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A PROPOSAL TO STUDY THE ECOLOGY OF NATIVE GRASSLANDS AND THEIR HUMAN USERS IN THE TERAI OF NEPAL

Stephen Berwick
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International Institute for Environment and Development
1717 Massachusetts Ave. N.W.
Washington, D.C. 20036
(202) 462-0900

THE ECOLOGY OF IMPACTED NATIVE GRASSLANDS AND THEIR HUMAN USERS IN THE TERAI OF NEPAL

A Proposal

INTRODUCTION

The Kingdom of Nepal is characterized by the geographically intimate juxtaposition of mountain-hill and lowland forest (terai) ecosystems. The terai is an important element of this unusually closely-linked human, and biophysical system. The nival zone of 8,000 meter mountains is easily seen from the back of an elephant at Royal Chitwan National Park. The ecosystems which the eye transects also constitute the watershed of nearly a quarter of the earth's human population. The consequences of land use plans and practices in Nepal are thus magnified in other downstream nations of the subcontinent. Foreign assistance donor presence is evident (e.g. 9 donors are currently spending $110 million in integrated rural development projects alone) as are PVO's (at least 17 in the environmental sector). The natural environment and the cultures which it supports are responsible for a tourism-based industry which contributed nearly $52 million in 1981--the largest single foreign currency earner.

In some instances this assistance has had measurable and salutory results such as the response in literacy rates (which rose 10 fold in the past 25 years) to about $1 million a year in USAID. For other programs the effects may be measured but the benefits are less clear. Malaria eradication and translocation of hill people has greatly impacted the natural systems of the terai--e.g. over half the forest cover has been removed. Clear understanding of the ramifications of foreign assistance can not always be demonstrated. The important corollary to ignorance of biophysical components is a pervasive lack of even rudimentary understanding of systemic processes. Some simple, well-conceived applied research is necessary to guide sustainable development. Even three decades into the process it is not too late to benefit from the essential insights the research suggested below can contribute.

THE SITE

Malaria eradication programs in the Nepal terai during the 1950's promoted the widespread conversion of forests and grasslands to agriculture by immigrant hill people. The trend continues today, although the Nepali government has considered measures to halt the flow of people from the hills. Development pressure was rapidly leading to the decimation of the unique habitats and wildlife in the terai. Foremost among these areas was the Royal Chitawan hunting reserve in the Rapti River valley. The government of Nepal (HMG) declared this area a national park in 1973 and proceeded to develop

the Park, protect the wildlife, and encourage tourism to create revenue. The impact of this process on the local people was substantial (Milton and Binney 1980). Several villages were removed, access to grazing, fuelwood, and construction material was curtailed, and hunting was stopped. Local villagers retained the privilege of entering the Park once a year to collect thatch grass and grass canes for building material. Crop depredation by Park animals became a serious problem in some areas, although it was likely a problem before the Park was created.

Research for management began in the mid 1970's on the most visible species--rhino (A. Laurie), and tiger and their prey (Smithsonian Tiger Ecology Project). However, little was done to study the structure and dynamics of the forest and grassland habitats that supported such diverse and abundant wildlife. Such research is essential for addressing problems of managing wildlife populations, and it is equally useful and essential for solving park-human conflicts. Further, habitat research can provide a paradigm for managing wildland use, such as grazing and collection of forest products, throughout the terai.

The real challenge lies not only in perceiving and managing the Chitawan ecosystem but in reconciling its presence with the needs of human neighbors. If this can be systematically attempted, the lessons will be of use throughout South Asia. For example, the problems tend to be a close analogue of those at the Gir Forest (Berwick 1976), Dudhwa (Saharia 1980), and many other locations. Common elements include grazing, tourism, endangered species, wild animal damage or danger, fuelwood and timber harvest, usurpation and confiscation of property, minor forest product needs for ayurvedic medicine or construction (e.g. thatch) and a very rudimentary and anecdotal knowledge of system processes essential for management. Milton and Binney (1980 p. 8) state that "until a great deal more is known about the complex array of factors leading to development and maintenance of grasslands and riverine forests--including past and present human populations--developing sound park management policies for wildlife will be difficult, if not impossible." The constitution of the Park in 1973 and subsequent restrictions have greatly reduced the available grazing for residents nearby. There are shortages of grass and abuse of remaining land. Additionally, Milton and Binney found that loss of crops to park wildlife ranged from 28 to 90 percent over 4,000 people in the study area who held land (about 60 percent of the total population). Because of such depredation and the danger and effort of stemming it, agricultural productivity has plummeted often to 1/2 of the 1975 figure because of crop loss (primarily due to rhino, chital, boar or parakeets) or conversion ot grazing.

The results of such recent land use shifts include severe erosion and flooding by the Rapti River. Yet 80 percent of the people would prefer to remain where they are if the wildlife-related problems could be resolved. Their perspective "...is unanimous on the

point: the Park has radically lowered their agricultural productivity and disrrupted their lifestyle" (Milton and Binney 1980, p. 18). These authors note that (p. 27)

> "Research on the patterns and dynamics of plant succession at Chitawan are badly needed to provide an intelligent base for ecologically sound management practices. Very little is currently known concerning successional processes, yet the survival of many species dependent upon certain vegetation types may require such understanding for effective habitat management. Seasonal burning, thatch collection, monsoon flooding, sedimentation and flooding by streams and river, domestic elephant impacts, and introduction of large herbivores formerly present (such as wild buffalo) are examples of subjects needing to be carefully researched and developed as tools for maintaining optimum vegetation types for wildlife."

I would add that such data are necessary to manage agricultural depredation, devise optimal grazing systems, maximize forest products and generally integrate the human residents into various forms of wildland use from tourism in national parks to reserve forest use.

GOALS AND OBJECTIVES

The project has four goals:

1. Study the problems of human ecology related to wildland resource use and availability.

2. Investigate the successional ecology of the grasslands.

3. Study the relationships between domestic and wild herbivores and grassland successional dynamics.

4. Develop management concepts and tools that integrate the above information.

Goal 1. Human Ecology

Objectives

A. Determine the demand for and importance of forest products such as thatch, seed, and building materials.

B. Determine the availability of the above products in conjunction with successional studies and forest studies of the Smithsonian ecologist.

C. Determine the grazing demand by an analysis of livestock populations.

D. Estimate crop depredation.

E. Study the cultural institutions, demography, attitudes and decision-making processes which relate to natural resources.

Goal 2. Grassland Successional Ecology

Objectives

A. Develop a habitat classification scheme for Chitawan National Park and adjacent lands (with Smithsonian ecologist).

B. Quantify the roles of fire, collection, habitation, herbivory, soil conditions, plant dispersal strategies, and abiotic factors on grassland composition, productivity, nutrient quality, recovery and phenology.

C. Collect for the Park herbarium and develop plant keys (with Smithsonian ecologist).

Goal 3. Herbivore Ecology

Objectives

A. Determine diet composition, and forage preference, intake, and digestibility by direct and indirect methods using animals in conjunction with successional, phenological and nutritional studies. Domestic animals will receive priority.

B. Use simulated grazing trials (e.g. clippings) to determine the impact of low, medium, and high levels of grazing on grassland composition, productivity, and quality.

Goal 4. Management Concepts and Tools

Objective

Integrate ecological information into a grassland simulation optimization model to analyze grassland management alternatives and their effects on grassland composition and stability. Problems to be considered are:

1. grazing management schemes

2. thatch management

3. fire management

4. revegetation strategies

5. concepts of carrying capacity to look at strategies for keeping wild herbivores in the Park and reduce crop depredations

6. integration of domestic and wildlife forage needs in Park buffer zones

Other benefits of such a model would be:

1. organize ecological information collected during the study and in the future into a concise structure for analysis and to point to future research needs

2. simulations and sensitivity analysis of model will indicate critical ecological processes for more research or that require caution in management

3. provide for long-term analysis for Park and adjacent agroecological planning

METHODS AND TASKS

Task 1

- a pre test of existing discrete groups (by caste and tribe) and the construction of a survey addressing attitudes, knowledge, familial attitudes and history, resource-related behavior (e.g. forest product use) and social/demographic characteristics.

Task 2

- statistical analysis of pre-tests to initially catagorize respondents into discrete attitudinal strata

Task 3

- sampling these strata in a larger survey shose numbers will be determined from the variance encountered in the pre-test

Task 4

- the survey is then analyzed. The attitudes and knowledge of residents for the resources they encounter are essential to formulating educational plans and interpreting the decisions evaluated below.

Task 5

- The audio-visual demonstration of a resource problem (using the Survival Anglia movie of Chitawan) and its resolution

through management decision games. This involves translation of the sound track and the post "decision" administration and analysis of a brief questionnaire.

Task 6

- The socio-demongraphic data (sex, age, caste, level of education, etc.) are analyzed by a form of step-wise multiple regression (path analysis) in which the contribution of each variable (e.g. level of education) to the decision is determined (e.g. 33 percent) and a notion of which elements of the decision are refractory to change is obtained.

Task 7

- Vegetation inventory and type mapping with releve quadrats along transects, and coordinated photo/imagery interpretation. Includes undisturbed/disturbed paired sites and mensurational data (e.g. volume, canopy, coverage, density and height of trees).

Task 8

- plant collection and herbarium maintenance.

Task 9

- penned cafeteria trials and feeding site observations of domestic and wild ungulates and rumen analysis of wildlife

Task 10

- phenological observations of plants

Task 11

- soil compaction, structure, exchange capacity and trends in different sites
- mapping soil groups

Task 12

- annual forage productivity studies using exclosure and twig clippings and dimension analysis

Task 13

- simulated grazing and browsing effects upon vigor, productivity and reproduction of forage plants

Task 14

- autecological studies of several key forage species and land use history/fire indicator species (e.g. Bombax) to determine optimal adaptive grazing and revegetation systems

Task 15

- measuring and analyzing controlled prescribed burns in different vegetation types--e.g. fire and soil temperatures, fuel loading, subsequent mortality, germination and demography of successional plants with quadrat sampling

BUDGET

I.	Salary		1 1/2 yrs
A.	Cook	@ $600/yr	900
	Driver/mechanic	900/yr	1,350
	Field Assistant (2)	600/yr	1,800
B.	Nepalese Sociologist	3,000	4,500
	Nepalese Botanist (1/3)	3,000	1,500
C.	U.S. Doctoral Candidate	8,000	12,000
D.	U.S. Consultants at $225/day		
	1. Attitudinal resource	15 days (12 in country)	3,375
	2. Decision-making	15 days (12 in country)	3,375
	3. Range/fire	15 days (12 in country)	3,375
	4. Wildland use	15 days (15 in country)	borne by institution
		Subtotal	$32,175.
II.	Travel		
A.	3 r.t. Seattle-Kathmandu including consultant #4 and consultant at $2,700/		8,100
B.	In-country at $500/yr		750
C.	Consultants at $2,700		8,100
D.	Per diem	51 days at 60/	3,060
		Subtotal	$20,010
III.	Insurance at 2.25/100		800
IV.	Capitol Equipment		
	(2) motorcycles	@ $2,000	4,000
	elephant rental	@ $1,000	1,500
	(1/2) petrol/maintenance	@ $5,000	3,750
	oven, mill, scales, etc.		1,000
			$10,250

IV.	Other Direct Costs (copying, lab, communications, etc.) @ $500.	750
		750
	TOTAL	$63,965