

AN ALTERNATIVE TO EVALUATE MANAGEMENT EFFECTIVENESS FOR PROTECTED AREAS

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Abstract

This paper proposes a management system focused on enhancing and evaluating management effectiveness for protected areas. The model, developed from case studies from Mexico and Canada, integrates strengths of ecosystem-based management and environmental management systems and principles from certification standards (e.g. sustainable forestry and ecotourism). It is flexible enough to be applied to other situations such as management of public lands. From planning throughout evaluation, two modules distinguish park-driven from agency-driven reporting needs. The model consists of four stages (preparation, planning, implementation, and evaluation). Management objectives and needs are organized into four components (environmental, economic, operations, and social). A planning hierarchy links objectives, indicators, targets and outcomes within each component. The evaluation stage provides effectiveness scores for different management aspects and for overall management. The model helps integrate the uniqueness of individual parks and track management effectiveness on the long term for individual parks and the whole system of parks.

Introduction

The need for more accountability in natural resources and protected areas management has led protected Areas' organizations, e.g. IUCN, to release a framework to evaluate management effectiveness for national systems (Hockings et al. 2000) that can be applied to parks as well. This framework separates inputs, outputs, and outcomes basing evaluation on the last ones.

Various countries such as Spain and Mexico have been developing their own evaluation frameworks (Batiste 2003; Guerra 2003). In Mexico there have been attempts to integrate concepts initially developed in the business sector, e.g. performance evaluation. Mexico's National Commission of Natural Protected Areas (Comision Nacional de Areas Naturales Protegidas, CONANP as per the Spanish acronym) has introduced a System of Indicators for Monitoring, Information, and Conservation (SIMEC, by its Spanish acronym; CONANP 2005).

ISO standards (ISO 1996, 2000) or principles are being adopted by a few parks in an effort to improve management (Batiste, 2003; Di Paola, 2005; PCA 2002). Parks Canada Agency has implemented a system-wide environmental management system to reduce the environmental impacts from operations (PCA 2002). The agency also uses human use and ecological integrity indicators for parks.

However, park agencies are still struggling to integrate different aspects of management and different types of indicators. In

this paper we propose a model of an Ecosystem-Based Management System for Protected Areas (model, hereafter) that combines principles from Ecosystem-Based Management (EBM) and Environmental Management Systems (EMS). These approaches are being adopted to improve management in natural resource and business organizations, respectively (Mendoza et al. 2004). Our Purpose is to develop a management system that can assist parks managers on the planning process and that can facilitate the evaluation of management effectiveness through the integration of different types of indicators.

Methods

The design of the Ecosystem-Based Management System Model consisted of three steps. For detailed information, please refer to Mendoza et al. (2004):

1. Analysis of strengths and weaknesses of EBM and EMS;
2. Identification of criteria for the EBMS based on the previous analysis, observations from case studies (Table 1); and
3. Literature and document review.

The validation and adjustment of the model followed four steps:

4. Presentation of model to the manager and staff of the Mexican case study (Izta-Popo-Zoquiapan Nacional Park).
5. 2-week stay in the park to identify further management needs. This included observations on the reporting and evaluation systems used by the CONANP.
6. Field visits to nine case studies to identify additional management and reporting needs, indicators and reporting schemes (Table 1).
7. Interviews (56 informants) and document reviews to identify additional issues and reporting and/or evaluation requirements.

Table 1. Case studies. NP = National Park, BR = Biosphere Reserve, RPFF = Reserve for Protection of Flora and Fauna.

Protected areas	Location
<i>Mexico</i>	
Izta-Popo-Zoquiapan NP	Mexico-Puebla-Morelos
El Pinacate y Gran Desierto de Altar BR	Sonora
Ría Lagartos BR	Yucatán
Ajos-Bavispe y Buenos Aires, ZPFF	Sonora
<i>Canada</i>	
Grasslands NP	Saskatchewan
Fundy NP	Newfoundland
Pacific Rim NP	British Columbia
Point Pelee NP	Ontario
Waterton Lakes NP	Alberta

Results

Issues identified

Each country had specific issues regarding management, reporting, and evaluation. Some issues were common in both countries.

Mexico

- CONANP has endorsed both the OECD (2003) Pressure-State-Response model and the IUCN (2000) framework. However, current evaluations, based on programs and projects, do not follow them.
- Indicators
 - Development as suggested by OECD and IUCN has been difficult.
 - Those used by SIMEC (CONANP 2005) are a mix of variables, indicators, and targets; they measure mainly processes or inputs.
 - Measuring process or inputs may be misleading for evaluating effectiveness of management or conservation.
- Park reporting is based on pre-determined strategic results. Parks could include modifications but there were two complications:
 - The use of results was not clear for staff
 - There is no clear way to integrate different results introduced by individual parks.
- Park operations are not evaluated; there is not follow up of their efficiency.
- Environmental impacts from parks' operations, programs, or projects are not considered.
- The evaluation process has been confusing to park staff and the results discouraging, perceived as not representative of real achievements.

Canada

- Parks use indicators of ecological integrity to provide information on for the State of Protected Heritage Areas Report. Still, there are aspects of interest for individual parks that are not accounted for in the report on the national system.
- Environmental management indicators are provided by the national agency, some are not relevant or applicable to all the parks.
- Development and integration of indicators for different aspects (e.g. social and environmental aspects) is a challenge.

Both

- Evaluation systems have been designed with a top-down approach (agency to parks).
- It has been difficult to develop indicators that measure management output or outcomes.
- Individual park priorities for evaluation are inadequately reflected in top-down evaluation.
- Parks' projects or activities not fitting into agencies frameworks do not count for evaluation. Thus, some achievements are praised.
- Evaluation systems are not designed to show conflicts among outcomes of different objectives, e.g, increasing revenue a managing visitor's impact.

IUCN framework

There are obstacles to implement the IUCN framework at park or system level:

- The framework combines indicators for management and governance; however, governance is not under managers' control.
- Evaluation does not rely on objectives and targets set in management plans.
- The evaluation systems developed in each country does not follow UICN's framework.

Based on those findings, we proposed five principles to consider for management evaluations:

1. Parks should be evaluated based on elements over which there is management control;
2. Evaluations should rely on what park management commits to achieve, i.e., objectives in management plans;
3. Evaluations should be based on outcomes, not inputs or processes, to really evaluate management effectiveness;
4. Performance, compliance, effectiveness, and efficiency are different aspects. Evaluations should clearly distinguish among them; and
5. Effectiveness in achieving park's conservation and management goals-expressed through objectives and targets-should be the purpose of evaluations.

In addition, the following characteristics would be desirable in the model:

- Implementation, evaluation, and reporting differentiate between aspects of interest for the agency from those of interest of individual parks;
- Indicators and weights are selected through a combination of top-down (agency to park) and bottom-up (park to agency) approach. This acknowledges the specific priorities or needs of individual parks;
- Various types of indicators can still be used to tracks individually social, economic, environmental, and operational aspects;
- Measures of performance or effectiveness are available for each aspect and the whole system.
- Aggregate indicators summarize effectiveness in a single, simple measure.
- Conflicts among objectives or outcomes from different components can be minimized by using the Pressure-State-Response model.
- Indicators for outputs and outcomes of management actions follow the framework proposed by the World Commission on Protected Areas-IUCN PA-IUCN framework (Hockings et al. 2000). This makes the model compatible with the framework.

Structure of the Ecosystem/Based Management System

The Ecosystem/Based Management System model (model hereafter) starts by organizing management objectives in two modules, depending on whether the park or the central agency is the main responsible for achieving the outcome or has direct control over it (Figure 1).

A planning hierarchy is the tool for planning, implementation and evaluation. The higher levels of the hierarchy reflect the principles, policies and regulations that are guiding management (national and international). The lower levels of the hierarchy focus on the implementation and relate objectives to actions needed achieve them, to the desired targets, and to the indicators used to measure progress or success. It helps separate aspects that fall into the agency's interests or responsibilities, from those that are park specific or fall directly under the control of managers and staff.

- Module A: objectives, indicators, and targets that are agency-driven:
 - aspects the agency is required to report on for national purposes;
 - aspects the agency is required to report on for international agreements, treaties, and conventions;
 - governance elements; and
 - objectives whose achievement is not direct responsibility of park managers and staff.
- Module B: objectives, indicators, and targets directly under the control and responsibility of park managers and staff:
 - park-driven priorities;
 - park projects with partner organizations; and
 - requirements for reporting to other national or international entities (e.g., park regional stakeholders or foreign funding organizations, respectively).

The modules, components, and subcomponents reflect the range of policies guiding management, from international commitments of the national agency to individual parks. The hierarchy also helps organizing objectives into four components social, economic, environment, or operations. The model has flexibility to incorporate other components or sublevels in the hierarchy if needed (Appendix....Luf....poster). Thus, according to the level on the hierarchy, some components may be the same for all parks in the national system (e.g., from component to objective) and other may be park specific (e.g., from some objectives to targets; Figure 2).

Figure 1. Structure of the Ecosystem-Based Management System. Modules help organize management objectives and targets according to whether park management has direct control over the outcomes. Components separate objectives in four management areas for parks and two for the agency.

Figure 2. Elements of the Planning Hierarchy. The Hierarchy guides the organization of objectives and their correspondence to management principles or existing regulations.

Adaptive Management Review

The accounting system evaluates quantitatively management performance (through auditing) and/or effectiveness (through evaluation) through achievement of targets. The process used to measure the effectiveness is exemplified in Figure 3.

- The accountability system uses aggregate indicators to summarize effectiveness in a single measure.
- Modules, components, and objectives are weighted according to how important they are at a given time, e.g. reclamation may be more important for older parks with more visitors than for newer parks with fewer visitors).
- By using modules and components, the scores reflect responsibility for achieving outcomes, increasing accountability for outcomes;
- The scores reflect a ratio of the number of objectives with targets that were met in the corresponding level of the hierarchy for the reporting period divided by the total number of objectives in that level.
- The evaluation measures management effectiveness based on outcomes, as defined by Hockings et al. (2000). If a park is in process of consolidation, the indicators can measure inputs, outputs, or processes, although then the scores will reflect performance, rather than effectiveness.

Effectiveness or performance scores can be obtained for any element of the hierarchy: objectives, components, modules, or overall management. The scores give a benchmark to track progress among years for individual parks, for parks within a system, and for the agency in aspects such as governance.

The example provided is based on the assumption that, for calculation the scores per level in the hierarchy, each target achieved counts as one point. i.e. it counts full achievement (0 or 1). Alternatively, it is possible to acknowledge partial progress (0.0 to 1.0); then, the points per target represent the proportion of progress towards achieving it. This may be useful for evaluating long-term projects. As example, on its annual plan a park could have set x number of school visits for an outreach program. In the first case, a point (1) could be given only if the x number was achieved. In the second case, if only 70% of the x visits were reached, the park could get a 0.7. In the first case, a restoration project could set X hectares to be restored per year and get a point if they reach the x target. Alternatively, the project could get in each evaluation the fraction of progress made towards the final target (e.g. 3 of ha restored per year/ total of ha planned to restore). Reaching 1 would indicate project completion.

Ideally, the relative importance each module would have in the final evaluation should be constant among parks or group of parks to facilitate the agency's accounting. This could be based on the agency goals that apply to all parks. Agencies and parks should decide which objectives fit into each module. Parks should agree with the agency how they would split the weight of the park module among their priorities and needs. For instance, if the park module represents 50% of the total evaluation, they could prioritize objectives and decide their weighs. For instance, a priority for a park in consolidation may be the control of illegal uses, whereas for a consolidated park where illegal activities are under control, a priority may be an outreach program for surrounding communities.

Figure 3. Example of Adaptive management Review. Performance or Effectiveness scores can be obtained for all levels in the hierarchy, including overall park management.

Discussion

Challenges and benefits

Management evaluation seeks to promote accountability in two ways:

- demonstrate the proper use of financial and human resources, and
- progress toward achieving management and conservation goals.

However, the following factors may be a challenge for evaluation:

- variations on available information, e.g. type of indicators used, development stage of the parks, management categories, or parks' socio-economic and biophysical environment;
- apparent complexity of evaluation frameworks; and
- reluctance to change institutional culture.

To evaluate individual parks and compare among parks in a national system, the adaptive management review relies on how well the management team has achieved planned objectives and targets instead. The model focuses on performance or effectiveness by using weights and scores rather than indicators.

There are three main success factors for implementing the EBMS:

- commitment to allocate human and financial resources needed;
- commitment from individual parks, park agencies, and relevant stakeholders to adaptive management and learning; and
- willingness and flexibility to communicate and negotiate priorities, indicators, and weights.

It will likely require more resources and effort than regular top-down approaches. However, once implemented, it has advantages over other proposals to evaluate management effectiveness and benefits for agencies and parks:

- Capacity to built from existing management plans, objectives, and indicators;
- Flexibility to update and change objectives or other elements of the hierarchy as they are met, or as parks' needs evolve, without affecting the meaning and comparability of final scores;
- Inclusion and use of diverse types of indicators through the modules and components (no need to re do monitoring programs);
- Improvement in governance and fairness and objectivity of evaluations;
- Emphasis and evaluation of effectiveness and performance (according to inputs), rather than compliance;
- Encouragement of innovation and discouragement of status quo;
- Engagement of staff in the development and implementation of the system, increasing their trust and motivation;
- Availability of detailed information on the situation and progress of individual parks;
- Acknowledgement of reporting requirements a park may have and may not fit into the agency's reporting system, e.g. from sponsors or stakeholders;
- Inclusion of the diversity contained in the national system, e.g. different ecosystems; consolidation stages or categories;
- Separation of park and agency priorities and recognition of park's achievements in both;
- Consistency with the IUCN framework and other proposals for management evaluation; and
- Compatibility with ISO certifications.

Conclusion

An agency-driven system for evaluating management often reflects the agency's reporting priorities (top-down) although allows for national comparisons and reporting. However, this approach may overlook priorities and/or achievements of individual parks in other aspects not evaluated by the agency. Likewise, a system designed by an international organization allows for global comparisons but may not be fully applicable for a particular national system and their parks. The purpose

of evaluations is to reward effectiveness in delivering outcomes; however, the indicators used often reflect only inputs or outputs. A bottom-up approach may be more adequate to reflect the aspects that may be important for individual parks. The Ecosystem-Based Management System suggested here combine agency and park needs. It also accounts for the diversity of natural and social conditions represented by protected areas within a national system. Although implementing this system requires more effort and coordination, the information obtained from parks is more detailed and can help improve planning and management. This will be useful for showing achievements in management and conservation goals to parks' stakeholders.

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Fig.1.

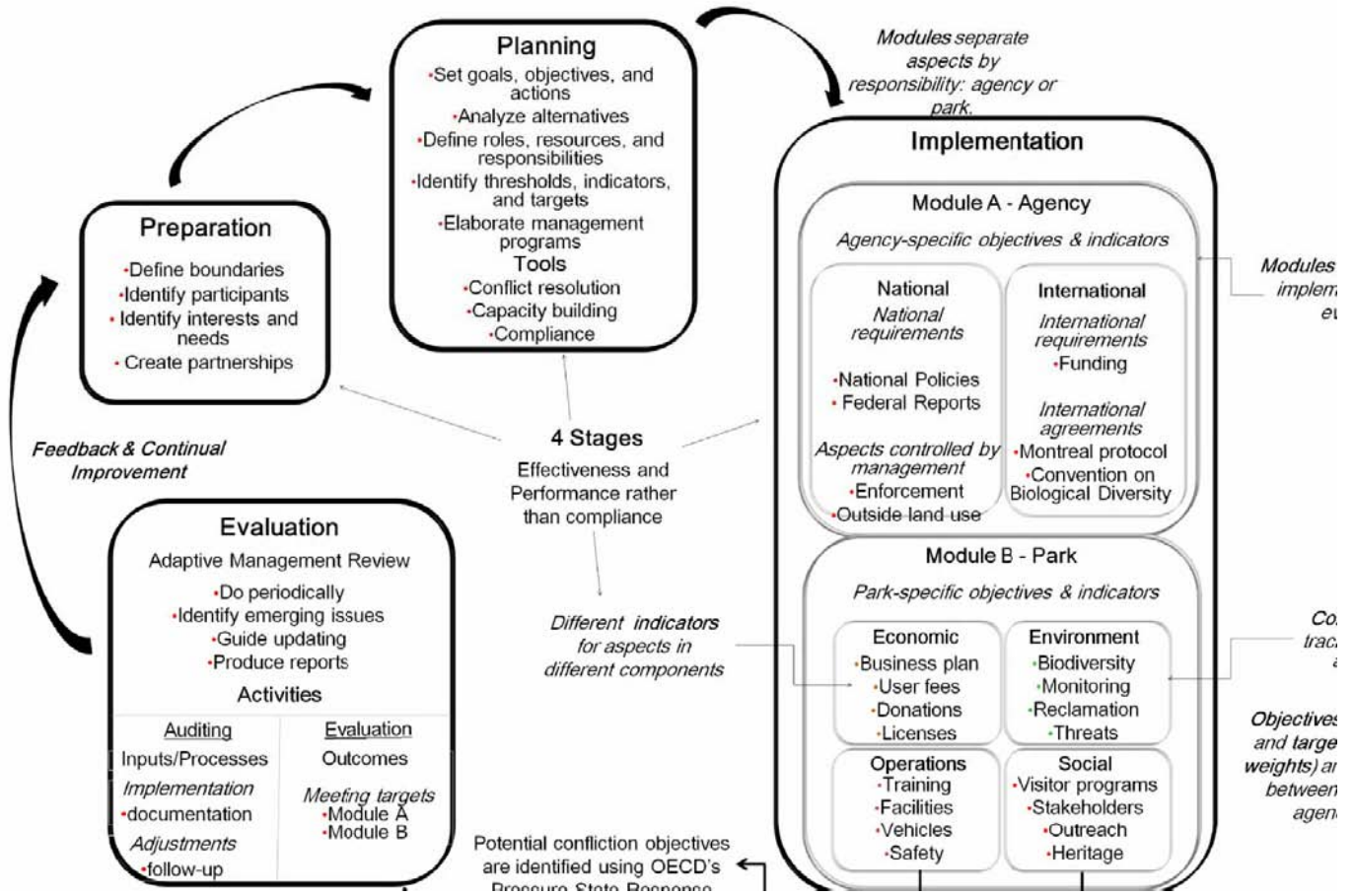


Fig.2.

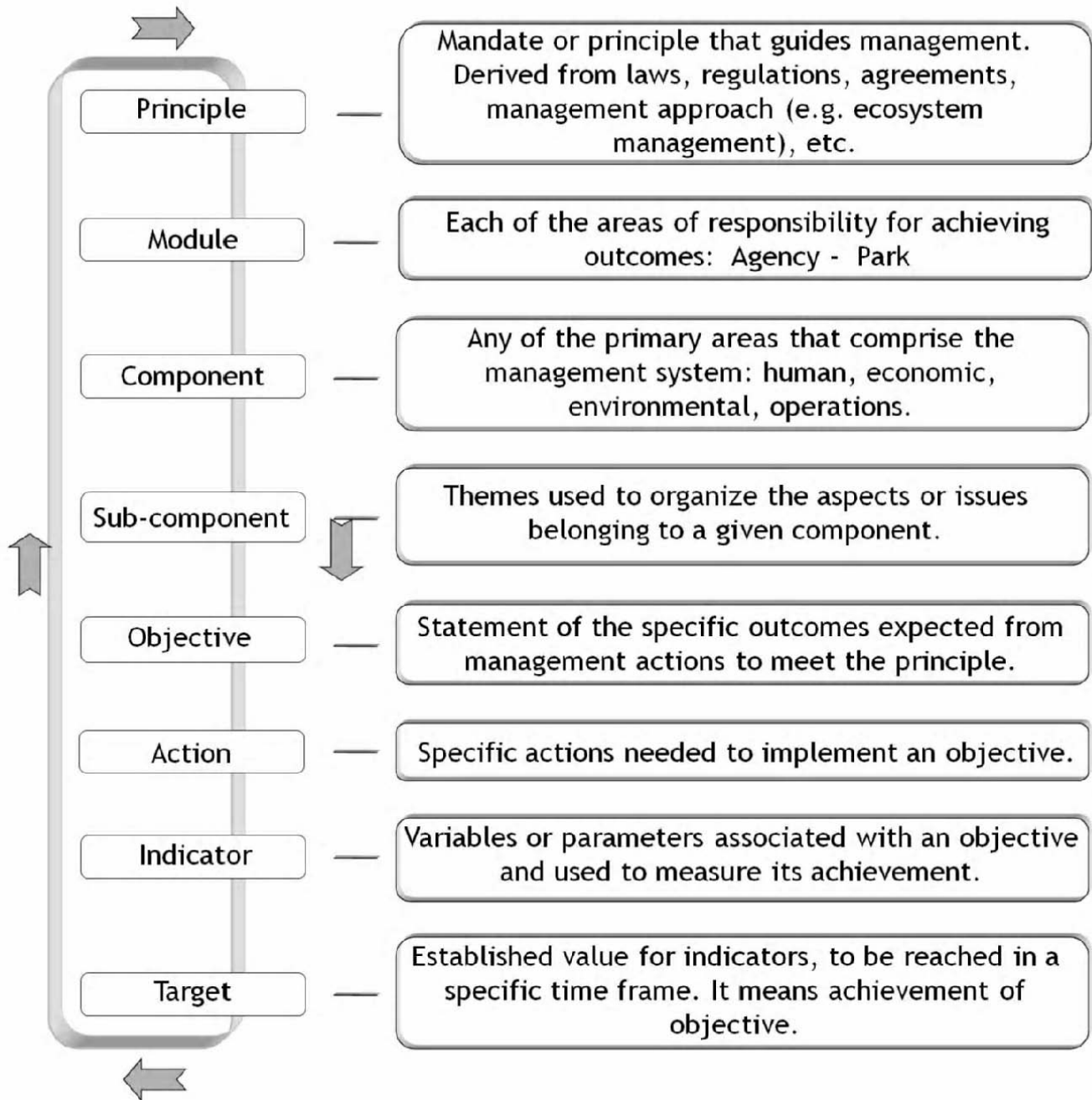


Fig.3 below

Scoring system

- Modules, components, and objectives are weighted combining agency and park's priorities
- Aspect within components have associated objectives, indicators, and targets
- Aggregate indicators are used to summarize effectiveness in a single measure

Scores

- reflect achievement of targets
- are used for benchmarking and follow-up
 - Measure two properties:
 - effectiveness (if indicators reflect outcomes) &
 - performance (if indicators reflect inputs or outputs)

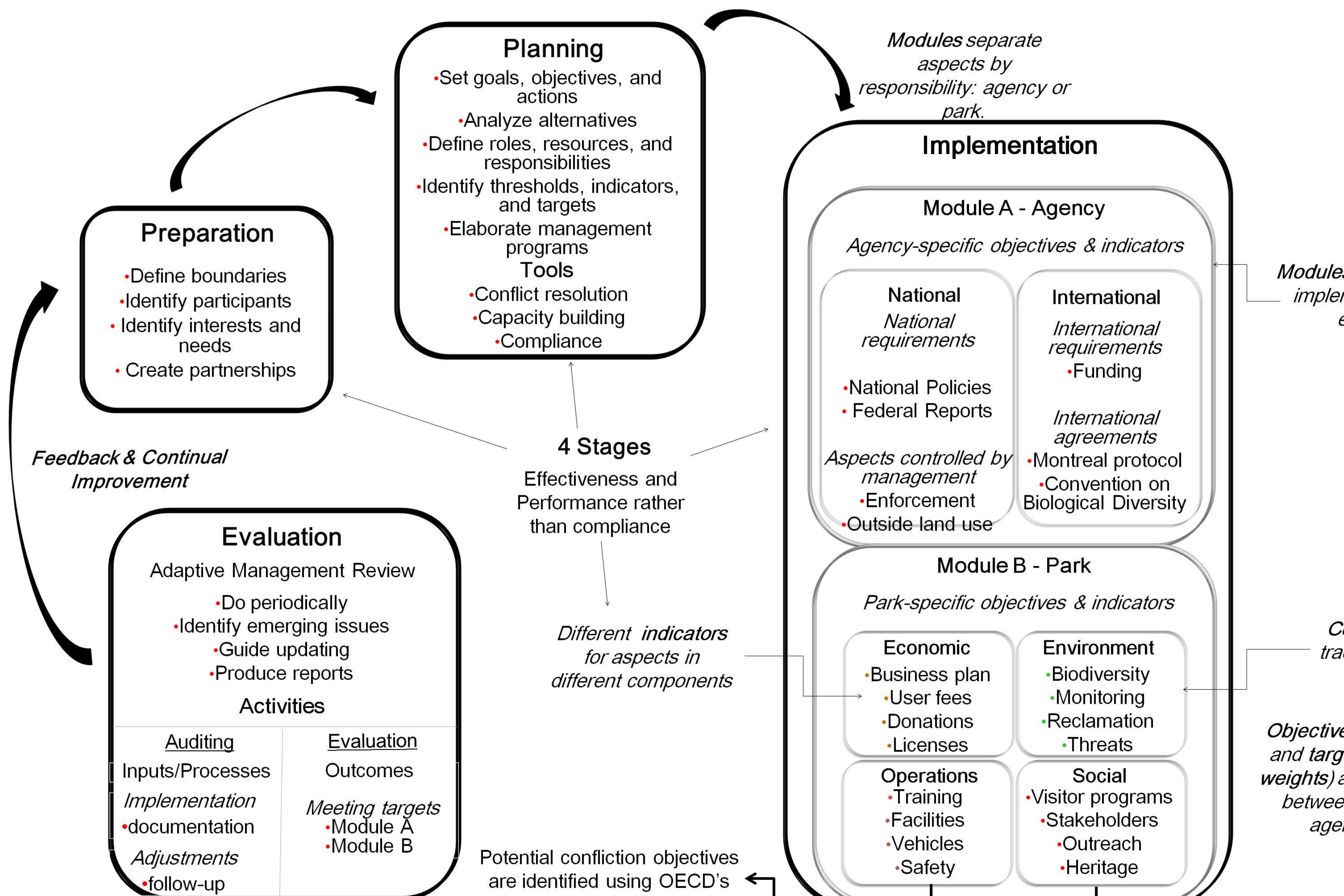
Scoring

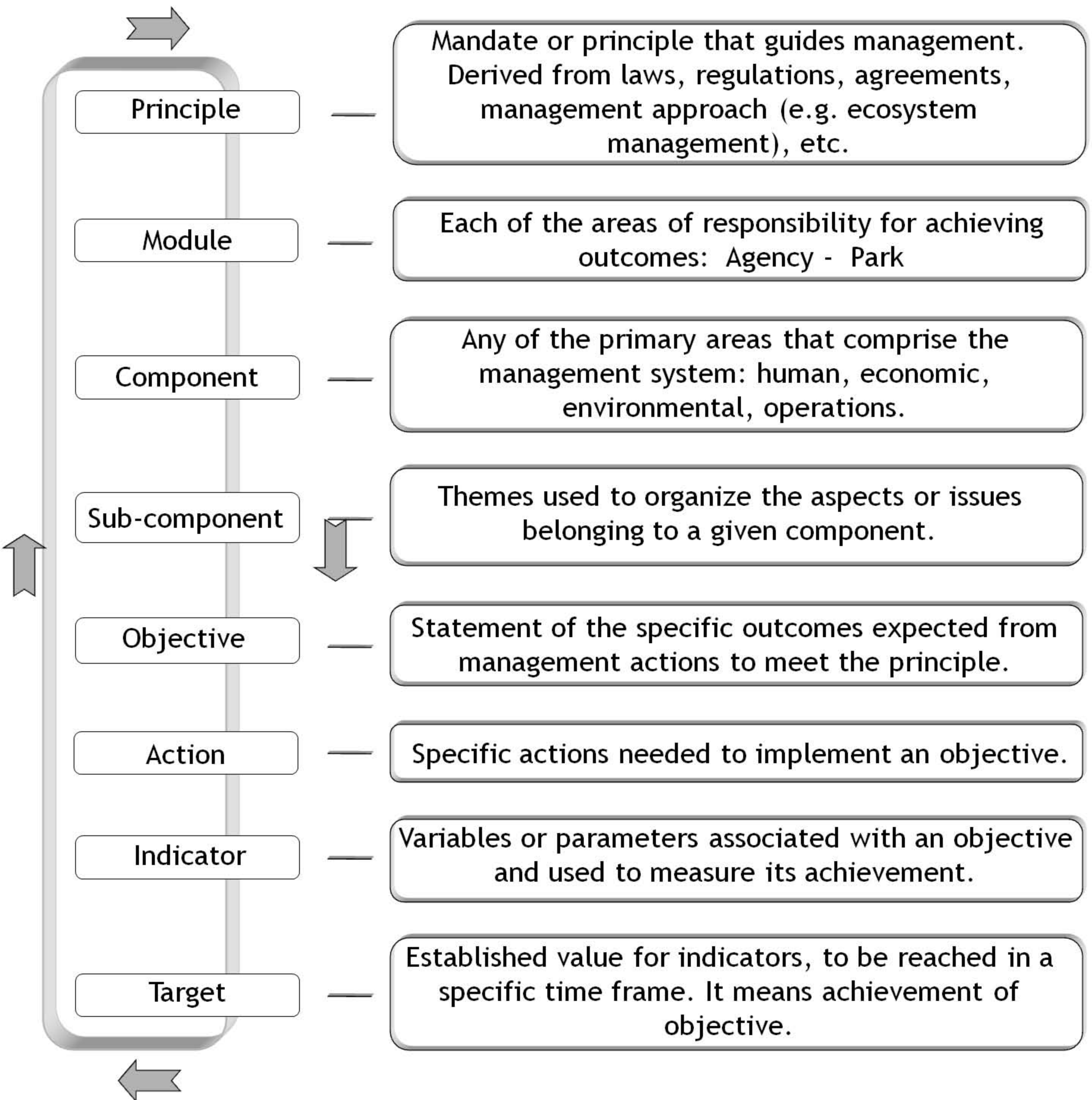
PA effectiveness is scored for each **component** within a module (a), for each module (b), and in total (c).

$$\text{Score per component} = \left[\frac{\text{\# of objectives with targets met}}{\text{Total number of objectives}} \quad \frac{8}{9} \right] = 0.88$$

$$\text{Score per module} = \left[\frac{\sum \text{Performance achievement per component}}{\text{Total number of components}} \quad \frac{5.37}{6} \right] = 0.90$$

$$\text{PA Final score} = \left[\frac{\text{Module A (0.91)} + \text{Module B (0.90)}}{2} \quad \frac{1.81}{9} \right] = 0.90$$





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