Assessing Threats in Conservation Planning and Management: Exercise

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OBJECTIVES

- To develop a conceptual model for the threats faced by the Khakaborazi National Park, North Myanmar, based on a summary description of the Park (see below) and to identify objectives to reduce those threats (Level 1)
- To conduct a Threat Reduction Assessment of the project to measure project success (Level 2)
- To design a monitoring program for the project (Level 3)

BACKGROUND SITE INFORMATION

You are the scientific technical advisor for a collaborative project involving the Ministry of Forestry, Union of Myanmar, and an international non-governmental organization (NGO), the Nature Conservation Society. The Khakaborazi National Park was established in 1998 and spans 3,812 km^2; it is the second largest protected area in Myanmar. The northwestern boundary of the Park, or reserve, borders China (see Figure 2 below). High levels of species richness and endemism have led to the region being recognized as a conservation hotspot (Myers et al., 2000) and a globally outstanding terrestrial ecoregion (Wikramanayake et al., 2002). The region represents one of the few places in the Indo-Pacific region where potential exists for proactive conservation action to protect threatened species that are rare or declining in neighboring countries.

The Park consists primarily of large areas of subtropical broadleaved forests but also includes small patches of temperate broadleaved forests and sub-alpine conifer forests. The region contains the headwaters of the country's most important river system, the Ayeyarwady, which drains vast expanses of agricultural lands and helps sustain extensive rice production areas in this predominantly agrarian economy. Forest areas lying south of the Park border and demarcated by the Nam-Tamai River have been proposed for designation as a buffer zone area comprising 690 km^2. There are 13 villages with a total population of 2,000 people within the Park itself and 36 villages with a population of approximately 8,400 people within the buffer zone of the Park. The majority of the population is concentrated within five villages: Makhungam, Pannandin, Gushin, Tazundam, and Tasuhtu. Residents belong to two major ethnic groups: Lisus and Rawans.

Village residents pursue various occupations including shifting and permanent cultiva-

tion, livestock raising, hunting for subsistence and trade, and honey and medicinal plant trading. Villagers harvest timber and non-timber forest products (NTFPs) for use in their homes and for sale in local markets. The Lisus are professional hunters and undertake long hunting expeditions to remote areas throughout the year. Most hunting by the Rawans occurs during the winter months (November-March) and coincides with the growing season for agricultural crops. Hunting for trade is suspected to have resulted in the local extirpation of mammals such as the elephant (*Elephas maximus*), tiger (*Panthera tigris*), rhinoceros (*Dicerorhinus sumatrensis*) and gaur (*Bos gaurus*).

Funding for the project is from a large international environmental NGO and a private philanthropic foundation. The project is currently scheduled to last for five years. Core NGO and Government staff members involved with this project include the NGO executive director, the Park director, the agronomist, the ecologist, and the project community enterprise specialist. The goal of this project is to conserve the primary forest and wildlife in the Khakaborazi National Park, which is globally recognized for its rare and endemic flora and fauna.

The greatest threats to wildlife in the core area of the reserve are hunting for trade, habitat destruction through shifting cultivation, a proposed mining concession, and over-extraction of forest products. Hunting for trade is one of several sources of cash income for some of the village residents who often trade wildlife in exchange for basic household items or cash. However, many heavily hunted species are gradually being locally extirpated due to trade that occurs across the porous northern boundary of the reserve and the few villagers who are actually dependent on wildlife as a source of protein are finding it increasingly difficult to obtain what they require. Traders from across the border routinely visit the villages and reap a much larger share of the profits than the villagers who actually hunt the species. The project needs to take swift and effective action to address this widespread problem.

Shifting cultivation by landless villagers in easily accessible, low elevation regions of the buffer zone and core area has resulted in degraded forest patches, and there is some indication to suggest that the problem is escalating due to population growth. There is a large mining concession proposed within two years in the core area of the Park by the Ministry of Natural Resources, to be leased to an international mining company for a period of 20 years. If the mining concession is approved, the Ministry of Forestry will be forced to redraw the boundaries of the reserve, significantly reducing the core area of the Park. Many stakeholders, including the villagers, are against the mining concession. Over-harvesting of non-timber forest products occurs primarily within the buffer zone and within a 10 km radius of the villages. Anecdotal evidence seems to indicate that the number of people involved in this activity is on the decline due to reduced availability of resources.

Lack of awareness of wildlife and forest laws, insufficient opportunities to pursue more sustainable sources of livelihood, lack of systematic land-use planning, and inappropriate development policies all negatively influence the conservation of natural resources of the Khakaborazi National Park.

PROCEDURES

Instructions for Students

LEVEL 1

Objective: to Develop a Conceptual Model for the Khakaborazi National Park Identifying Objectives to Address Threats

A conceptual model in this context is a simple, graphical tool used to design, manage, and monitor conservation projects. It is used to identify threats affecting biodiversity at a designated site and the conservation actions needed to address those threats. It has three main components:

1) The **conservation target,** i.e. the target condition (such as biodiversity) that the project ultimately would like to influence.
2) Causal chains of *direct* and *indirect* **threats** affecting the conservation target. Direct threats are factors that immediately affect the target condition or physically cause its destruction, and include habitat fragmentation, invasive species, pollution, overexploitation, and global climate change. Indirect threats are defined as factors that underlie or lead to the direct threats (see module *Threats to Biodiversity: An Overview*).
3) A description of the **conservation actions** (**objectives** and **activities**) that project managers can use to counter the threats to their conservation target. (See Figure 1 below).

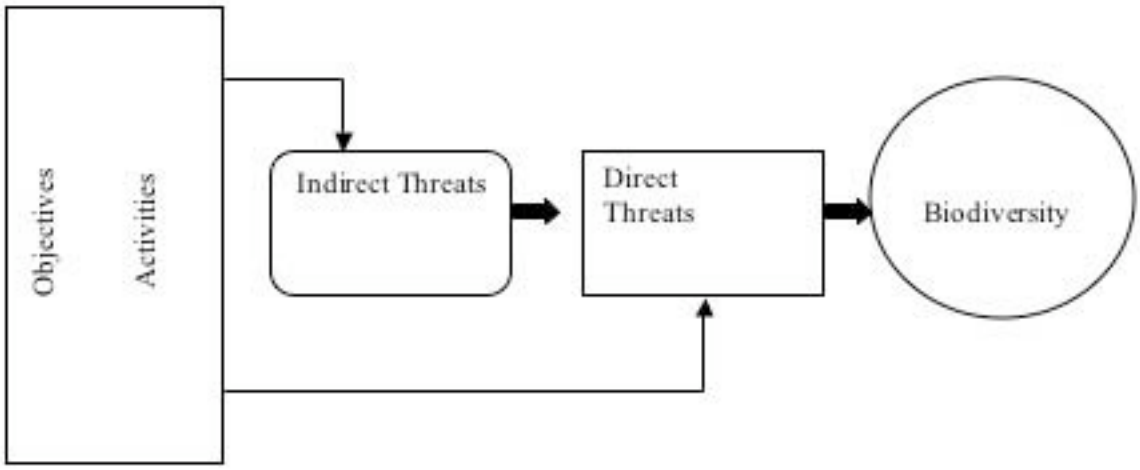
Using the data provided in the background information for the site, develop a graphic conceptual model identifying the **conservation target**, **indirect and direct threats**, and at least one **objective** and one **activity** to reduce each threat. Objectives differ from activities in that activities are specific actions or tasks undertaken by project staff designed to reach each of the project's objectives.

In developing objectives for the project, evaluate whether these objectives meet the following criteria.

A good **objective** meets the following criteria:

- *Impact oriented*. Represents desired changes in critical threat factors that affect the project goal.
- *Measurable.* Definable in relation to some standard scale (numbers, percentages, fractions, or all/nothing states).

Figure 1: Conceptual model



- *Time limited.* Achievable within a specific period of time.
- *Specific.* Clearly defined so that all people involved in the project have the same understanding of what the terms in the objective mean.
- *Practical.* Achievable and appropriate within the context of the project site.

A good **activity** meets the following criteria:

- *Linked.* Directly related to achieving a specific objective.
- *Focused.* Outlines specific tasks that need to be carried out.
- *Feasible.* Accomplishable in light of the project's resources and constraints.
- *Appropriate.* Acceptable to and fitting within site-specific cultural, social, and biological norms.

It can take a bit of thinking to decide if something is an objective, activity, or neither one. In the following table, identify the item listed in the first column (Example) as being either an objective, an activity, or neither, and indicate why in the last column (Explanation).

Example	Objective, Activity, or Neither	Explanation
1. To promote community well-being and health in the area surrounding Khakaborazi National Park.		
2. To reduce the amount of illegal hunting in the reserve by 30 percent in two years.		
3. Within 3 years, support the Department of Parks in its efforts to enforce hunting regulations within the Khakaborazi National Park.		
4. By the end of the project household income for all families participating in non-timber forest product harvesting enterprises has increased by at least 20 percent.		

LEVEL 2

Objective: To Develop a Threat Reduction Assessment for the Project

One way to measure conservation success is through the threat reduction assessment (TRA) approach described in Salafsky and Margoluis (1999). This approach monitors threats to conservation targets rather than directly monitoring the conservation targets; e.g. through this approach one would monitor harvest rates for hardwoods rather than the size and status of hardwood populations. Assessment of the progress in reducing threats provides a framework for measuring conservation success.

An index known as a **threat reduction index** is used to implement the TRA approach. The index is designed to identify threats, rank them according to their relative importance, and assess progress in reducing each of them. The information is then pooled to obtain an estimation of actual threat reduction. Threats are ranked on the basis of three criteria: area, intensity, and urgency. Area refers to the percentage of the habitat(s) in the

site that the threat will affect: will it affect all of the habitat(s) at the site or just a small part? Intensity refers to the impact of the threat on a smaller scale: within the overall area, will the threat completely destroy the habitat(s) or will it cause only minor changes? Urgency refers to the immediacy of the threat: will the threat occur tomorrow or in 25 years?

In Khakaborazi National Park, hunting for trade declined to approximately half the original level two years following project initiation. The area affected by shifting cultivation in the core zone has increased by 10% and the proposal for the mining concession has stalled due to a number of reasons, including successful advocacy by the project and disagreements between the Government and the international mining company. The over-harvesting of forest products has declined by 30%.

Using this information, together with the background site data, conduct a Threat Reduction Assessment to determine if the project in Khakaborazi National Park is succeeding.

Example of a Threat Reduction Assessment Exercise

The Research and Conservation Foundation in Papua New Guinea worked with the Wildlife Conservation Society to implement research tourism and handicraft enterprises with the communities of Crater Mountain Wildlife Management Area (CMWMA) in the highlands of Papua New Guinea. Table 1 below shows results of the application of the procedure to the Crater Mountain Project.

Table 1: Sample calculation of threat reduction assessment (TRA) index based on data drawn from an interview with field staff about the Haia site (1994-1997 assessment period) at the Crater Mountain Wildlife Management Area Project in Papua New Guinea

Direct threat (1)	Area ranking (2)	Intensity ranking (3)	Urgency ranking (4)	Total ranking (5)	Threat met (%) (6)	Raw TRA index score (7)	Final TRA (8)
Hunting (subsistence)	5	3	4	12	15	1.8	
Logging (corporate)	2	5	1	8	50	4.0	
Expansion of gardens	4	1	5	10	5	0.5	
Hunting (market)	3	2	3	8	0	0.0	
Mining (commercial)	1	4	2	7	100	7.0	
Totals	**15**	**15**	**15**	**45**		**13.3**	**30%**

Calculation of the TRA index in the Crater Mountain example above showed that there was a 30% reduction in total threats, primarily by reducing the threats posed by corporate logging and commercial mining.

In order to do this, you will need to follow these steps:

(1) *Develop a list of all direct threats to the biodiversity at the project site present at the start date.* Direct threats (Table 1, column 1) are those that immediately affect the biodiversity of the site. Indirect threats (e.g., poverty) are those that cause direct threats (e.g., logging) and should not be included in the list. It is advisable, however, to group together direct threats that come from different proximate or ultimate causes (e.g., hunting for subsistence or hunting for market sale) or that are presented by different stakeholders (e.g., local people clearing forest for agricultural gardens versus external companies clearing forest to produce timber for commercial sale).

(2) *Rank each threat based on three criteria: area, intensity, and urgency.* Count the total number of threats and assign this number (n) to the highest ranking threat in each category (Table 1, columns 2-4). For example, if there are 5 threats and subsistence hunting is the most serious threat, as in the example above, then its rank is 5. Assign the next highest-ranked threat in each category the score n – 1. Continue ranking the threats until you get to 1, which is assigned to the lowest-ranked threat. Tip: it can be helpful to write all the threats on separate slips of paper, which can then be moved up or down relative to one another to create the rankings.

(3) *Add up the score across the three criteria.* Add the three rankings for each threat together to get the total ranking (Table 1, column 5). Assign an equal weight to each of these columns. (If desired, these columns could be weighted, but this would complicate calculation of the index.)

(4) *Determine the degree to which each threat has been dealt with.* At the start of the project, for each threat identified, it is necessary to define what completely (100%) eliminating this threat would look like. For example, 100% reduction of the threats of:

- Subsistence hunting (harvesting of birds and mammals by local people for their own consumption) might involve harvesting animals on a sustainable basis through setting up and implementing hunting regulations;
- Corporate logging (timber harvesting conducted by large multinational firms) might involve eliminating logging and any plans for logging in the boundaries of the management unit;
- Expansion of gardens (cutting primary forest to make subsistence agricultural plots) would involve eliminating expansion of gardens into areas of primary forest;

- Market hunting (harvesting of selected bird and mammal species that are commercial commodities) might involve harvesting animals on a sustainable basis through setting up and implementing hunting regulation;
- Commercial mining (mineral extraction conducted by large, multinational firms) might involve eliminating mining and plans for mining in the boundaries of the management unit.

At the end date of the assessment period, and subsequent to defining 100% reduction for each threat, work with the project team to determine the degree to which each threat has been addressed, based on definition of 100% threat reduction described above. These assessments can be made either quantitatively (e.g. area of forest that has not been clear-cut by logging firms, or reduction in numbers of animals hunted) or qualitatively (e.g., ranking of intensity of clearing for agriculture on a scale 1-5, or assessing local expert opinion on the level of hunting), depending on the type of threat and the data available. In all cases, the reduction in threat should be expressed as the percent change in the original threat identified at the start of the project (Table 1, column 6).

(5) *Calculate the raw score for each threat*. Multiply the total ranking by the percentage calculated in step 5 to get the raw score for each threat (Table 1, column 7).

(6) *Calculate the final total threat reduction index score*. Add up the raw scores for all threats (13.3 in Table 1), divide by the sum of the total rankings (e.g., 45 in Table 1), and multiply by 100 to get the final threat reduction assessment index (30%) for the project (Table 1, column 8).

Calculation of the TRA index in the Crater Mountain example above showed that there was a 30% reduction in total threats, primarily by reducing the threats posed by corporate logging and commercial mining. A key lesson learned from the analysis was that it is generally fairly easy to define and assess success in meeting external threats such as corporate logging or mining. It is much harder to define and assess success in meeting internal threats such as over-hunting of wildlife or expansion of subsistence food gardens, especially if the information for evaluating the threat comes only from the local people. What are the key lessons that you can draw from the TRA for the Khakaborazi National Park?

LEVEL 3

Objective: To Design a Monitoring Plan for the Project

In a conservation project, an approach to measuring management effectiveness is to either monitor the status of threats themselves or monitor the ecological integrity of the conservation targets or do a combination of the two approaches. The two broad categories may be summarized as:

1. Assessment of the status and impacts of threats
2. Measurement of the ecological integrity of conservation targets

For the first category, the measurement of threat status as an indicator of management effectiveness, the question addressed is as follows: are the most critical threats that confront biological resources at a park changing in their severity or geographic scope as a result of conservation strategies (or lack thereof)? For example, has wildlife poaching declined as a result of efforts to develop and improve contained domestic animal husbandry as a protein source for local communities?

For the second category, measuring ecological integrity as an indicator of management effectiveness, the question becomes: do the ecological systems, communities, and species that are the focus of conservation efforts occur with sufficient size, with appropriately functioning ecological processes, and with sufficiently natural composition, structure, and function to persist over the long term? For example, are populations of mammals and birds declining at a slower rate, or growing, as a result of alternative protein production activities?

This stage of the exercise project aims to address all the major threats to the Khakaborazi National Park as described in the section titled "Background Information" above. You need to develop a Monitoring Plan that will help you and your team determine whether the strategies you have chosen to counter the threats are effective and if your project is succeeding. You can choose to either focus on monitoring biological/ecological indicators (e.g. population status of hunted wildlife species) or the threats themselves (e.g. hunting). An important step in the development of a monitoring program is to identify key indicators such as land-use change, fluctuations in species populations, ecotourism visitor impacts, etc. that are relatively easy and cost-effective to monitor through the duration of the project. Refer to Boxes 1 and 2 below to help you identify monitoring strategies and indicators that will help determine project success.

(1) For each objective and activity that you have identified in Level 1 above, identify one or more monitoring strategies that you feel will help measure project success in reducing that particular threat.

(2) For each monitoring strategy, identify what (i.e. indicators) and how (i.e. methods) you will monitor.

(3) The monitoring strategies you have chosen will fall into one of two broad categories. The strategy will focus on biological monitoring as in the monitoring strategy 2 above (i.e. measuring the ecological integrity of targets such as forest area, status of wildlife populations, etc.) or threat monitoring as in monitoring strategy 1 above (i.e. measuring

the status of threats such as fires, commercial logging, etc.). Classify the strategies you have chosen into one of the two categories and briefly tabulate the major advantages and disadvantages of the two types of monitoring systems. Are there other monitoring methods you can think of?

Box 1. For example

Threat: Commercial logging within the core area of the reserve

Objective: To stop all timber extraction in the core area of the reserve by the end of the third year of the project

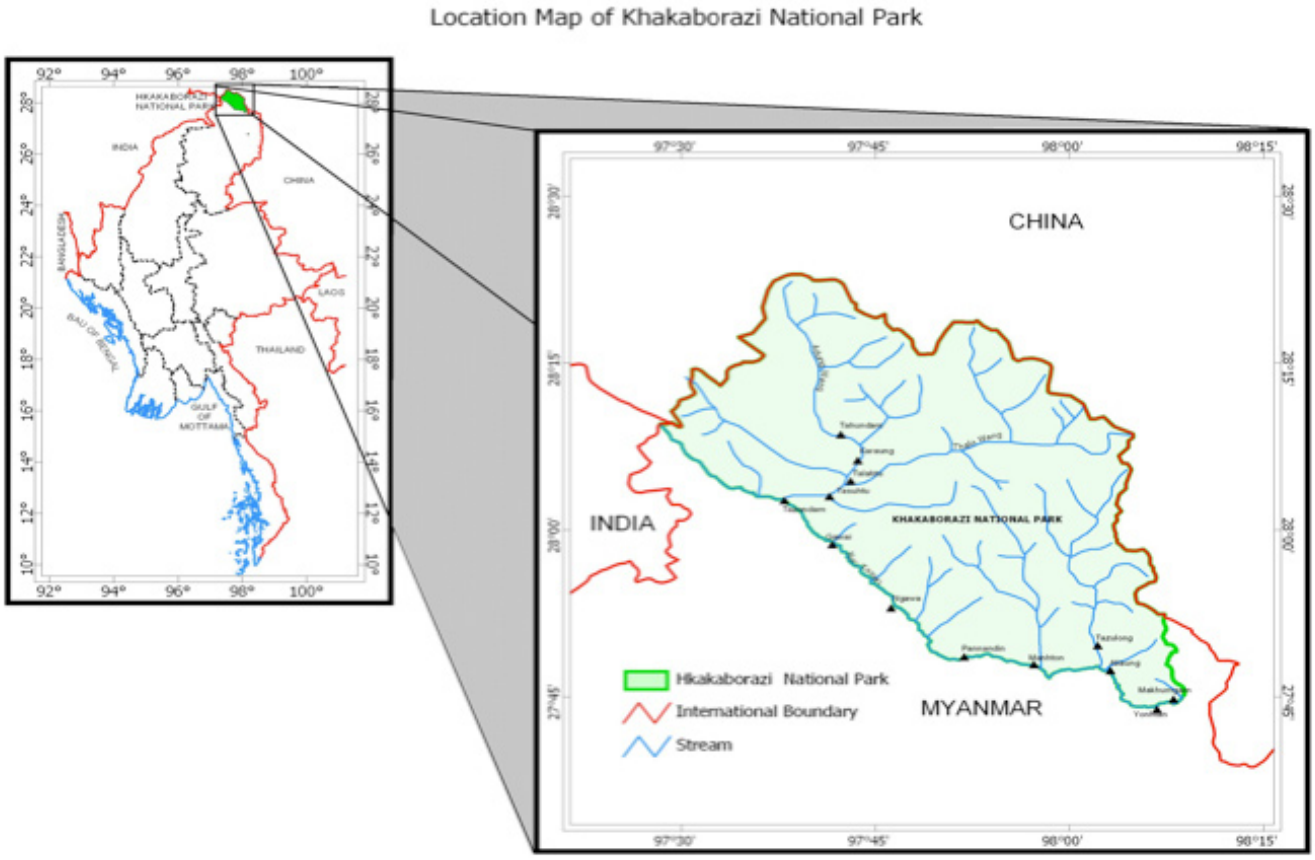
Monitoring strategy 1: Determine changes over time in a number of active logging concessions in the reserve.
Indicator: Number of active concessions in reserve core area.
Method: Periodic review of updated records from the Ministry of Natural Resources regarding the number and duration of offical concessions.

Monitoring strategy 2: Measure changes over time in area of core forest zone affected by logging.
Indicator: Area (ha) of undisturbed and disurbed core reserve area.
Method: GIS and land-use mapping.

Box 2. Threat impact monitoring

Variable monitored	Monitoring parameters	Reference
Land-use changes as an indicator of protected area integrity	Land use pressure (land-clearing, logging, hunting, grazing, fire)	Bruner et al., 2001; Jepson et al., 2002
Ecotourism visitor impacts in protected areas	Trails and recreational site impacts, behavioral parameters target species	Farrell and Marion, 2001; Kinnaird and O'Brien, 1996
Species persistence within individual protected areas	Mortality causes (incl. effects of poaching on mortality) and rates for Eurasian badgers in relation to edge effeects	Revilla et al., 2001
Habitat fragmentation	Degree of fragmentation (distribution and intensity); loss of primary forest, structural classification based on radar data	Saatchi et al., 2001
Harvest of plant resources	Effects of harvesting on distribution, abundance, population structure, population dynamics of harvested NTFPs	Hall and Bawa, 1993; Godoy and Bawa, 1993
Impact of hunting and trade on a single species	Type and number of wildlife species captured and traded; offtake	Johnson et al., 2004
Ecological degradation in protected areas	Rate of change in forest cover and habitat (Giant Panda)	Liu et al., 2001

Figure 2: Location map of Khakaborazi National Park



vation. Available at http://ncep.amnh.org/linc."

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