❖ Standard 13: Set overall priorities for conservation action within the ecoregional portfolio/biodiversity vision and define institutional goals, roles and priorities. [implement]

Rationale

The number of places necessary to conserve biodiversity and threats to biodiversity in those places can be considerable. Selecting priorities among them is essential for effective and efficient conservation. In setting priorities, one should consider the potential biodiversity contribution, scope and severity of threats, opportunities for success in abating types, scope and severity of threats, key enabling conditions (e.g., presence of partners and conservation capacity, leverage opportunities, conservation funding, and potential for success). Frequently multiple organizations or partners may seek to have impact on the ecoregional portfolios. Mutual agreements should be established among key conservation players in the ecoregion regarding where each will work complementarily but separately and where collaboration may occur.

Recommended Products

- Assignment of priorities for actions among targets, threats and/or areas of biodiversity significance.
- Clear, transparent, and explicit description of criteria, data types and sources, methods and tools used to define priorities.
- Maps and databases of priority areas of biodiversity significance and their priority levels.
- A set of institutional priorities, goals and roles for action for all key partners and stakeholders involved in conservation actions.

GUIDANCE

Ecoregional Portfolios/Biodiversity Visions can be made up of a significant number of conservation areas that can seem overwhelming when we are charged to "conserve the whole portfolio." How do we figure out what to conserve first, or next? How should limited resources be allocated? Should resources first go to those areas that have the highest number of conservation targets? What about those places that have the last remaining population of certain species? Perhaps those places that are most threatened? Perhaps those that are least threatened? What about potential for success? How do we factor in opportunity or the potential for leveraging further action? Are the most highly leveraged opportunities always the best investments? Should we only think of places when defining priorities? What about priority strategies? Which strategies will contribute to conserving the most targets? Which will affect the most places? Which will be most leveraged? These questions have stimulated innovation to develop methods to define priorities and sequences to guide our conservation efforts.

Sequencing conservation actions, or priority setting, involves the determination of both geographic and strategic priorities. Methods for sequencing conservation actions can help managers by organizing information about conservation project[1] values, costs, and opportunities in a way that informs more rational and transparent decision-making. Sequencing tools can also help identify key conservation strategies that cut across portfolios, and inform projections about staffing and funding needs. As conservation organizations and resource management agencies around the world define priorities for their work from a broad, comprehensive vision, sequencing methods and tools will also be useful for defining programmatic goals for conservation outcomes in the ecoregions and other spatial scales where we work, and can support proposals for large conservation projects to organizational senior management and trustees.

Defining and sequencing priorities can be accomplished through:

- Setting geographic priorities
- Prioritizing strategies and projects
- Organizing information utilizing key steps
- Defining priorities for key partners

Setting geographic priorities

Most priorities for conservation actions are currently developed by focusing on places. This is a common, albeit a limited perspective, for setting conservation priorities. This approach is based on evaluating the attributes of places, and using combinations of those attributes to define priorities for place-based conservation actions. Groves (2003) reviews approaches and highlights many examples to identify priorities for conservation actions. Criteria that he suggests can help planners determine priorities include:

- Some measure of biodiversity or conservation value (diversity, irreplaceability, number of rare and endangered species).
- Threats (vulnerability, severity and urgency).
- Degree to which biodiversity in areas has been conserved elsewhere (complementarity).
- Quality or ecological condition.
- Ability to restore a degraded area.
- Feasibility or possibility to achieve conservation.
- Leverage potential.

Prioritizing Strategies and Projects

In addition to geographic priorities based on the attributes of place, another critical component to priorities is informed by strategies and projects. Priority strategies and projects should have significant scope and impact to threats affecting biodiversity, and have

[1] A conservation project is any set of strategies that are designed to conserve biodiversity by improving ecological condition of conservation targets or abating the threats to that biodiversity. A conservation project has traditionally been at the scale of single conservation areas. However, it can target multiple conservation areas, or focus on specific targets or threats across the range of their distribution.

significant impacts on many areas of biodiversity significance. These are called multi-site strategies or multi-site projects. Defining strategies and projects requires knowing the scope of threats and the potential scope of strategies to abate the threats at multiple sites. Evaluating the impact of strategies and projects on biodiversity is accomplished by analyzing the areas that would be affected by a strategy, and summarizing the targets and number of examples that would be affected by the strategy. This is almost the reverse of defining area-based priorities and then defining strategies. (For an introduction and case studies to Strategies follow this link).

Key Steps to Organize Information

Appropriate methods for sequencing conservation actions will vary regionally depending on available information and the purposes for setting priorities. Several programs have been pioneering methods for priority setting and sequencing based on ecoregional assessments, and have tailored them to their different needs and circumstances. Priorities differ with the questions and the criteria that are used. There should not necessarily be just one way to define priorities, and organizing information to provide alternative views is important. Given the different approaches that are available and the different questions being asked, a set of general key steps are summarized below to organize information and inform the process, whether it is a place-based or strategy-based process.

- Use existing GIS interactive data base developed for ecoregional assessments to organize existing data and manage new information on the attributes of areas of biodiversity significance so they can be spatially evaluated and presented. This information will include data that have been addressed in other standards such as existing levels of conservation/protection, type, scope and severity of threats, viability, ownership, and conservation target types and number. Additional information suggested above may need to be developed to better define priorities. Options for data management are provided in the Data Management standard (Standard 5).

- Summarize biological contribution of each area of biodiversity significance. Develop classes to rank biological contributions using target attributes. Classes are commonly created through generating quartiles for the range of numbers of attributes listed below. The attributes that have been commonly used include:
    - Number of ecological system targets
    - Number of threatened and endangered, and imperiled and other "listed" species (e.g. T&E listed, G1, G2 species, IUCN species, AZE species)
    - Number of ecoregional endemic species, communities and ecological systems
    - Number of species, community and ecological system targets
    - Number of irreplaceable targets (only found in one area of biodiversity significance)

- Summarize relative viability of targets in the areas of biodiversity significance using information from the viability assessment (Standard 9). Simple classes of high, medium,

low, unviable, or viable/unviable are useful. This information should be used to define the relative opportunities for:
  - Conserving highly ranked viability
  - Improving viability
  - Restoration

- A threats assessment should allow a summary of types, severity and urgency of threats by areas of biodiversity significance. Spatial information on type of threat is useful to align and prioritize strategies. Severity and urgency can inform the sequencing of priorities and sequence of strategies. An assessment of vulnerability and future threats will also contribute to a prioritization effort. Standard 10 (Threats) addresses threat assessments and categories in further detail.

- Conduct a GAP assessment of the conservation status of the areas of biodiversity significance and the targets already under conservation strategies. Using this information, assess the complimentarity of areas of biodiversity significance. Areas that have a high complementarity value provide targets that are not well represented by existing enabling environments, such as protected areas, stewardship and other conservation actions. There have been suggestions that coarse filter targets be the initial focus of this type of assessment, as many fine scale targets occur at only one place, and will make many areas of biodiversity significance highly complementary. Suggestions for classes include:
  - High: No occurrences of targets are represented in any enabling environments
  - Medium: One occurrence of a target is under an enabling environment
  - Low: Two or more occurrences of targets are currently in an enabling environment

  Alternative classes might include:
  - High: No targets are represented in any enabling environments
  - Medium: 1-50% of the targets have at least one occurrence in an enabling environment
  - Low: >50% of the targets have at least one occurrence in an enabling environment

- Assign a value for opportunity for success based on the existing or potential to implement strategies. This would be done through input from regional experts, partners and staff involved in implementing strategies. Suggestions for classes include:
  - High = Conservancy or partners have capacity to implement strategies to abate the critical threat, and there is reasonably high probability of success, and the strategies can be implemented at reasonable costs
  - Medium = uncertain capacity, or medium probability of success, or high costs
  - Low = capacity unlikely to exist in 10 years, or probability of success low, or very high costs

- Assign a value for opportunities for leverage. Most areas should be assigned the default low value of unless there is good, persuasive information for assigning a higher ranking. This information should be gathered during the process of gathering information on opportunity. Suggestions for classes include:
  - High: Clearly specified, demonstrable leverage for building partnerships, tools or funding to conserve other sites with plans and capacity in place to capitalize on this leverage
  - Medium: Potential leverage to build partnerships, tools, or funding to conserve other sites
  - Low: No clearly specified, demonstrable leverage

A variety of methods and tools exist to use the information organized in the key steps above. They range from documenting expert opinion, using excel spread sheets, access databases and other interactive databases to evaluate spatial data with a GIS such as the EDMT data model, and SCAT. See the case studies and resources sections to evaluate alternative methods to identify priorities.

An assessment can result in a set of spatial and project priorities, but actions are facilitated by having a set of assignments for key partners. By agreeing on responsibilities for activities, partners are better coordinated in their efforts, and can hold each other accountable for their actions to conserve the biodiversity of the ecoregion.

Defining Priorities for Partners

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OPPORTUNITIES FOR INNOVATION

The examples in the case studies provide a range of approaches to define geographic priorities for actions based on biological contribution, irreplaceability, integrity and threat. These criteria are biologically based. Priorities generally focus on geographies with high threat levels. Perhaps it would be easier and less expensive to work in places with low threat levels, all other things being equal? Evaluating the outcomes of applying this criterion might be informative for conservation organizations. Scope and severity of threat can also be viewed as information about the potentials for estimating costs and potentials for success. Should we focus on geographies because of the number of species, communities and ecological systems in them? Does it matter if we conserve 4 places with 10 targets each vs. one place with 40 targets (yes there are size/refuge design/isolation issues)? Defining priorities based on the potential impact of conservation strategies needs to be further developed in order to inform priorities for site-based actions.

Though a lot of work has gone into defining the criteria, little attention has been given to assessing how prioritization outcomes change with differences in approach. Are there combinations of criteria that are optimal for setting priorities? How does weighting of certain variables affect the outcome? How much are outcomes affected when criterion categories are defined differently among analyses? Sensitivity analysis can help judge the efficacy of different applications and interpretations of priority setting efforts. The stability of a prioritization can be tested by examining how sensitive the results are to changes in criteria and criteria weightings.

We have yet to apply information on costs or timeline into our assessments. Using this information may guide us to a subset of many places that collectively provide what one or two large places do, but the financial and time investments are less and the opportunities for success are higher. We need to think of providing programmatic guidance that contains biodiversity information and values, but the leverage, costs and opportunity for success are also important when thinking about limited financial resources and time. We need to continue to identify ways to make our analyses better show the potential outcome of different strategies and investment scenarios on biodiversity conservation progress.

CASE STUDIES

Geographic Priorities

- **Southern Rocky Mountain Ecoregion.** Defined area-based priorities considering conservation value (number of globally imperiled targets and viability), and level of threats. Information was gathered from the Natural Heritage Program, workshops and subject experts. Priorities were areas that had higher numbers of threatened targets with higher viability and higher levels of threats.
- **Arizona (portions of 5 ecoregions).** Defined a Biological Value Index using total # targets, global ranks, listed status, # endemic targets, taxonomic diversity, and # aquatic/riparian targets. Defined an Irreplaceability Index to evaluate uniqueness of targets in areas. Conducted multiple prioritization schemes among 499 areas and discussed different outcomes.
- **Southeastern Regional Priorities.** Four classes of urgency for actions were defined using level of threat and contribution to ecoregional goals. All highly threatened areas were priorities, and combinations of high levels of biological target contribution and high threats were priorities. A program was developed for data analyses. Further analyses included opportunities for conservation actions and priorities for specific strategies linked to specific threats.
- **Prioritizing Conservation Areas in the Willamette Valley-Puget Trough-Georgia Basin Ecoregion.** Prioritization among terrestrial portfolio sites was determined by plotting conservation value against vulnerability. An Excel-based tool was developed to allow assessment of various conservation value weighting schemes. This tool also automates the reporting of results in tables, graphs and maps. Figures are available here.
- **Ranking Priority Areas in the Northern Andes.** Priority areas were ranked through an involved process that included assessing each area's importance for biodiversity, importance for ecological processes and intactness.

- Prioritization Matrix in the Northern High Plains. Priorities were determined from an index based on the biodiversity value of portfolio conservation areas, and the urgency of threats to the biodiversity of these areas.

Priority actions and strategies

Visit our preliminary unit on prioritizing actions and strategies for case studies on the subject.

TOOLS

SCAT- Sequencing conservation action tool V 6.2. A Microsoft Access tool designed to prioritize conservation strategy options and identify the sequence of those actions and various geographic scales. Manual available through conserveonline.org.

EDMT data model. This data model uses the Conservation Planning Tool and a GIS to evaluate attributes of areas of biodiversity significance or entire ecoregions and develop alternative scenarios based on different questions. Areas of biodiversity significance can be evaluated for their biological attributes, contributions towards goals and types and patterns of threats. Individual targets can be evaluated as well to inform target-specific strategies and projects. To read more about the EDMT data model click here.

ResNet: A software program that uses a heuristic algorithm to prioritize areas based on "biodiversity content" as indicated by target occurrences, rarity and complementarity. Aggarwal A, J. Garson, C.R. Margules, A.O. Nicholls and S. Sarkar 2000 ResNet Ver 1×1 Manual (Report. Biodiversity and Biocultural Conservation Laboratory, University of Texas) available for download at http://uts.cc.utexas.edu/~consbio/Cons/ResNet.html

The California Legacy Project produced an analytical, data-driven, prioritization method where sites are scored based on it marginal conservation value. Prioritization depends on the resources the site contains, the threat to those resources, and the conservation cost of mitigating that threat. See Davis et al. 2003 below.

BioRap priority setting tools (software, text and case studies). Australian BioRap Consortium. A set of coordinated analytical tools including spatial modeling tools and classification and biodiversity-priority setting tools. These tools are meant to rapidly identify and prioritize areas for the conservation and sustainable management of biodiversity relying predominantly on abiotic data. Case study in Papau New Guinea available at http://www.amonline.net.au/systematics/faith5j.htm

Action Site Selection Tool is an Excel based tool designed to help planners select action sites within ecoregional conservation portfolios.

NatureVista DSS http://www.natureserve.org/prodServices/vista.jsp Vista is a decision support system, or a series of tools designed to assist in land use and conservation planning.

Vista incorporates biodiversity information into the planning processes allowing users to assess the biodiversity implications of alternative land use scenarios.

RESOURCES

Websites

Biodiversity and World Map: Assessing Conservation Priority & GAP Analysis, Can be found at http://www.nhm.ac.uk/science/projects/worldmap/priority/index.html.

International Society for Multi-criteria Decision Analysis provides information about existing decision support tools at www.mit.jyu.fi/MCDM/publ.html.

Society for Ecological Restoration internet site provides extensive reading and resources pertaining to restoration at www.ser.org

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