

**Tiger Conservation and Priority Areas for Ecological Restoration:  
A Landscape Approach  
Final Report to NFWF: 2000-2001**

**December 31, 2001**

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**NFWF Final Report 2000-2001**

**Summary**

In July 2001 we submitted a report that summarized the results of our activities during the past field season. This final report reviews the extent to which we accomplished the goals set out in our original proposal. See the interim report for project results. This report also outlines our current plans to complete our objectives. The objectives of the original proposal were extended to a larger geographical area since the inception of this project in October of 1999. Bhim Gurung plans to complete his thesis by

the end of February and will return to Nepal to continue working on the NFWF project under new funding. He will expand the role of the Villager Rangers to include additional biodiversity monitoring and will also extend the network of Village Rangers to the buffer zones of Royal Chitwan and Bardia national parks. This expansion is important in light of the increased human tiger conflict (man eating by tigers). Mahendra Shrestha will continue to analyze data for his thesis and he and Smith will work closely with other organizations on the TAL project. Smith will present a long term research plan to the Department of National Parks and Wildlife Conservation (DNPWC) in February and will circulate that plan after seeking comments from the Department.

## **Review of the extent to which we accomplished the proposal objectives**

### **(1) Establish a Long Term Tiger Monitoring Program**

#### **Accomplishments to date**

Bhim Gurung established an innovative monitoring system that focuses on tigers outside of protected areas. He initiated this effort in October 1999 when he began recruiting a network of "Village Rangers". These rangers are from a variety of backgrounds including community leaders, farmers, herders and hunters.

The network began collecting data in November, the month that Gurung did most of the hiring, and continued to December 2001 (see below for a detailed account of the project). Gurung and Smith are preparing a publication, to be submitted to Conservation Biology, that describes (1) the network as an innovative way to involve local people in community based conservation and (2) the distribution of corridor and breeding habitat outside the protected areas in Nepal.

#### **Future plans**

Dr. Maskey, the staff of WWF Terai Arc Landscape Project, Gurung, Shrestha and Smith plan to expand the Village Ranger network in 3 ways. The network will be increased to add rangers in the buffer zones of Chitwan National Park as outlined in the current NFWF proposal. Second, the duties of the rangers will be increased to include more active patrolling. Currently, rangers do some patrolling and investigate livestock kills by going with villagers to the kill sites to document evidence of the kill. In the coming year they will team up with wildlife technicians to do more patrolling and to help monitor relative prey abundance.

## **(2) Estimate relative prey abundance**

### **Accomplishments to date**

Mahendra Shrestha accomplished much more than we initially planned. He established a very large sample of > 700 transects (17,500 plots). These cover the entire Terai between Mahendranagar (Sukia Phanta) in the west to east of Kosi Tapu reserve in eastern Nepal.

### **Future plans**

Shrestha will correlate relative prey abundance with a forest cover classification that is currently funded by the USFWS Asian Elephant Fund. This analysis will include forest cover, forest condition, roads, population centers, forest use and forest ownership as independent variables; the relative prey abundance data are the dependent variable.

## **(3) Use satellite data to monitor habitat quality**

### **Accomplishments to date**

This objective has not been completed. Our original plan was to refine the classification of a single Thematic Mapper TM scene of central Nepal (row 151, path 41) using multi-temporal data. We expanded Shrestha's prey sampling to include the entire lowlands of Nepal. This extension was based on our realization that connectivity between

reserves is critical to tiger conservation. As a consequence of extending our study area, we decided to do a vegetation classification of the entire Terai region of Nepal. Our original budget from National Fish and Wildlife Foundation covered only the classification of a single scene and we submitted and received funding from the Asian Elephant Fund to acquire and classify 7 scenes. These have been purchased and with the strong encouragement of NFWF, Shrestha (DNPWC), Smith (UMN), and Ahearn (Hunter College, New York) are collaborating with WWF and NORAD in this Terai-wide vegetation analysis.

### **Future plans**

We are following the methodology outlined in our proposal, but have acquired 2001 TM data and expanded the study area to include Corbett to Chitwan (parts of 7 TM scenes covering a distance of approximately 700 km east-west and 20-40 km north-

south. This classification will serve as the base map for the WWF Terai Arc Landscape Project. Field work is scheduled for mid-March and the field team will be composed of 8 people from the various organizations. If the political situation allows, we will undertake the ground verification across the entire Terai. If the political situation has not improved we will confine our efforts to the 3 protected areas.

To complete the prey analysis we outlined in our proposal to NFWF, Shrestha will use logistic regression as described in (2) with vegetation type and condition as a major variable.

#### **(4) Investigate and model tiger use of forest habitat outside protected areas**

##### **Accomplishments to date**

Smith and Shrestha radio-collared 2 tigers living on the periphery of Royal Chitwan National Park. One collar failed; 562 GPS locations were obtained from the other collar. These data will be used to enhance a model of tiger behavior originally developed by Ahearn, Smith and Joshi (Ahearn et al. 2001). This model investigates the relationship of tigers to different abundances of domestic and wild prey and geographic variation in human behavior in guarding livestock and poisoning livestock carcasses. Preliminary results suggest that changes in patterns of grazing livestock can improve the quality of national forests as dispersal and additional habitat for tigers. Attached is a reprint of the paper in which the model is described.

##### **Future plans**

We have proposed to work closely with the DNPWC to provide GPS collars for monitoring problem tigers. Our goal is to acquire basic ecological and behavioral data on tigers living outside protected areas while helping the Department to monitor these problem tigers. We will also expand the scope of our village ranger project to include more detailed observation of patterns of human behavior in grazing livestock. These data on tiger and human behavior in national forests will allow us to develop a refined model of tiger use of national forest habitat. The goal is to increase the connectivity between protected areas and also to increase the breeding land base for tigers without increasing human tiger conflict.

## **(5) Identify Priority Areas for Habitat Restoration**

### **Accomplishments to date**

We proposed to select an area among the identified priority areas as a pilot study site. Mahendra Shrestha has thoroughly investigated the Basenta Forest as a potential priority area. It rates as a high priority area for the following reasons:

- It is the strongest possible corridor to Dudwa Tiger Reserve in India.
- It is a large block of forest where tigers have occurred for the past 17 years.
- Local people who Shrestha interviewed support community action to restore this forest and its biodiversity.
- The natural prey base is low, but higher than most other areas outside the protected area system.

Shrestha's task outlined in our original proposal has to a large extent been taken over by 2 larger-scale projects, the Terai Arc Landscape Project and the UNDP project. This is a very positive step. Further efforts to set priorities as we outlined in our proposal will be done in close coordination with the DNPWC and the TAL Project. Shrestha's role and his research are still vital. His analysis of prey abundance in relation to forest cover and condition and Gurung's research (identifying areas where tigers occur and are breeding outside reserves) will establish priorities for restoration and community forests. Shrestha's analysis may provide insights into the long term efficacy of these areas in supporting tiger populations in the Terai. He also conducted interviews of forest officers and local people to establish a broad level of communication among stake holders and to build a framework for community based conservation. Bhim Gurung's Village Rangers have an important role in developing this framework of cooperation between the government and citizens of Nepal and therefore are critical for establishing a community component to TAL.

Additional information that Shrestha is contributing to this effort to develop land use priorities and approaches to conservation in the Terai is an analysis of conservation and resource issues that foresters and park wardens identified in interviews that Shrestha conducted in 2000.

## **Future plans**

Our future plans to contribute to setting restoration priorities will use the results of Mahendra Shrestha's analysis of current natural and domestic prey distribution in relation to tigers and other ecological factors (as outlined under Objective 2). Our next step will be to team up with Dr. Joshi and WWF staff to do ground surveys. We have modified our original criteria for site selection.

### **Criteria for selecting pilot restoration site**

1. The site will be outside the sphere of influence of RBNP and RCNP, where previous community forestry projects have been successful. It is important to show that habitat restoration projects through community forestry can be successful in areas where such projects have not been attempted.
2. We will select an area where forest edge is becoming increasingly degraded based on satellite imagery analysis and ground truthing.
3. The area will have tigers and low, but recoverable, populations of prey.
4. The site will comprise a degraded forest at least 150 km sq and an edge where community forestry activities can be developed by local people to meet their daily resource needs.

### **Steps for collecting information**

1. We will hold a series of meetings with stakeholders to discuss the necessity of forest restoration to meet their resource needs and tiger conservation. We will ask how forest resources are used locally and obtain information on:
  - number of livestock individuals own and frequency with which they are grazed in this area.
  - amount of timber and forest products local people extract from this area.
  - alternative sources villagers currently use to obtain fodder and fuel
  - attitudes of local people towards the forests (economic and aesthetic/spiritual

importance of forest)

- local people perception of wildlife, with the tiger as a focal animal
2. We will also discuss the tiger conservation issues based on the following topics: tiger biology, prey dynamics, biodiversity issues and impact of different land use practices on ecosystem services.

We envision that our approach will be useful to the larger TAL Project. The main objective of our proposal has been to meet the economic and resource needs of the local community while restoring the land base for tigers and other wildlife.