The ConsNet Portal 1.0

Systematic Conservation Planning Primer

***Roldana gilgii* (Asteraceae).** Shrub common between 2000 -3000 m in a cloud forest at Fuentes Georginas in Pico Zunil, Quetzaltenango, Guatemala.© 2006 Taylor Sultan Quedensley.

M2: Systematic Conservation Planning Overview

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Learning Objectives: This module describes, with an overview, the stages of systematic conservation planning and tools that support conservation planning. This is meant to help the learner understand the larger picture for the in-depth material provided in later modules.

Stages of Systematic Conservation Planning

1. Identify stakeholders for the planning region.

(M3: Stakeholder Identification and Involvement)

- Stakeholders include: (a) those who have decision-making powers; (b) those who will be affected by conservation plans for a region; (c) those with expertise about the region and; (d) those who may commit resources for conservation plans.
- Both local and global stakeholders must be included.
- Right from the beginning, there must be transparency about the ultimate goals and strategies of all stakeholders.

2. Compile, assess, and refine biodiversity and socio-economic data for the region.

(M4: Data Compilation, Assessment, and Treatment)

- Compile available geographical distribution data on as many biotic and environmental parameters as possible at every level of organization.
- Compile available socio-economic data, including values for alternate uses, resource ownership, and infrastructure.
- Collect relevant new data to the extent feasible within available time; remote sensing data should be easily accessible; systematic surveys at the level of species (or lower levels) will usually be impossible.
- Assess conservation status for biotic entities; for instance, their rarity, endemism, and vulnerability.
- Assess the reliability of the data, formally and informally; in particular, critically analyze the process of data selection.

- When data do not reflect representative samples of the landscape, correct for bias and model distributions.

3. Identify biodiversity surrogates for region.

(M5: Surrogacy Identification and Analysis)

- Choose true surrogate sets for biodiversity (representing general "biodiversity") for part of the region; be explicit about criteria used for this choice.
- Choose alternate estimator-surrogate sets (for representing true surrogate sets in the planning process).
- Prioritize sites using true surrogate sets; prioritize sites using as many combinations of estimator-surrogate sets as feasible, and compare them.
- Potentially also use other methods of surrogacy analysis to assess estimator-surrogate sets, including measures of spatial congruence between plans formulated using the true and estimator-surrogate sets.
- Assess which estimator-surrogate set is best on the basis of (i) economy and (ii) representation.

4. Establish conservation targets and goals.

(M6: Conservation Targets and Goals)

- Set quantitative targets for representation of biodiversity surrogates.
- Set quantitative targets for total network area.
- Set quantitative targets for minimum size of population, unit area, *etc*.
- Set explicit design criteria such as shape, size, dispersion, connectivity, alignment and replication.
- Set precise goals for criteria other than biodiversity, including socio-political criteria.

5. Review existing conservation areas.

(M7: Review Existing Conservation Areas)

- Estimate the extent to which conservation targets and goals are met by the existing set of conservation areas.
- Determine the prognosis for the existing conservation area network (CAN).
- Refine the first estimate.

6. Prioritize new sites for potential conservation action.

(M8: Place Prioritization)

- Using principles such as rarity and complementarity, prioritize sites for their biodiversity content, to create a set of potential conservation area networks.

- Starting with the existing CAN, repeat the process of prioritization to compare results.
- Incorporate design criteria such as shape, size, dispersion, connectivity, alignment, and replication.
- Alternatively, carry out the last three steps using optimal algorithms.

7. Assess prognosis for biodiversity for each potentially selected site.

(M9: Vulnerability and Persistence Analysis)

- Perform population viability analysis for as many species as possible (and using as many models for each species as possible) given limitations of data and time available.
- Perform the best feasible habitat-based viability analysis to obtain a general assessment of the prognosis for all species in a potential conservation area.
- Assess vulnerability of a potential conservation area from external threats using techniques such as risk analysis.

8. Refine networks for sites selected for conservation action.

(M10: Network Refinement Protocol)

- Delete potential conservation areas if these are deemed highly likely to be degraded.
- Delete the presence of surrogates from potential conservation areas if the viability of that surrogate is not sufficiently high.
- Run the prioritization protocol again to prioritize potential conservation areas by biodiversity value.
- Incorporate design criteria such as shape, size dispersion, connectivity, alignment, and replication.

9. Examine feasibility using multi-criteria analysis.

(M11: Multi-Criteria Analysis)

- Order each set of potential conservation areas by each of the criteria other than biodiversity representation.
- Find all the best solutions using multi-criteria analysis and discard all other solutions.
- Select one of the best solutions.

10. Implement conservation plan.

(M12: Implementation of Conservation Plan)

- Decide on the most appropriate legal mode of protection for each targeted place.
- Decide on the most appropriate mode of management for persistence of each targeted surrogate.
- If implementation is impossible, return to Stage 5 (Review existing conservation

areas).

- Decide on a time frame for implementation, depending on available resources.

11. Periodically reassess the network.

(M13: Periodic Network Reassessment)

- Set management goals in an appropriate time-frame for each protected area.
- Decide on indicators that will show whether goals are met.
- Periodically measure these indicators.
- Return to Stage 1.

- Protocol for Systematic Conservation Planning.
  - The outline of these stages is an extension and generalization of the framework presented in Shafer (1999), Margules and Pressey (2000), Groves *et al*. (2002), Cowling and Pressey (2003), and Sarkar (2004, 2005).

- Initiation of a conservation planning exercise must identify the human and biological goals.
  - Ignoring human goals has often been disastrous in the past.
  - Ignoring human aspirations is also ethically unsound.

- The goals of conservation planning must refer to the future or the **time horizon**.
  - The time horizon should not be too distant – we do not have the tools to make reliable predictions too far into the future.
  - The appropriate time horizon should be decided through explicit expert discussion – approximately 50 years is appropriate in most contexts.
  - The time horizon will vary from region to region – it depends on the quality (range and accuracy) of the data available (as well as the particular data analysis tools that can be used).

- Basic data requirements.
  - Planning data requirements include a set of geographically specified cells (each representing a site on a geographical map) and each cell should have a **unique identifier** locating it precisely.
  - Cells need not be homogenous (same) in size or shape.

- For each cell, a list of **surrogates** for biodiversity that occur in the cell must be compiled. (Ideally, the **probabilistic expectations or abundances** of surrogates should be used).
- Surrogate lists may not be substituted by summary statistics, such as richness – see **M1: Introduction to Conservation Area Networks**.

- Additional data, listed below, must also be **geo-referenced** to specific cells.
  - A **vulnerability assessment** (that is, to help ensure the persistence of biodiversity in the CAN, not only the representation of biodiversity) must be performed and the indicators of vulnerability must be known for each cell.
  - Biological indicators must be compiled, including abundance, growth-rate and other vital parameters (characteristics), climate change effects, *etc*.
  - Socio-political indicators must be incorporated and include levels of threat, patterns of land use change, *etc*.
  - A multi-criteria analysis must be performed. Information included in a **multi-criteria analysis** is the information required for each cell corresponding to a set of criteria selected by conservation planners.

- **Conservation planning tools**: These are defined as software that have the following two characteristics.
  - It can be used to guide decisions about a conservation plan for biodiversity. But, it can also be used to plan for the conservation of values such as scenery or ecosystem services, as opposed to biodiversity.
  - These tools must also identify either: (i) sets of **complementary** sites needed to achieve quantitative targets or goals for biodiversity features; or (ii) the complementary contribution that individual sites make to biodiversity conservation within a region.

- Systematic conservation planning does not exclude expert advice.
  - Conservation planning tools are decision support systems. In other words, the tools do not provide the final word on the appropriate conservation area network.
  - Planning tools are also decision support systems in that they aid in decisions, not make them.
  - Mathematical algorithms and software are tools for human decision-makers; they do not replace the human decision-makers.
  - Often, systematic procedures can identify options missed by human decision-makers.

- Systematic conservation planning, specifically using software tools ensures: (i) speed or computational efficiency; (ii) exactness, including repeatability; and (iii) flexibility or allowing the use of tools to explore a wide variety of scenarios met in the field.
  - Algorithmic procedures incorporated in the tools should also be transparent - it should be clear to a user why a site is selected by the algorithm.
  - Tools should be versatile, allowing them to be used in a variety of geographical contexts with different types of data and conservation priorities.

- These educational modules are not exhaustive about systematic conservation planning. The modules do not detail **all** the issues connected with implementation or management of conservation areas.
  - The modules are limited to conservation area network review and conservation area network selection for which several public domain software planning tools are available.
  - Problems associated with systematic conservation planning implementation and management have not been extensively studied, partly because systematic conservation planning is so new that it is yet to be extensively tested in the field.
  - In the past, very few results or plans of systematic conservation planning have been implemented in the field. However, this situation is changing and these modules will help that process.

Assess Your Knowledge

M1: Introduction to Conservation Area Networks
M2: Systematic Conservation Planning Overview
M3: Stakeholder Identification and Involvement
M4: Data Compilation, Assessment, and Treatment
M5: Surrogacy Identification and Analysis
M6: Conservation Targets and Goals
M7: Review Existing Conservation Areas
M8: Place Prioritization
M9: Vulnerability and Persistence Analysis
M10: Network Refinement Protocol
M11: Multiple Criteria Analysis
M12: Implementation of Conservation Plan
M13: Periodic Network Reassessment
M14: Conclusion and Review - Future Directions

Systematic Conservation Planning Modules

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