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In the last decade increased attention has been paid to monitoring for ecological and commemorative integrity and visitor experiences. Moving beyond "monitoring for monitoring's sake" various mechanisms from state of park reporting, audits and report cards, external reviews, roundtables and risk assessments have been employed to assist in reporting, assessing and synthesizing the results of monitoring. These '*state of*' tools are utilized at various scales and for purposes ranging from improving and prioritizing planning activities; identifying and evaluating management and restoration initiatives; educating stakeholders; and public accountability. At a time when widespread experimentation with these methods was just beginning, Wiken (1999) proposed criteria for '*State of*' reporting. Ensuring reporting material is **authoritative**; the scope of work is **inclusive**; assessments and conclusions are **objective**; context is **ecosystemic** and that the methods encourage a **preventative and anticipatory** approach are just some of these criteria. Using a modified Delphi process we examined a broad array of tools developed and implemented in various jurisdictions to compare, contrast and critique the strengths and weaknesses of these various approaches. We present a revised set of principles and criteria for '*State of*' reporting and recommendations for obtaining the most value out of these tools.

Keywords: monitoring, reporting, state of parks

Introduction

In the last decade increased attention has been paid to monitoring for ecological and commemorative integrity and visitor experiences. Ensuring that the resulting program is not just "monitoring for monitoring sake" (Grumbine 1994) involves the functions of synthesis, analysis, interpretation, and presentation in order that monitoring data are converted to useable knowledge as part of the broader adaptive management process. Too often treated as an afterthought, the analysis process involves determining in advance the purpose for the monitoring program and who needs information for what purposes at what spatial scale and at what time intervals. Within protected areas various mechanisms from state of park reporting, audits and report cards, external reviews, roundtables and risk assessments have been employed to assist in reporting, assessing and synthesizing the results of monitoring. The application of '*state of*' tools to parks and protected areas (hereafter referred to as SOPs) is an extension of state of environment (SOE) and state of forest (SOF) reporting. Given the overlap between these other types of reporting programs parks and protected areas can learn from, and are frequently a part of these other reports.

These SOP tools are utilized at various scales and for purposes ranging from improving and prioritizing planning activities; identifying and evaluating management and restoration initiatives; educating stakeholders; and public accountability. As such, the audiences for whom SOPs are geared towards varies and the resulting documents vary in how available they are and how the information is presented.

SOP reports vary in a number of ways including: type, scale, authorship, style and methodology (Table 1). True ‘state of’ reports (e.g., SOP, SOE, SOF) are typically a presentation and examination of monitoring data collected at the scale of interest to provide an overall assessment of the state of the resource(s) in question. Other approaches rely less on specific monitoring data (which may not be available) and present a resource assessment based on for example a professional assessment of stressors affecting the resource; or expert judgment of a range of other key aspects. Still others are more organizational in scope and focus on assessing management capacity, management performance, or management effectiveness.

State of reports also vary by spatial scale and there may, or may not be, explicit links between reporting at various scales (Table 1). Site-level ‘state of’ reports typically examine the results of particular land management units or sites of specific management activity (e.g., results of restoration initiative in a particular grassland property). Park unit-level ‘state of’ reports are the most common reporting out at the scale of the individual park or protected area. In some jurisdictions there will be explicit ‘state of’ reporting conducted at a greater park ecosystem type scale although for some organizations park-unit level reporting includes resource assessments in this broader area. Bioregional ‘state of’ reports have been indicated as a goal for some organizations but examples of these are harder to find at this point and time. Finally, reporting is often done across park units at the organizational level either of a province (e.g., State of Provincial Parks) or federally (e.g., State of National Parks).

Although most SOPs are authored by the organization responsible for managing the protected area it is not uncommon to find ‘state of’ assessments completed by external groups such as non-governmental organizations.

Table 1. Sample of range of different SOP reports by scale, authorship

Title	Scale	Authorship
Center for State of Parks: Virgin Islands National Park Resource Assessment	Park	National Parks and Conservation Association
Fathom Five National Marine Park of Canada: State of the Park Report	Park	Parks Canada Agency
State of the Greater Fundy Ecosystem	Greater Park Ecosystem	Greater Fundy Ecosystem Research Group
The State of BC's Ecological Reserves 2006	Province	Friends of Ecological Reserves
The State of Alberta's Parks and Protected Areas: An analysis of the challenges and opportunities for ensuring ecological integrity	Province	CPAWS
State of Protected Heritage Areas Report 2001 Report	Nation/Agency	Parks Canada Agency
State of the Parks in Finland: Finnish Protected Areas and Their Management 2000 to 2005	Nation/Agency	Natural Heritage Services
The State of the Nation's Ecosystems	National	The Heinz Centre

The differences between SOP reports based on these different attributes are not clear with many a hybridization of various combinations of these attributes. For the purposes of this study we were primarily interested in those that might be more typically identified as 'state of parks' monitoring resource assessments regardless of scale or authorship, however, we looked to other types SOP reporting to inform our critiques.

One of the few articles on 'state of' reporting comes from a 1999 introduction to a special issue of the *George Wright Society* journal, Wiken identified a series of potential principles for 'state of' environment reporting including:

- reporting material should be authoritative;
- the scope of work should be inclusive;
- assessments and conclusions are objective;
- the context should be ecosystemic;
- methods encourage a preventative and anticipatory approach.

Other related literature comes more broadly from the ecosystem/sustainability monitoring disciplines. Clearly the practices of monitoring and reporting are highly interrelated and it is difficulty to reflect on the practice of reporting without commenting on the monitoring foundation from which the information is derived. However, our goal here is not to critique monitoring in general – rather we focus on monitoring literature that relates more narrowly to the presentation or reporting of results.

Failing and Gregory (2003) identified a suite of typically encountered mistakes in forest monitoring that may carry over to reporting the results of monitoring including:

- endpoints undefined/indicators not linked to endpoints;
- mistaking means and ends;
- reporting lists not indicators ;

- letting data availability drive monitoring/reporting;
- not weighting importance of indicators;
- avoiding overly simple summary indices; and
- errors associated with context-specific or scale-specific indicators applied in the wrong situation.

Woodley (1993) noted the value of approaches that help facilitate data interpretation including the value of defining endpoints or reference systems; and the value of analyzing trends. With respect to presenting, or reporting on the results of monitoring Woodley (1993) notes, like Failing and Gregory (2003) the potential utility, albeit complexity, of indices for presenting complex information and synthesizing it for interpretation. Woodley proposes alternatively interpretation devices (e.g., amoeba diagrams) that don't reduce the inherent complexity to a simple index but rather present it in a way that facilitates integration by the individual.

Wright et al (2002) discuss the importance and various types of reference values in understanding the results of monitoring and the range of different types and approaches for reporting, analyzing, synthesizing and presenting the results of monitoring data including individual indicator reports; numeric approaches (e.g., indices); narrative approaches; spatially-based approaches (e.g., GeoNetWeaver); graphic approaches (e.g., Amoeba diagrams, the Sustainability Dashboard or Barometers of Sustainability) among others. They note overall that the value of a good tool to aid in synthesis and reporting are that it:

- reduces complicated presentations of data;
- clarifies complexity;
- helps synthesize components; and
- facilitates understanding of interrelationships.

Purpose

As the practice of SOP reporting is relatively new it seems timely to begin to examine the different approaches taken to date, and to learn as we go about what might make the practice of 'state of' reporting better. The goal of this project was not to critique a specific SOP, or style of SOP, but rather to identify the strengths and weaknesses of various approaches – including those employed by SOE and SOF reporting that may be of value. The goal is to develop a set of principles and criteria for SOP reporting and a set of best practices and recommendations for obtaining the most value from these tools.

Methods

The approach we employed was a modified Delphi panel with two primary stages. In preparation for the Delphi, we assembled a range of SOP, SOE and SOF reports from various scales, countries, organizations and authors. From this initial suite of reports we winnowed out a preliminary set of SOP reports, or portions of reports, that we felt captured the range of the variability presently in practice. Additionally, we conducted a literature review (see for example Wiken 1999 and Failing and Gregory 2003), and a review of the documents themselves to try and identify a potential list of questions or evaluative criteria by which to examine or structure the review of these reports.

An expert panel of twelve specialists from the protected areas or monitoring and evaluation was assembled including members from both from the academic research community and the informed (e.g., ENGO) public. Care was taken to ensure that no panelist had contributed to any of the SOP reports that might be discussed.

This expert panel participated in two rounds of a Delphi process. In stage one, panel members were given access to a non-public website where they could look at the assembled sample of SOP reports. The goal in stage one was to identify a suite of evaluative criteria or questions for SOP reporting. Participants reviewed the existing notes on potential evaluative criteria and questions and then completed a set of questions – primarily open-ended to refine, delete, or add to these questions. Participants were asked to refer or reference the example SOP reports provided as a way of clarifying their suggestions.

The responses were collated, summarized and then re-distributed to panelists for their further review and comment. By and large there were relatively few additions or deletions resulting from this second stage, however, there was significant reorganization of evaluative criteria and questions and identification of critical relationships between criteria. The final stage of the project will be a suite of best-practices assembled from the data provided in stage one and two that will be vetted by the Delphi panelists in a final round. This paper, however, presents the results of the first two stages of the Delphi panel highlighting some of the examples that will be contained in the larger best practices document.

‘State of’ Criteria

The Delphi panel identified a series of evaluative criteria and questions for SOP reports. These were roughly grouped by theme and highlights are presented here in summary tables only. The detailed evaluative questions and notes for each of these criteria will be presented in full in the best practices report.

Purpose of SO Report

The purposes of SO reporting vary and include:

- to inform internal decision makers

- to influence external decision makers
- to satisfy legal requirements
- to maintain familiarity with resource
- to provide better understanding of resource
- to provide background information
- to provide early warning of global or regional problem

Table 2. Purpose-related assessment criteria

Criteria/Questions
Purpose of reporting made clear to reader
Specific intended audience identified
'Decision' resulting from SO report identified
Management context specified
– areas of management control vs. influence vs. context
– management purpose/legislative orientation etc
Relationship of SO report to other documents (e.g., management plans) clear (timing appropriate to other documents)
Frequency of reports clear (and relates to purpose/intended use)

Who Does Assessment

The source of the assessment can vary significantly. Panelists noted that while the "who" does not inherently affect the quality/legitimacy of the report there are potential issues that should be addressed depending on authorship.

Table 3. Author-related assessment criteria

Criteria/Questions
Author affiliation identified (internal, external, combination)
Internal assessment – methods/procedures for verifying information, involvement of 3rd parties in process/proofing reports, availability of original data for verification
External assessment – methods/procedures for verifying information, relationship (and involvement of) to managing agency, availability of original data for verification, review procedures
Sponsors (if different) affiliation identified
Authorizing authority identified (e.g., is report legislatively mandated – by whom?)

Method of Assessment

As the data sources used to prepare SO reports can take many forms the method(s) used should be specified. Specific questions/issues are associated with each of these types of methods.

- ❒ Data-based measurements
- ❒ Stressor survey
- ❒ Professional (internal) judgment
- ❒ Professional (external) judgment
- ❒ External review of 'documents/practices'

Table 4. Method-related criteria

Criteria/Questions
Detailed (with specific methods provided e.g., in an appendix)
Verifiable
For 'professional' related assessments information should be provided re::
extensiveness of review
qualifications of reviewers
criteria/terms for review
methods of verification
Identify methods for ensuring reliability with repeated measures
Peer reviewed

The methods of assessment for the SO report often include important process related steps including consultations with key stakeholders; preliminary gathering and discussion of tentative conclusions with others etc. These process-related steps are equally important and should be provided.

What is Being Reported –Indicators

State of reports summarize progress based on resource assessments, stressor surveys, monitoring data, professional judgments or some combination of these approaches. These assessments are made about specific aspects or elements of performance that for simplicities sake here will be referred to by the monitoring terminology of indicators. There are a range of different types of indicators commonly referred to as:

- input (means measures)
- output
- outcome
- performance (effectiveness) measures
- early warning

Although the intent of this report is not to critique the indicator selection method used by these SOP there is a strong relationship between the selection of the indicators and the reporting approach. Panelists identified a series of criteria that should be examined in this regard organized under a series of sub-headings.

Table 5. Indicator-related criteria

Criteria/Questions
Type of indicators
Relationship between 'indicators' and purpose of reporting
There should be a match between the purpose of reporting and the type of indicators selected. Reporting may be conducted for a variety of reasons e.g.,
– track performance (results-based management),
– to discriminate among competing hypotheses (scientific exploration),
– to discriminate among alternative policies (decision analysis)
Indicators are context specific and should be placed in context
Indicators should be mapped to endpoints

Indicators should be linked to decisions being made
Type of indicators
The type of indicators should relate to the purpose of monitoring (appropriateness)
In most situations there should be a broad range of types of indicators (breadth)
Means (input) measures should be tracked carefully (but not confused with) endpoints
Uncertainty or tradeoffs regarding means measures and endpoints should be indicated
Indicators should be selected to address both short and long term changes
Spatial scale of indicators should be appropriate to the property of the resource to be monitored
Methods (criteria) for selecting indicators
There should be a logical model/framework to explain indicator selection
The framework should illustrate the relationships between indicators
The framework should be presented to the reader
The framework should help conceptualize the system relative to the endpoints for reporting
The framework should be linked to synthesis/analysis of results

Analysis and Synthesis of Information

Analysis and synthesis are separate but related steps in monitoring. SOP reports should not simply present data on the individual indicators (analysis – table 6) to the reader but should help the reader gauge overall performance. Synthesis techniques are those that go beyond simply analyzing individual results. Panelists felt strongly that SOP reports should employ any of a range of techniques (e.g., narrative, graphic etc) to help the reader synthesis the results (synthesis - table 7)

Table 6. Analysis-related criteria

Criteria/Questions
Data sufficiency/information adequacy measure present and obvious
Thresholds (by whatever term) present
Where not available note reasons/time frame
Type and basis for developing thresholds explained/justified
Where data is lacking for an indicator and a narrative/case-study approach is used – the report should be clear on limitations associated with this narrative approach (e.g., uncertainties etc)
Explanation/justification for how reader should weigh the results of progress on differing indicators
Explain relationships (interrelationships) between indicators
If indicator weighting is used explain rationale/approach
If weighting is not used explain why not and implications
Employ graphic approaches to summarize status of indicator
Are these methods meaningful or overly simplistic

Table 7. Synthesis-related criteria

Criteria/Questions
Is there a link made back to the original model or framework (and endpoints) to be monitored?
Is reader instructed as to approaches and limitations associated with synthesis techniques?
Are links between indicators clear?
Are possible futures forecast/ hypothesized?
Where indices are used are they used appropriately and explained?
Summated/synthesized in some way to help tell net status of phenomena
Does the synthesis approach recognize variability across 'scales'?
Does the approach facilitate understanding of cumulative impacts?

Communication Criteria

Building upon the criteria above, there are a series of other criteria that relate directly to presentation of the information to the public. SOP reports are most frequently presented as written documents distributed either in paper form or through websites. Presentations or roundtables may also be used on a more limited basis however the panelists did not comment on these.

Table 8. Communication-related criteria

Criteria/Questions
Targeted audience specified
Assistance with interpretation/synthesis/meaning making
Balance of breadth (overview but shallow) and depth (overwhelmed with details) appropriate to audience
Detailed information (e.g., specific methods or foundational data) available to reader (although preferably not in the core of the report) for re-analysis/examination
Meaningful method of communicating a snapshot
Report is approachable, available, accessible
'Trend' or implications of results available and readily apparent
Context influencing result presented
Alternative explanations, uncertainties and causal relationships specified
Possible futures (implications) are included
Does method of communication misrepresent the specifics
Does information seem verifiable
Scientifically credible
Content is a critical presentation of results – versus a self-congratulatory approach (we only tell good-news stories)
Easily understandable/user friendly
Does the approach encourage action

Discussion and Conclusions

Few reports provided sufficient information on the purpose and intent of the reporting program and on the methods used to gather the information. Interestingly it appeared that external authored reports (e.g., NGO authors) were more likely to provide details regarding methods (e.g., State of BC Ecological Reserves; National Parks and Conservation Associations' Resource Assessments for US National Parks). Few reports provided information on the related and important processes involved in preparing the reports – information that could help verify the trustworthiness of the results.

Panelist found that most of the reports – particularly (although not exclusively) those from internal authors were authoritative in nature and generally presented sufficient detailed information although some (e.g., Greater Fundy Ecosystem) provided so much information in the body of the report as to cloud the significance of the findings. Few written SOP reports, regardless of authorship (internal vs. external) are transparently inclusive. That is to say there may have been procedures in place to ensure multiple perspectives informed or commented on the reports but this information in apparent in the documents themselves. A few (see for example Kluane National Park and Reserve of Canada) are attempting to integrate traditional knowledge and western scientific data together but these are relatively rare and limited in scope as of yet.

The scale/context for which the reports cover largely relates to some organizational/agency mandate (e.g., BC Ecological Reserves, Provincial Parks, National Parks) – examples of state of protected areas systems are largely limited to reporting on number, size, extent and ecosystem representation or similar accounting criteria. A number of the reports limit the contextual scale of the evaluation to the scale of the individual protected area. Regional/bioregional context is often not included. Although SOP reports for Canadian national parks are more likely to be ecosystemic in context there is still work to be done in providing an overall context (recognizing the limitations of management authority/influence) in which to situation the results.

The methods for conducting the assessment varied widely with relatively few organizations having access to sufficient monitoring data to inform results. Most organizations relied more heavily on policy reviews, professional assessments (e.g., stressor surveys) or on reporting monitoring reports for inputs (means measures) as opposed to ends/outcome measures. The latter issue was confounded in many situations when the uncertainty associated with the relationships between means and ends was not discussed (Failing and Gregory 2003) or that endpoints were not even identified in the first place. This critique is common particularly for social/cultural indicators for which the practice of monitoring is less developed overall. We also point out here issues associated with the relative balance of presenting indicator results (regardless of data source) versus the case study/sidebar narrative approach. While reviewers found merit in the use of brief cases or sidebars that bring life to a specific situation (e.g., a sidebar on a species restoration project or on visitor satisfaction for a particular user group) some SOP reports (e.g., Finnish State of Protected Areas) were almost exclusively case study based and consequently it was difficult to obtain a meaningful picture of the state of the system.

This is compounded where the writing style/approach to narrative presentation is self-congratulatory vs. critical.

Most SOP reports presented information on an indicator by indicator basis. Those that had developed some type of model (e.g., Fathom Five) or explicit framework for the selection of indicators tended to use these generally as organizational subheadings. There are an increasing number of reports using graphic status/progress reporting mechanisms (e.g., yellow/green/red status) to indicate the overall state of an indicator or suite of indicators. However, few are using any more explicit techniques to help in synthesizing the results. As a result the overall state of the system is hard to assess and interrelationships and linkages (e.g., between related indicators) are not clear. One organization (National Park and Conservation Association) has developed an overall index – a single multi-metric index score that can be computed at several levels (NPCA, n.d.). Overall indices such as this can be critiqued as black box approaches that may overly simplify complex situations although we note in this case that the NPCA thoroughly documents the methodology used and that individual resource assessment data is available for the reader to re-examine in their own assessment. Delphi panelists in this study were divided in their review of this approach – most appreciating the attempt to synthesize a large amount of information into a more manageable package while some were uncomfortable with the sources of information used in the analysis and the coding/computational methods involved. We feel there is room to explore and experiment with the middle ground between limited to know synthesis of information to those that move from synthesis to aggregation. We continue to look for application of techniques that help the reader navigate through the information, the linkages and interrelationships, and the uncertainties and draw conclusions about possible futures and alternatives.

The first stages of the Delphi panel involved review of a subset of SOP reports with the purpose not to evaluate or critique specific reports but rather to identify key criteria or best practices in SOP reporting. Consequently, the highlights presented here are not meant to be definitive or conclusive of all SOP reporting. Rather they are some of the preliminary observations of the experience of panelists. We have illustrated these comments with examples from various SOP reports – at times highlighting strengths and at other times weaknesses. In doing so our intent is not to criticize any individual report – in fact when looking closely at any SOP report we found a mix of strengths and weaknesses. Rather we found that these specific examples are often a reflection of a different mix of report purpose, intended audiences, resources available for reporting etc and that in our review of these reports we may be stretching the purpose for which these SOP reports were intended. However, these points illustrate ways we can strengthen the practice of ‘state of’ reporting.

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