping of these interview sessions to ensure accuracy of record-keeping;
- Follow-up email/telephone/fax contacts to collect management information reports and other additional information; and
- Recording of information in a matrix structure reflecting the various types of visitor data being collected against a set of key questions about data collection, management and use, as described below.

The interviews were guided by a matrix that sought to address the following questions:

- What types of visitor data are collected?
- How is the data collected?
- At what organisational level is visitor data collected?
- How is visitor data used and to what extent is visitor data integrated into management planning and decision-making?
- How is visitor data stored within the agency?
- What are the factors influencing or constraining the collection and use of visitor data?
- Are there protocols in place to guide visitor data collection, management, and use?
- How adequate and reliable is the available data?
- What are the perceived gaps in existing collections?

These questions were developed through a review of the literature and validated through consultation with the IRG. The number and range of interviews undertaken within each agency varied depending on the complexity of the organisational structure, size and agency context. The interview process sought to include a broad range of perspectives from all relevant areas of the agencies. A total of 120 interviews were conducted by the research team over a six-month period from February to August 2006. A protocol was developed to guide the selection of staff for inclusion in the interview process. Essentially, the team sought to interview those staff involved in either the collection, management or use of visitor data, or were responsible for performing functions which relied on visitor data. The selection of relevant interviewees was driven by a snowballing approach that began with fielding recommendations from the IRG and other key agency contacts within the various head offices. The relative success of the project has been facilitated by the positive approach taken by all members of the agencies including the Heads, IRG members and individuals involved in the participative action research process. This paper focuses on a critical review of current practice, which has been aided by the willing involvement and open and frank discussions with agency staff during this stage of the project. This review has also identified numerous examples of good, even exemplary practice by each of the agencies. These practices will be fully documented and used to inform the future stages of the research and any subsequent publications. The remainder of the paper will focus on a discussion of the emergent themes where there is clearly room for improvement in current practices.

DISCUSSION OF EMERGENT THEMES

The findings from this study indicate that there are some significant problems associated with the collection, management and use of visitor data by Australia's agencies. This section articulates the major themes that emerged from the review process, as reported by the various

agency staff interviewed. Most of the themes discussed below emerged as problems or deficiencies in the majority of agencies. They represent key areas where action is required to improve the quality and quantity of visitor data and/or the use to which it is put. The discussion is divided into two sections:

- Key issues associated with current data collection, management and use; and
- Significant gaps in current data collections, where the agencies have identified a need for new or additional data.

It should be noted that not all of these issues or gaps were evident in all agencies, rather there were numerous instances of what appear to be very effective and appropriate practices, some of which could act as models for practices in other agencies. A full exposition of these successful practices is, however, beyond the scope of this paper. The research team also sought to understand the circumstances which had contributed to the deficiencies in current practices, recognising that devising solutions must be sensitive to and cognisant of these circumstances. All agencies are constrained in terms of their human and financial resources. In some agencies, there were significant cultural factors that also militated against the strategic and systematic collection and use of visitor data. The organisational structures of agencies also differed in terms of the degree of centralisation, as did the range of tenures for which that they were responsible, and these factors created some specific difficulties for developing visitor data systems. Formulating solutions is thus a complex task, but this process must necessarily begin with an understanding of the problems that need to be addressed most urgently.

Issues

The key issues could be grouped under five main themes:

- Measurement;
- Use of data;
- Knowledge management;
- Communication; and
- Staff training and capability.

Measurement

The most significant measurement issue related to counting the number of visits to protected areas. Problems were evident at both the aggregate state/territory and individual park levels. A wide variety of methods was employed but, generally, current methods for estimating visitor numbers were fraught with difficulties and were often regarded as producing highly unreliable figures. Moreover, counting methods often involved high costs in terms of capital expenditures on equipment and staff time, and questions must be raised about whether this represents money well spent.

For individual protected areas, the most common method of counting visitor numbers involved counting the numbers of vehicles entering and then calibrating that with figures on the number of persons per vehicle. Calibration also can allow for multiple vehicle movements and movements by agency vehicles. Ultimately, the accuracy of visitor counts emerging from vehicle counters relies on the quality of the calibration. Vehicle counters generally were of two main types: classifiers and non-classifiers. The former are able to record data on the times of entry, thus enabling an analysis of visitor flows over time, and can identify the type of vehicle, to which different passengers per vehicle figures can be applied. In principle, classifiers should be capable of producing more accurate and detailed visitor counts. However, the review revealed numerous problems: equipment failures; vandalism or theft of counting units; problems with durability and poor maintenance; units being installed and then no record being kept of their location; units being purchased and not installed; and a variety of technical or resourcing problems, such as the units requiring a laptop to download data but no laptop being

available to the relevant park staff. Such problems often led to a reversion to the less sophisticated non-classifier counters, or the abandonment of visitor counting altogether. Where vehicle counting was maintained, it was often not supported by appropriate, recent studies to enable accurate calibration. Management units within the agencies generally had far fewer resources than required to properly implement and maintain a visitor counting system.

At the aggregate level, all state and territory agencies expressed a powerful need for a more accurate method of estimating total visitation within their jurisdiction, with a number of agencies describing these estimates as "embarrassing". The perceived value of such data was that it provided a key performance indicator for the agency. It was also fundamental to any attempt to construct an estimate of the economic value of the protected area estate, which was seen as vital to support funding submissions to the respective state or territory Treasuries. In addition, all state and territory agencies must report their annual visitation numbers and these figures become the basis for these estimates to the Commonwealth Grants Commission, which make recommendations to the Commonwealth and state treasuries about the granting of resources for agencies. The fact that different agencies had varying methods for arriving at these estimates, most of which were acknowledged as being subject to a high margin for error, was a concern for some agencies. Agencies that tended to be conservative in their estimates felt that they could be disadvantaged in the distribution of funds. One agency noted that it had been disadvantaged by a number of recent amalgamations of a few small adjoining national parks into one large park. In such situations a single visit would now be recorded where, on a single trip, a visitor has been to different parts of the park which had, until recently, been separate parks; previously these visits would have been counted as multiple national park visits. There were also concerns over whether the number of visits to national parks, which could be varyingly defined, was an adequate basis for determining the load that visitors placed on protected areas. For example, in making a case for additional funding from the Commonwealth to support management activities visits could vary in duration and this could have a great influence on the load placed on a park. For this reason alone, there is a strong case for standardising the method for estimating aggregate visitor numbers, or an alternative visitor load indicator, across all agencies.

In relation to visitor data other than counts, there was a general issue relating to the variability in the way certain indicators were measured, across agencies and even in different management units within the same agency. This makes it unnecessarily difficult to draw inferences about general issues such as the importance of certain park facilities, and to benchmark performance against other parks and agencies in relation to performance indicators such as visitor satisfaction.

Use of Data
In most agencies, there was generally a poor integration of data into many management and planning processes. Visitor data were rarely integrated with other management information systems, such as those dealing with asset or risk management, although some agencies had made progress in this direction. Many park management plans were poorly informed by hard visitor data. For example, rarely were any visitor surveys conducted in the process of preparing a park management plan but, rather, there was a reliance on the "best available" data, which often involved simply talking to rangers about their views on visitor profiles, expectations and facility requirements.

There were numerous reported instances of visitor data being collected but not used or made generally available to staff who might find value in it. Often the problem was a lack of time to properly analyse and interpret the data, although on some occasions this was due to a lack of appropriate resources, such as computer software, or appropriate staff expertise to carry out such activities. Associated with this was the observation that some data was not being used as

thoroughly as it could be, and was even disposed of when it had served its immediate purpose. It was recognised that data relating to such things as licensed commercial tour operators, camping permits and visitor passes could yield much valuable information about visitors but it was rarely analysed beyond its immediate purpose or made available to staff in other operational units of the agency. There was also limited use made, or even awareness of secondary data from sources outside of the agencies, such as Tourism Research Australia (TRA) and Australian Bureau of Statistics (ABS), which could have implications for strategic planning and park management.

Knowledge Management
Generally, there has been a great deal of activity in relation to the collection of visitor data amongst agencies over the past decade or so. However, much of that activity has been carried out in an unsystematic way and without an overall framework that would enable the knowledge generated to be managed, disseminated and used effectively and efficiently across all relevant units of the agency. This issue had been previously identified in a number of studies discussed in the background literature section of this paper. Certainly, some agencies have been making efforts to address this problem and have made considerable progress in this regard. Others, however, are still very much in the embryonic stage, and in some cases, the early outcomes from current efforts to develop visitor-related knowledge management systems are not encouraging. Overall, the need for data to contribute to improving the evaluation of management effectiveness was identified as a strategic priority for a number of agencies. To this end it was recognised that visitor data reporting frameworks need to be integrated with park management plans to include performance indicators, targets and other measures for assessing outcomes relating to management objectives.

Much of the visitor data generated within agencies has been collected on an *ad hoc* basis, without an overall research strategy that could provide an organising framework. Most agencies lacked a central registry or database of visitor research, so that many agency staff were not aware of the availability of data that could be useful to them. There were also numerous instances of data being gathered but not being made generally accessible to staff because of the lack of an appropriate storage and delivery system. In some cases, agencies had developed different data storage and management systems relating to various activities and functions but there was a high degree of fragmentation and a lack of coordination between these systems. Finally, many of the efforts to improve the situation had been over-reliant on individual staff initiative rather than being driven by a systematic approach. The result was that when that staff member left the organisation or took periods of extended leave there was at best a loss of momentum and at worst a complete cessation of that effort. In some instances, records were not kept to provide a corporate memory of even basic things like the location of vehicle counters.

Communication
The agencies reviewed varied in terms of their organisational structures, often a reflection of scale, and the extent to which control over matters relating to visitor data was centralised. In some cases, responsibility for these activities was highly decentralised with limited direction from head office. Similarly, the channels and levels of communication were highly variable. Often, however, the direction to collect visitor data was given by a higher level to a lower level within the agency's hierarchy without their being adequate communication between the two levels. Field staff, for example, were reported as ignoring head office or other higher-level directives. This was most commonly attributed to field staff not seeing the value of the data they were being asked to collect and/or experiences of the results of data analysis not being fed back to them from higher levels. Some agencies also reported that cultural issues were a constraint to visitor data collection and contributed to differing perceptions of the value of such data, and general attitudes to visitors, at different organisational levels. In some instances staff at lower levels complained of a lack of direction on visitor data matters from higher levels of the agency,

so that they were largely left to rely on individual initiative.

Staff Training and Capability
At a very general level, there were concerns about the capabilities of staff with regard to the collection, analysis and interpretation of data. This presented a considerable constraint on the subsequent use and application of data to inform planning and management decisions. In some instances, visitor data collection protocols and management systems had been introduced without adequate cross-agency training on how to operationalise and use these.

Gaps
The agencies recognised a broad range of needs where potentially valuable data was not being collected, or the current quality and quantity of those data were seriously inadequate. In a few instances, some agencies were addressing these needs but most were not. The most significant unrequited data needs included:

- Developing credible estimates of the economic value of protected areas, at both state/territory and regional levels. This data is considered highly important in supporting funding submissions to Treasury or Cabinet. A recent method developed by Carlsen & Wood (2004) was viewed by some agencies as potentially filling this gap, although this was not a view held by all.

- Assessing community perceptions of and attitudes towards protected areas and various aspects of their management. Some agencies had taken steps to address this need at least partially, but only one was currently doing so in an ongoing systematic way.

- Undertaking regular monitoring and interpretation of broad trends that could affect the demand for and use of protected areas. This was thought to be a vital input into strategic planning and was a widely felt need across most agencies and at various levels within agencies.

- Understanding the particular requirements of specific user or activity groups. There were specific concerns raised about new and increasingly popular activities such as mountain biking, and about market segments that were making increasing demands on national parks, such as "grey nomads". With the incorporation of many former state forests into national parks, there was also a concern about developing a greater understanding of the new user groups that this would bring to parks, groups that had become accustomed to operating in less constrained environments.

- Developing a better understanding of the diversity of experiences which people sought to have in protected areas, and the service and facility provisions required to appropriately meet expectations about these experiences. There was also a perceived need to better understand the relative importance of various park attributes, services and facilities, so that more appropriate resource allocation decisions could be made.

- Determining the conditions under which, and the point at which, one group of users is effectively displaced by another. This relates to the previous point whereby increasing levels of services and facilities, and the increase in numbers of visitors that might accompany this, changes the nature of the experience and leads some users to seek those experiences elsewhere. This information would allow for a better understanding of the implications of some park planning and management decisions.

- Ascertaining detailed and comprehensive information about the profiles or characteristics of visitors, so that a more precise and thorough segmentation of market can be constructed. The currently available information was often described as being very patchy and partial.

- Understanding the reasons why some people make little or no use of protected areas for tourism and recreation purposes. There was a perceived need in some agencies to try to diversify the current visitor base, and this information was considered fundamental to achieving this.

- Generating more precise data on the spatial patterns of visitor use within parks. Some agencies expressed the need for this data at the individual park level in order to provide a better basis for making decisions about facility provision and impact management.
- Incorporating information on the health and other social benefits of park usage.
- Understanding the type of information that visitors require and expect in order to plan a visit to a park. This was needed to better inform the design of websites, brochures and other promotional material.
- Including better information on visitor impacts and associated cause-and-effect processes.

SUMMARY
With respect to visitor data collection, management and use by Australia's protected area agencies, the project on which this paper is based represents both an acknowledgement that current practices are deficient and a commitment to improve those practices. Before achieving those improvements, however, it was necessary to identify the key shortcomings of current practices from the perspectives of the agencies involved. A participative action research method was employed to this effect, which enabled those within the agencies who were involved with, or relied on visitor data to express their views. This approach also enabled the researchers to gain an in-depth understanding of the constraints under which the agencies operated. The researchers in this instance were playing the dual role of objective, external observers as well as being facilitators of a process of self-appraisal by the agencies. Generally, the agency staff consulted talked freely and objectively about the issues, and often appreciated the opportunity to learn about what was happening in other agencies and in other parts of their own agency.

This paper has highlighted some key outcomes of this process, by pointing to the more common and significant problems with current practices and indicating areas where there was a strong perceived need for visitor-related data that is currently not available. The next stage of the project is to identify ways and means to address these deficiencies and then to initiate a process whereby such strategies for improvement can be implemented. In this sense the project goes beyond previous reviews of visitor data collection amongst Australia's protected agencies, which have defined guiding best practice principles without fully considering the practical implications of operationalising those principles. Having identified the key deficiencies and strengths in current visitor data practices through a participative action research approach, the next stage will also involve working closely with agencies to produce and implement the necessary improvements. The overall aim is to produce better quality, more timely and readily accessible visitor data to those within agencies who need it to support policy, planning, management and operational decisions. There is, moreover, a need to develop a more systematic and strategic approach to visitor data collection, which integrates more thoroughly, effectively and consistently with other agency management processes and systems.

ACKNOWLEDGEMENTS

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APPENDIX 1: GUIDING PRINCIPLES FOR VISITOR DATA IN PROTECTED AREAS

PRINCIPLE	EXPLANATION
	Visitor Monitoring Systems
Principle 1	**Develop partnerships** with other government agencies, industry and the public. Such partnerships can improve relationships with stakeholders and lead to significant cost savings.
Principle 2	**Develop and operate visitor monitoring systems based on clear objectives.** Understanding why data are required and how they will be used are fundamental to a successful system.
Principle 3	**Make data accessible to all levels of management and other stakeholders.** If data are not accessible to staff and stakeholders then they are unlikely to be used to their greatest potential.
Principle 4	**Use pilot studies** when developing visitor monitoring systems to limit expensive, time-consuming changes once systems are fully implemented.
Principle 5	**Develop and operate systems with the flexibility** to collect and store data for a diverse range of sites.
	Data Collection
Principle 6	**Explore simple, innovative data collection techniques** and use a wide range, either singularly or in combination. Recognise that every site has different opportunities and constraints for collecting visitor data.
Principle 7	**Use an adequate, representative sample.** The collection of accurate data relies on selecting an appropriate sample. Data that are not representative of the visitor population should not be used to inform decision-making.
Principle 8	**Undertake systematic, regular collection of visitor data.** Monitoring the changes in visitor characteristics over time is of greater value than a one-off study.
Principle 9	**Ensure data collected have spatial and temporal elements where possible.** Spatial and temporal components increase the utility of visitor use data in protected area management and planning issues.
Principle 10	**Use limited resources wisely.** Only accurate data can properly inform decision-making.
Principle 11	**Work towards regional, state and national data standardisation.** Comparisons and aggregation of similar data are valuable in a number of applications. Data standardisation goes some way towards ensuring valid conclusions are drawn from data comparisons and aggregations.
Principle 12	**Develop and use core questions in visitor surveys.** Visitor surveys should include a core set of questions for all protected areas as well as allowing for additional, site-specific questions to be asked. Such an approach provides flexibility in the choice of data collected within a standardised survey.
Principle 13	**Use existing and secondary data.** Opportunities for using such data should be explored before developing a visitor monitoring system or collecting new data for a specific application.
Principle 14	**Regularly calibrate counters.** Vehicle and pedestrian counters must be regularly calibrated at each location over a range of seasons.
Principle 15	**Aim for quality not quantity of data.** Resources should be directed towards collecting accurate data rather than regularly collecting poor quality data.
	Data Storage
Principle 16	**Verify data to ensure they are error-free before storage and use.** During the data entry process data must be checked for errors before use. Validation as part of system maintenance is necessary to ensure that data are entered and stored in a consistent format. Such maintenance also increases the efficiency of data handling.
Principle 17	**Geo-reference data so they can be used in spatial databases and associated applications.** Spatial management and manipulation of data provides visual representation of visitor numbers, movements and activities in protected areas that can greatly assist in managing visitor use. Such spatial data can also be combined with biophysical data, such as vegetation maps, to enhance the integrated management of protected areas.
Principle 18	**Design and maintain databases that are user-friendly** for data entry, storage and retrieval. Such friendliness reduces the time spent by staff entering and retrieving data, reduces human error and increases the likelihood of data being used in decision-making.
Principle 19	**Guarantee the confidentiality of data.** Some data may be too sensitive for public access, requiring security measures and staff education.
Principle 20	**Display and provide data outputs in ways that readily inform decision-making.** A storage database should have the ability to formulate and present data in ways that can easily, readily and accurately inform decision-making.
Principle 21	**Transfer data efficiently and accurately to storage databases** from sites of data entry. Transfer of data to a storage database should be efficient and minimize human error, for example, by electronic transfer, web links and digital phone technology.
	Data Application
Principle 22	**Use the available visitor data for numerous applications.** Avoid duplicating the collection of data.
Principle 23	**Collect data to enhance understanding of visitor perceptions, motivations and values.** Good management of protected areas relies on exploring not only visitor numbers, but also visitor values and opinion. Such information is needed to help meet the expectations of existing users and potential uses. It is also needed to manage the demand for, as well as the supply of, recreation and tourism opportunities in protected areas.
Principle 24	**Establish and maintain strong links between data collection and application.** How data are to be applied should guide the processes of collection. If there are any changes in application, then corresponding changes to collection may be required.

Source: Wardell and Moore (2004, ii-v)

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