WILDLIFE CONSERVATION SOCIETY

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The Living Landscapes Program is a Wildlife Conservation Society initiative that identifies, tests, and implements wildlife-based strategies for the conservation of large, wild ecosystems integrated within wider landscapes of human influence.

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USING CONCEPTUAL MODELS TO SET CONSERVATION PRIORITIES

What is a Conceptual Model?

At almost every conservation project site, the manager has a mental map of what the project hopes to achieve in terms of better conservation, what factors are having an adverse impact on plant and animal communities at the project site and are thus threats to conservation, and how the conservation actions initiated will address these threats and result in the outcomes wanted. A conceptual model is, at its simplest, a printed representation of the mental map inside the head of each and every conservation site manager.

Why are Conceptual Models Useful?

A conceptual model, based on local site conditions, makes explicit the project goals, conservation objectives, causal network of threats, and priority conservation interventions. It allows others to "see" inside the head of the site manager, creates a permanent record should the manager leave, and most importantly, allows others to contribute their expertise to define the objectives of a project, characterize the threats, and identify key interventions.

Conceptual models are extremely useful conservation planning tools because they force us to:

1) explicitly define what we want to influence or change as a result of project interventions (i.e., the conservation objectives);

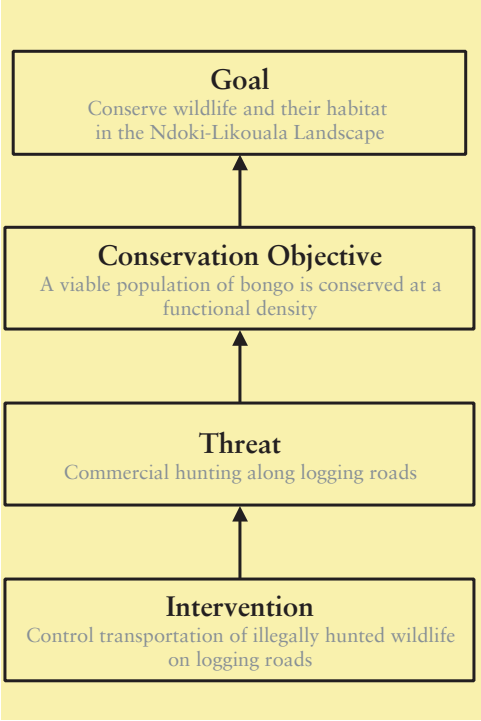
2) characterize and prioritize the factors that directly or indirectly result in undesirable impacts on the species or landscape we want to conserve (i.e. the threats);

3) graphically represent how these threats, individually or in combination, cause the undesired changes in the species or landscape that we want to conserve; and

4) demonstrate that the interventions we choose are clearly focused on reducing key threats and attaining our objectives.

Key Concepts:

- Conceptual models help us to be explicit about project goals, conservation objectives, and threats to wildlife and their habitats.
- Conceptual models serve as the basis for strategic planning in a project or program.
- These models cause us to think critically about how various threats interact and influence one another- an important step in planning effective interventions.
- Ranking direct threats identified within a conceptual model is an essential step in establishing priorities for the actions we will take.
- A conceptual model is only as good as the information used to create it.
- Monitoring is one way to test the conceptual model and revise and improve it over time. This provides a basis for adaptive management.



A simple illustrative conceptual model with one conservation objective, threat and intervention.

Components of a Conceptual Model

Conceptual models can range from being exceedingly simple to being highly complex. Regardless, within the Living Landscapes Program all are typically composed of four interconnected elements: goals, conservation objectives, threats, and interventions.

Overall project or program goals are visionary, relatively general and brief, statements of intent (e.g., "Conserve the full complement of wildlife and their habitat in the Yasuní-Napo landscape over the long term"). In contrast, conservation objectives are specific statements defining the state or condition of a species or landscape that the conservation project wants to achieve through some interventions. An example of a conservation objective within the Living Landscapes Program might be "Maintain current white-lipped peccary density within existing habitat of the Madidi-Tacana landscape".

Conservation objectives that are phrased in terms of a species or a habitat imply the existence of one or more threats that adversely affect species numbers and habitat and the need to take action to halt or mitigate those threats.

Threats are land-use practices and policies that have direct or indirect effects on the species or habitats that we want to conserve. Direct threats such as hunting, fishing, logging, and farming are land-use practices that physically result in undesirable changes in species numbers or distribution, or in the quality and extent of their habitat. Indirect threats, such as market and land-tenure policies, for example, alter species' numbers and habitat by influencing one or more of the direct threats. Within that interdependent set of direct and indirect threats, some are exogenous in that they are outside our control (e.g., weather and solar flares). Including exogenous threats in our conceptual models when their effects are pronounced can be important as it makes us acknowledge what we can and cannot change.

Identifying threats and then deciding which ones are the most significant is an important exercise when building a conceptual model. However, conceptual modeling also requires us to decide how the indirect and direct threats link together to form a causal chain or network. Understanding not only the range of threats but also how they interact and influence one another is critical. This enables us to articulate clearly our vision of why we need to take certain actions to conserve a particular species or habitat. It also allows us to pinpoint where and why our interventions are likely to have the most success and the greatest conservation payoffs.

Lastly, interventions are actions linked directly and explicitly to halting or mitigating key threats and are thus targeted to achieve specific conservation objectives. Clearly, all interventions must be feasible in terms of project staff and resources, and appropriate in terms of site-specific cultural and biological norms. When developing interventions to address specific threats, project staff should ask both why and how the intervention would have an impact. If all project managers and staff responsible for implementing the intervention cannot easily answer this question, it is doubtful that the proposed intervention is directly linked to mitigating an important threat or that the investment in this intervention will help achieve the desired conservation objective.

Creating a Conceptual Model

In 'Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects' (Island Press, 1998), Richard Margoluis and Nick Salafsky suggest a group process for developing a conceptual model, with group composition varying according to the stakeholders implicated in resource degradation and conservation. The group first defines the conservation objective or objectives, then lists all direct and indirect threats that are thought to affect the conservation objective. Then the direct and indirect threats are arranged to show how each relates to one another and to the conservation objective. In this way, a chain or network of threats and interactions can be created that shows graphically how individual threats influence one or more additional threats (see example on p.4).

Once the "universe" of indirect and direct threats is mapped onto the

conservation objective as a network of interconnections, the next step is to rank the direct threats. This is a necessary prelude for identifying where the project is going to intervene and take action to reduce the adverse influence of these factors on the conservation objective. Because indirect threats only influence our conservation objective through their effects on direct threats, we do not rank them.

Ranking Direct Threats

To rank threats we first need to develop criteria against which each threat is assessed. Within the Living Landscapes Program, we strongly advocate that criteria assess only the level of threat and not the feasibility of intervention. This ensures that we focus on the factors that are most likely to jeopardize the conservation of wildlife and wild places, rather than those that are easiest to address. We would also suggest adopting the same criteria used to rank the sensitivity of landscape species to human disturbance. These are severity, urgency, recovery time once the threat is abated, proportion of the area affected, and the probability that the threat will occur.

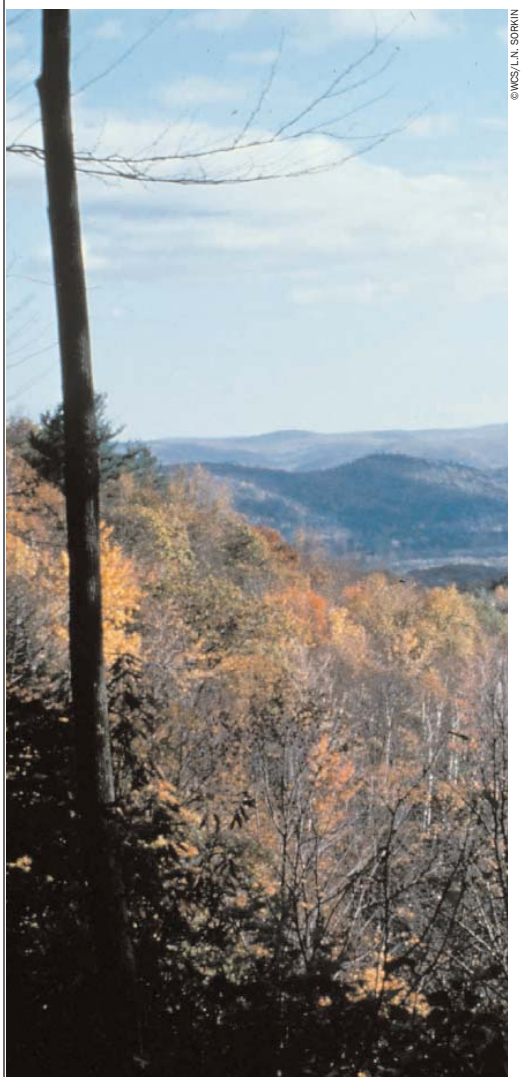
Once we have chosen the criteria for assessing the severity of threats and/or feasibility of addressing them, the next step is to rank them. Using the Living Landscapes Program's criteria and ranking system, we calculate the total score for each threat using the equation [(Urgency + Recovery) *x* Severity *x* Proportion of Area affected *x* Probability], rank the threats according to their scores, and identify the most important threats to conservation at the site. Margoluis and Salafsky provide an alternative approach to ranking threats based on stakeholder perceived importance, area affected, intensity (i.e., likely to destroy the resource or only cause minor damage or degradation), urgency (i.e., is the threat occurring now or will it likely occur at sometime in the future), political feasibility of attempting to address the threat, social desirability of addressing the threat, and management capacity to address the threat. These criteria include both measures of the scale of the threat, and of our ability to reduce the threat. To rank order the threats they suggest drawing a matrix with criteria along the top as the columns and each threat as a row. Then working progressively through each criterion, rank ordering the threats with the greatest threat receiving a score equal to the total number of direct threats in the matrix, and the least severe threat with respect to the criterion under consideration receiving a score of one. Once the rank order for each threat is entered into the matrix for each criterion, it is simply a matter of summing the ranks in each row to determine the cumulative importance of each threat order. These sums can then be converted to rank order.

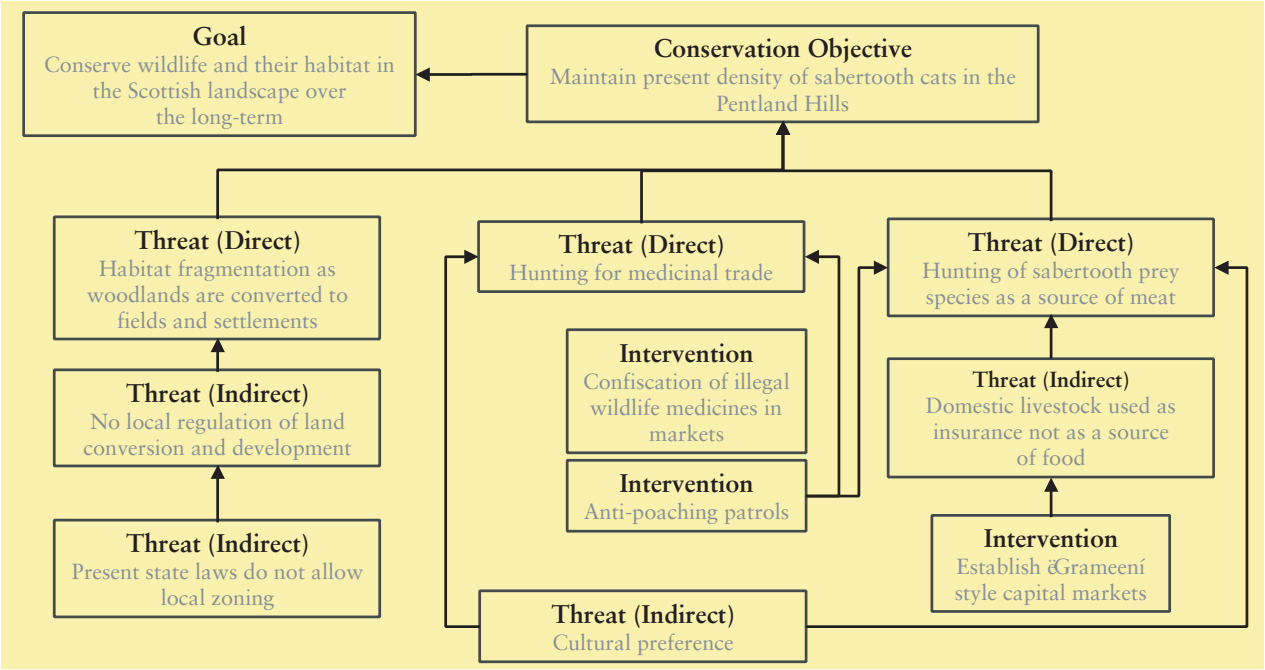
	Severity (0-3)	*Urgency (0-3)*	*Area (0-4)*	*Recovery (0-3)*	*Probability (0-1)*	TOTAL	RANK
Habitat fragmentation	*1*	*1*	*3*	*2*	*.25*	**2**	**3**
Hunting for medicines	*3*	*2*	*3*	*3*	*1*	**45**	**1**
Hunting prey species	*2*	*3*	*3*	*1*	*1*	**24**	**2**
	TOTAL = (Urgency + Recovery) x Severity x Area x Probability						

An illustrative example ranking three threats using the Living Landscapes Program threats criteria and ranking system.

SEVERITY	
none or positive	0
measurable effect on density or distribution	1
substantial effect but local eradication unlikely	2
local eradication a possibility	3
URGENCY	
won't happen in >10 yrs	0
could happen between 3-10 years	1
could (or will) within 1-3 years	2
threat is occurring must act now	3
PROPORTION OF LOCAL AREA AFFECTED	
0	0
1-10%	1
11-25%	2
26-50%	3
>50%	4
RECOVERY TIME	
immediate	0
1-10 yrs recovery	1
11-100 yrs recovery	2
100+ yrs or never	3
PROBABILITY	
	0-1

Criteria used by the Living Landscapes Program to assess threats.





A more complex illustrative conceptual model, showing one conservation objective and a network of several direct and indirect threats and interventions.

Choosing Where and How to Intervene

Given that personnel and money are always limited we should allocate these scarce resources to reducing the highest ranked threats first. Starting with the highest ranked direct threat, we can use the conceptual model to review what indirect factors are believed to cause this direct threat to have such an important adverse impact on the conservation objective.

Understanding how the indirect threats alone and together influence the factor that directly impacts biodiversity is critical: it helps us to determine where we should, or can, intervene to have the greatest success in reducing impacts on wildlife and their habitat. If an indirect threat like 'weak capacity' links to more than one direct threat, then we may need to provide more detail and identify separate indirect threats linked to a single direct threat. For example, if we identified cultural preference as an indirect threat that links to hunting sabertooth cats for both medicinals and food, we could specify cultural preference as: 1)preference for medicinals and, 2)preference for wildlife as food. This way, if we decide to intervene to alter cultural preference, we make clear which preference we hope to change. Margoluis and Salafsky suggest that we describe what we plan to do to reduce each high-ranked threat, and argue that the intervention should be: impact oriented (resulting in a desired change in the threat), measurable, time limited (achievable within a specific period of time), and practical given available staff and financial resources. Once we have defined how we intend to address each ranked threat, we can determine how many threats we can afford to address given available resources.

The Need for Monitoring

Our conceptual model and the threats-reducing actions we decide to implement are a hypothesis that is only as good as the information we have. Monitoring is thought of as an essential tool for conservationists to determine whether or not our actions are effective and our efforts are successful in improving the conservation status of wildlife and their habitats. However, monitoring is also the tool we use to assess whether or not our conceptual model truly reflects what is happening at the site. By monitoring impacts, we can test if our assumptions were correct in regard to the factors that influence wildlife conservation at our site ,and whether or not we should focus our conservation efforts on a different set of direct and indirect threats.

Upcoming Bulletins:

Monitoring Project Effectiveness

Setting Priorities: Threats Reduction or Monitoring Effectiveness?

Managing Wildlife Use
NGO/Private Sector Partnerships

Community-based Wildlife Conservation

Threats Analysis and Coalition Building - Rationale and Practice

Contacts:

Living Landscapes Bulletin
Wildlife Conservation Society
2300 Southern Blvd.
Bronx, NY 10460 USA

LLP@wcs.org
www.wcslivinglandscapes.org

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