Green Finance: A Case Study of Khao Yai

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No other park in Thailand has been a subject of more national controversy than Khao Yai National Park. Despite heated debate about what should be invested in the National Parks, no serious study has been attempted to seek guidelines for public and private investments and cost recovery. TDRI wishes to extend gratitude to the U.S. Agency for International Development (USAID) for providing financial support to this much needed study and the Royal Forest Department, for generously providing staff hours to make this study possible. Special thanks go to Khun Vallobh Sukont, the Superintendent of Khao Yai National Park, and his team.

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Abbreviations

baht	Thai currency; 25 baht is equivalent of US$ 1
CVM	Contingent valuation method
DTEC	Department of Technical and Economic Cooperation
NSO	National Statistical Office
OLS	Ordinary least square
rai	Unit of land; 1 rai = 0.16 hectares
RFD	Royal Forest Department
TCM	Travel cost method
USAID	United States Agency for International Development
WTP	Willingness to pay
WTA	Willingness to accept

Contents

Page

Page

Page

List of Tables

Table *Page*

List of Figures

Figure *Page*

Executive Summary

Growing national concern for biodiversity and awareness of environmental degradation has driven the Thai government to rapidly increase the number of environmentally protected areas over the past decade. Between 1987 and 1992, areas protected by the National Park Law increased more than 40 percent. The possibility of expanding the government budget to meet the cost of protecting these areas is limited, which may lead to more resource degradation. This study examines Khao Yai, Thailand's oldest and most popular national park, to seek avenues for financing of national parks throughout the country. In addition the study demonstrates a method for valuing the total benefits of a national park, including non-market benefits.

The data for this study were collected by conducting two large scale surveys on park users and non users. A total of 948 park users and 1057 non park users were interviewed. The sample of non park users was taken from residents of urban areas. Five provinces, including Bangkok, Nakhon Nayok, Phang Nga, Udon Thani, Phitsanulok were selected as survey sites representing different levels of gross provinceal income and various geographical distances from Khao Yai. Park officials, surrounding villagers and private businesses have also been interviewed. Our main findings, are as follows:

1) The cost of Park maintenance and protection has risen by 25 to 30 percent annually during recent years while cost-recovery over the same period has dropped from 51 percent to 30 percent.

2) Using the travel cost method which provides an estimate of direct benefits to park users, we found that visitors' total willingness to pay per visit was 1,420 baht, of which 240 baht was travel cost, 310 baht was expenditure for accommodations, food, and tour guides, and 870 baht was consumer surplus or the visitors' net gain or satisfaction from the visit.

3) The current direct cost of providing services to tourists (6 baht) exceeded the user charge or the entrance fee (5 baht). When the indirect cost of providing tourism services (i.e., cost of protection of wilderness) is included, the total cost of providing services to tourists amounts to 9 baht per head. According to our survey, Thai visitors to Khao Yai are on average willing to pay 22 baht per head per trip to enter the Park, far exceeding the current charge.

4) Thai visitors to Khao Yai are further willing to pay an average of 730 baht per head per year to ensure the continued existence of Khao Yai and to preserve their option to use it in the future.

5) Thai non-visitors, on the other hand, are willing to pay an average of 183 baht per head per year for the option and existence value provided by the Park. The average option value for those expecting to visit the Park in the future was estimated at 196 baht/year.

6) The total economic value of Khao Yai to Thai visitors and non-visitors taken together stands today at 3,080 million baht per year or a present value of 30 billion baht assuming a 10 percent discount rate. This is clearly a lower bound since many other significant benefits have been left out and our the population surveyed includes only urban residents. Based on projected GNP growth of 8 percent per annum and income elasticity of 0.3, the total economic value of the Park is expected to grow over time at the rate of 2.4 percent per annum.

7) The services that visitors reported to be inadequate and in need of improvement included road maintenance, the number and cleanliness of toilets, the availability of waste receptacles and the availability of information on park trails, flora, and fauna.

8) The users' average willingness to pay for access to Khao Yai rises from 22 baht to 44 baht per head per trip for improved services such as road improvements, increased cleanliness, and upgraded information.

9) Two-thirds of the park visitors expressed demand for more animal observation towers, suspension bridges, bird watching sites and the development of new attractions. About half of park visitors surveyed expressed demand for transport services from the entrance to the service centers and expansion and improvement of camping sites; contrary to general government attitude, park visitors were willing to pay for individual and incremental, man-made services provided by the park.

10) Income from vehicle entrance fees (about 3 million baht) accounts for 80 percent of the park's revenues and suffices to finance the maintenance of roads for traffic using Khao Yai as a thorough-fare. However, through-traffic generates little net economic benefit (0.5-0.6 million baht); the 3,000 trucks that use Khao Yai as a thorough-fare each year are responsible for much of the road damage, noise and air pollution in the Park, yet contribute only 90,000 baht or 3 percent of the total entrance fee revenues.

11) The opportunity costs of Khao Yai park's 1.36 million rai of forest, in terms of net present value of foregone harvests of forest products is estimated between 1,650

and 3,300 million baht. The opportunity cost of the land, given current land price of 20,000 baht per rai (for the least accessible and untitled land in the vicinity of the park) is at least 28,000 million baht. It is worth noting that the estimated economic value of the park (in net present value terms) compares favorably to these opportunity costs despite the omission of substantial additional benefits from conservation.

12) While only a few foreigners (non-Thai citizens) visit Khao Yai, accounting for only 1.5 percent of the total number of visitors, their willingness to pay to access Khao Yai (50 to 125 baht/person/trip) is two to five times as high as that of Thai users for the current level of service. For an improved level of service they are willing to pay 100 to 143 baht/person/trip. The non-use values of both users and non-users are respectively 551 baht/head/year and 121 baht/head/year.

13) The creation and protection of the park, while beneficial to the society at large, has resulted in significant loss of income and employment opportunities, due to reduced access to forest resources (for agriculture, timber and other forest products) worth about 165-330 million baht annually. Only limited employment opportunities were created by the park for local people, mainly as trekking porters and as employees in hotels, golf courses, and restaurants in areas adjacent to the park's entrance.

A number of conclusions may be derived from the above findings. First, the Park is clearly underpriced and underutilized. Second, government subsidization of about two-thirds of the Khao Yai budget is inadequate to offset capital and operating costs not covered by park revenues, thus resulting in poor maintenance and gradual deterioration of facilities. Furthermore scientific research on the biodiversity and forest ecology of the Park is grossly underfunded.

Third, Park encroachment and poaching, while declining because of stricter enforcement and increased dependence on commercial agriculture and urban employment, is clearly a response to the substantial welfare loss suffered by the 200 villages in the proximity of the Park; their loss was not offset by the meager employment opportunities for local people created by the Park. In this sense, the creation of the Park was regressive as it transferred wealth from low-income villagers to resort-owners, tour-operators and better-off tourists.

After careful consideration of each policy implication in light of the political, economic, and social realities of Thailand, we advance the following policy recommendations:

1) The entrance fee for Thai visitors to the Park should be raised from the current 5 baht to 20 baht per person per visit in line with the visitors' average willingness to pay. Based on an average of 1 million visitors each year and an estimated 27 percent drop in

visits due to rate increase, we project fee revenues at the level of 15 million baht, an amount sufficient to cover the cost of Park protection and current levels of service provision including maintenance of facilities.

2) The entrance fee for foreign visitors should be set at least at 50 baht per person per visit. A differential entrance fee between local residents and foreigners is common in countries with significant ecotourism such as Kenya and Costa Rica, as both the WTP and the demand elasticity vary significantly, because of different income levels and preferences.

3) In addition to raising the entrance fee, the Park Authority may attempt to capture a larger share of the visitors' expenditures during the stay in the Park by providing additional services such as low-impact lodging, improved food services, and transit between the entrance and the park center. The Park Authority could also attempt to capture a part of the visitors' substantial consumer surplus (870 baht per visit) through a differentiated yet simple tariff structure.

4) Significant expenditures up to 2.2 million baht a year are justified for improving Park protection and tourist facilities. In particular, road improvements, proper waste disposal, improved sanitation, increased information services, and Park rule enforcement will increase visitors' willingness to pay and justify a second increase of entrance fees for local tourists to at least 40 baht per person per trip.

5) All food, drink, souvenir and other concessions could be awarded through a competitive bidding process, subject to specified rules of operation, to maximize Park revenues.

6) A refundable deposit for bottles, cans, plastic bags, and packages of food and drink sold by the concessionaires is recommended to encourage return after use and reduction of littering. The concessionaire should agree as part of the bidding price to accept and refund the deposit on similar items found within the Park regardless of their origin. Simultaneously, the Park Authority should institute a heavy fine for littering within the Park.

7) We strongly recommend the establishment of a Khao Yai Protection Fund which would solicit contributions from Park users and non-users, both local and foreigners, for the specific purpose of protecting the Park from poaching, encroachment and forest fires. Our study suggests that up to 3 billion baht per year can be raised from domestic sources alone. Another option is to issue transferable conservation rights and to market them widely at home and abroad to foundations, NGOs, corporations, nature lovers, and the general public. The proceeds from such a fund should be earmarked for the protection and expansion

of the Khao Yai Park as well as the support of scientific research on its forest ecology and biodiversity.

8) In light of the limited economic benefits from through-traffic and the likely disturbance to the wildlife, the option of closing the road to through-traffic should be considered. Alternatively, the road could remain open to through-traffic but six-wheel trucks should be excluded and all vehicles allowed should be charged both a vehicle toll (at the current rate) and an entrance fee per person (including the driver) at the proposed higher rate. This policy would discourage through-traffic except for persons with a high opportunity cost of time or a high appreciation for the scenic route through the Park.

9) The Park Authority may want to undertake further studies of the feasibility and financial viability of investments in animal observation towers, suspension bridges, bird watching sites, transport services from the Park entrance, new camp sites, and other attractions. Our study suggests that visitors would be willing to pay the cost of using such facilities as a user charge. We have not, however, estimated the rate of the charge and the level of use that would justify these investments. Further study in this regard is needed and can be most appropriately undertaken or sponsored by the Park Authority.

10) Further research is needed to estimate the watershed and micro-climatic benefits of the Khao Yai Park and to explore the scope for a possible watershed charge on the beneficiaries in order to augment the Khao Yai Protection Fund. Similar watershed charges have been implemented in Indonesia and Costa Rica, among other places.

11) We recommend investigation of the potential market demand for bioprospecting in Khao Yai, including willingness to pay, potentially interested parties, and the experience of other countries (e.g., Costa Rica) with bioprospecting arrangements and their implementations in practice.

12) Finally, further research is needed to investigate how a larger share of the economic benefits of ecotourism could be distributed to the populations of the 224 villages around the Park, especially in those villages in which the opportunities for commercial agriculture and urban employment are limited and hence, the incentives for poaching and encroachment are high. One possibility is to use a part of the Khao Yai Protection Fund to finance the development of new income and employment opportunities in villages with intense forest use, such as the sampled villages in Prachinburi, Saraburi and Nakhon Nayok. Given the findings that 1) the value of the land as a national park is in the competitive range with other land uses and 2) the existence of significant additional benefits from carbon sequestration, we recommend that the Park Authority explore opportunities for jointly

implementing carbon offset projects financed by developed country utilities in degraded areas of the Park and in surrounding lands of low opportunity cost. Already, there is a pilot-project of thiskind in the area sponsored by the United States Agency for International Development. Such projects promise to generate employment opportunities and other local development benefits as well as global environmental benefits.

I. Introduction

Khao Yai is Thailand's first and most popular national park. Of the ten million visitors to Thailand's national parks each year, Khao Yai receives almost ten percent of the total. The Park's popularity is due to its proximity to Bangkok, availability of tourist facilities, convenient access, and more importantly, the Park's natural endowments of varied vegetation, wildlife and scenic beauty.

Although the Park charges entrance fees to users, the fees are low and cost recovery from entrance fees was merely 11 percent and thus, operation costs are largely met through government funding each year. However, the possibility of expanding the government budget to meet the growing needs of nature conservation is limited. Between 1987 and 1992 the number of national parks increased from 54 to 77 and the areas protected by the National Park Act increased from 28,156 to 39,283 km^2, an increase of 40 percent.

However, tourism could be an important avenue for financing protected areas. For Khao Yai, this issue has been controversial. Until 1991, the Tourism Authority of Thailand (TAT) operated tourist accommodation facilities and a golf course within the Park. As tourism expanded, so did the problems of poaching and solid waste disposal. Wildlife was also disturbed by tourist activities. Finally, the government, under the leadership of Prine Minister Anand, decided in 1991 that the TAT-run lodging and golf facilities should be discontinued but camping for students should be allowed. Tourists can stay in hotels and resorts at the entrances of the Park.

To date, the legal uses of national parks have been limited in Thailand. The National Parks Act prohibits all human activities except in specified service and recreation areas. Tourism, education and scientific research are the only human activities allowed in Khao Yai. Collection of even one leaf or pebble is considered illegal under the law. For villagers living in areas surrounding the Park however this has meant that their traditional sources of employment are now prohibited activities and their traditional sources of income are now protected by law. Thus, the establishment of Khao Yai has deprived villagers in areas

surrounding the Park of economic livelihood and may have led some villagers to take up poaching and other illegal activities in the Park.

A less pressing issue is whether the Park should allow non-park users to use the highway in the park as a through-way. Although traffic through the park is allowed during the day, the gates of the park are closed at midnight. Even so, it can be argued that through traffic disrupts the ecology of the Park and thus endangers survival of wildlife populations.

The most important issue is how Khao Yai National Park could raise more revenue to provide better services and increase protection. How could the Park Authority extract higher revenue to increase its cost recovery capacity without placing undue burden on the environment? Which park services should be increased and which should be reduced? This study proposes to look at the ways and means of raising non-budgetary income for Khao Yai and the surrounding villages. We expect this study to provide the government with the information to make informed decisions regarding investment, management and financing of Khao Yai.

1.1 Objectives of this study

The objective of this project is to improve the flow of economic benefits from Khao Yai National Park to consumers who enjoy the Park and to the operator of the Park, the Royal Forest Department, without placing the environment, biodiversity and wildlife in jeopardy. The premises of this project are that Khao Yai is under-priced and underused. By under-priced, we mean that consumers value the Park more than they currently are required to pay to enjoy the Park and would, therefore, be willing to pay higher fees. By underused, we mean that more consumers could enjoy the Park without straining its existing infrastructure or damaging the Park's ecosystem. If both of these premises are true then the Park, through improved management and careful investment, could yield higher revenues and greater benefits to visitors.

To test these premises in a way that is useful to policy makers, we have set forth three goals for this project.

1. To determine the economic value of the Park. We will compare the benefits the Park generates with the cost to the government of maintaining the Park. Estimating the total benefits produced by the Park requires aggregating the benefits to Park visitors, villages surrounding the Park, scientific and educational users, and individuals who

value the existence of the Park's unique ecosystem though they may not visit the Park. In addition to these human consumptive benefits, the Park has ecological benefits including its role as a critical watershed, and a reservoir of biological diversity.

2. To identify revenue-increasing measures that reflect the Park's economic value. Preliminary evidence suggests that the Park is highly valued yet unable to generate the revenue needed to maintain its services and protect its wildlife. This suggests that increases in the entrance fees, levies on retail sales within the Park, and the implementation of other cost-recovery measures may both enhance the operation of the Park and improve visitors' experiences.

3. To identify management options which improve the welfare of both visitors and the Park's ecosystem in a cost-effective way. This goal entails identifying improvements in management and infrastructure that will yield benefits greater than the cost of implementing and maintaining these improvements. In particular, we focus on improving Park protection along with services and activities in the Park.

1.2 On the organization of the research.

The approach adopted for this research is to value the total benefits that the park generates both as a provider of services (recreation, scientific education and research, watershed protection, carbon sequestration) and as a warehouse of future value i.e., biodiversity. At the same time, the cost of maintaining Khao Yai and the welfare loss of surrounding villages will be considered. This study will also show that total nature conservation has not been allocated the funding it required because the benefits of conservation are not readily apparent. Specifically, the report will attempt to determine the appropriate entrance fee, and seek extra budgetary sources of revenue to cover the costs of operating Khao Yai.

It is important to note that the establishment of a national park conveys different sets of costs and benefits to different interest groups. For the country as a whole, a national park acts as a storehouse for the wealth of biodiversity. For urban dwellers and tourists, a park is a source for recreation. For others, a national park may provide new income opportunities in tourism. However, for the villagers living in the Park's vicinity, loss of income, either from the loss of land for cultivation or from the loss of potential harvests of timber and other forest products, could be substantial.

In our approach we recognize the importance of identifying the "stakeholders" and quantifying the value of Khao Yai to these stakeholders. Initially we planned to undertake six research components, each seeking information on the value of the Park to a particular group of stakeholders. These components were: 1) a survey of Park users, 2) a survey of non-users, 3) in-depth interviews with villagers about village-park interaction, 4) a compilation of information on scientific and educational users, 5) an evaluation of the Park's contribution as watersheds, and 6) interviews with those using the Park for through-traffic.

One benefit of the park, carbon sequestration was not computed. Interviews with park officials revealed that the net effect of carbon sequestration is probably small at present as there has been no major deforestation or reforestation since 1985 and the carbon offset program to be introduced by United States Agency for International Development (USAID) is only about to begin. The hydrofunction of Khao Yai watersheds cannot be economically evaluated owing to lack of water gauging stations (and hence lack of data) for the different catchments. Therefore, Khao Yai's importance in terms of watershed protection is explained only briefly in the background section and is based on partial and secondary data.

A large scale survey was conducted to evaluate quantitatively the benefits of Khao Yai to both park users and non-users. A small questionnaire survey was conducted for through-traffic. The costs of maintaining Khao Yai were obtained by collecting official data and interviewing park officials. The village-park interaction study was conducted in six villages where researchers spent at least two weeks interviewing a group of informants. No attempt was made to conduct a large scale quantitative survey in the village owing to both budget constraints and the researcher safety.

II. Background

2.1 Environmental Importance of Khao Yai

Khao Yai National Park was established in 1962. It covers a total area of 2,168 square kilometers. Khao Yai National Park has been classified as an ASEAN Heritage Park and Reserve and ranks eleventh worldwide as a "Vavilov Center" i.e., an area abundant with precious plants and animals.

The Park is endowed with five types of vegetative land cover: tropical rain forest, hill evergreen forest, dry evergreen forest, dry mixed deciduous forest, grassland and secondary growth forest. Over 2,000 species of plants can be found within its confines, including the valuable Mai Krisana (*Aquilarea crassna*), used as an ingredient in incense (RFD n.d.). It used to be so abundant in the area that a village near Khao Yai became a center of the Mai Krisana trade.

Khao Yai is a well-known international bird watching site and at least 294 bird species have been recorded (RFD Management Plan n.d.). It is also an internationally popular site for scientific studies of elephants and hornbills. It is the only site in the world that the pileated and the white handed gibbons share overlapping habitats and produce hybrid offspring (Dixon, 1990).

The Park's four watersheds are crucial in maintaining water quality and flood prevention for four provinces of Thailand. The hydrological importance of Khao Yai National Park lies in the fact that it encompasses the head watersheds of three major river systems: the Mun river, the Nakhon Nayok river and the Prachin Buri river, as well as a small stream that drains into the Pasak river (now in the Pasak reservoir north of Saraburi).

Khao Yai's mountainous topography exerts a strong influence on its contribution of water in relation to the surrounding area. Topographically, six major catchments can be identified (Table 2.1). The largest two, the Nakhon Nayok and the

Prachinburi catchments, receive most of the rainfall, as they lie on the windward slopes of Khao Yai's Dangruk mountain range, where the monsoon clouds coming over from the Gulf of Thailand drain much of their moisture before moving further northeast. The two northern catchments of Lam Takhong and Lam Phra Phloeng, both of which drain into the Mun river, receive relatively less rainfall. The remaining two watersheds occupy a small portion in the west. Of these, Huay Yai eventually meets the Nakhon Nayok south of Khao Yai, while Muak Lek is a part of the Pasak river system.

Table 2.1 Catchments enclosed in Khao Yai National Park: Drainage areas and runoff.

Basin Name	*Major Streams/ Tributaries*	*Principal River*	*Location Within Park*	*Drainage Area (km^2)*	*Runoff ($10^6 m^3 year$)**	*Specific Yield ($10^6 m^3 km^2$)*
Prachinburi	Sai Noi, Sai Yai, Lam Phya Than, Prachantakham	Prachin-buri	southeast, east & central	1,122	790	0.70
Nakhon Nayok	Lam Si Sook, Sook, Tha Dan	Nakhon Nayok	west and southwest	660	813	1.23
Lam Takhong	Lam Takhong	Mun	north	201	104	0.52
Lam Phra-Phloeng	Lam Phra-Phloeng	Mun	northeast	114	19	0.17
Muak Lek		Pasak	northwest	n.a.	n.a.	n.a.
Huay Yai	Huay Yai	Nakhon Nayok	west	n.a.	n.a.	n.a.

Note: **** million cubic meters. Estimates based on runoff data for the period 1966-75.***
Sources: ***Ruangpanit and Tangtham (1982), Royal Forest Department (undated).***

These watershed areas within Khao Yai do not form physically complete units (i.e., the complete watershed is not inside the Park). Precise quantification of Khao Yai's hydrological contribution is therefore difficult. However, using sub-watersheds and entire watersheds (including areas outside Khao Yai) as units, and employing multiple regression,

Ruangpanit and Tangtham (1982) estimated annual runoff for four major catchments (excluding Muak Lek and Huay Yai) and for the entire park. Based on 1981 data showing 89 percent forest cover and average annual rainfall of 1,600 mm, they estimated the total runoff discharge produced by Khao Yai National Park to be about 1,889 million cubic meters (Ruangpanit and Tangtham, 1982).

Two additional factors need to be considered when evaluating Khao Yai's hydrological significance.

1. Higher water yield due to orographic influence: Khao Yai's high mountains act as a natural barrier to rain-bearing monsoon clouds moving northward from the Gulf of Thailand, providing rainfall on the south-facing slopes. This orographic influence on rainfall can be clearly seen in the case of the Nakhon Nayok catchment which has the highest specific yield of 1.23 x 10^6 m^3km^2 among the studied drainage basins in and around Khao Yai. This compares with the specific yield of 0.70 x 10^6 m^3 km^2 for the Prachinburi basin, and 0.17 x 10^6 m^3km^2 for the Lam Phra Phloeng basin which lies on the leeward side.

2. Predictable source of clean water: Protected areas serve as sources of water uncontaminated by human use, and provide a continuing, predictable supply of the resource (Alford, 1992). Khao Yai's anthropogenic use of water is currently restricted to use by tourists and park officials. As a protected area amid head watersheds of three of Thailand's major river systems, Khao Yai provides a water-protection service to the cities and agricultural lands in the surrounding regions.

2.2 Tourism in Khao Yai

In 1976, the year that the number of tourists was first recorded, Khao Yai had 140,700 visitors (Table 2.2). During the late 1970s, the number of tourists rarely exceeded 200,000. In 1985, the number of tourists almost doubled from the previous year, and in 1991 reached a peak of 1 million, due in part to Thailand's economic boom. The number declined sharply after the government announced the closure of TAT accommodation facilities and the golf course in the Khao Yai National Park.

Table 2.2 Number of visitors to National Parks in Thailand.

Year	Khao Yai National park (persons)	All National Parks (persons)	Number of National Parks	Khao Yai's Share of visitors (%)
1976	140,699	1,082,063	10	13.00
1977	115,675	1,229,430	13	9.41
1978	118,912	1,689,578	18	7.04
1979	231,627	2,120,299	19	10.92
1980	161,240	1,982,082	26	8.13
1981	169,409	2,494,831	40	6.79
1982	196,730	3,723,694	44	5.28
1983	275,108	4,199,788	46	6.55
1984	258,803	3,979,494	51	6.50
1985	461,528	4,050,313	54	11.39
1986	426,320	4,445,413	58	9.59
1987	401,661	5,846,202	64	6.87
1988	336,962	6,747,947	69	4.99
1989	585,265	8,117,394	73	7.21
1990	713,893	9,513,240	85	7.50
1991	1,009,687	11,173,901	92	9.04
1992	944,940	10,880,874	92	8.68
1993	729,818	11,183,696	95	6.53
1994	817,261	12,038,552	101	6.79

Source: Royal Forest Department.

Revenue from tourism, including entrance fees and accommodation charges, was around 3.5 to 4.5 million baht a year. This amount is approximately equal to the income allocated from the government's budget for tourism services. This does not include income generated from expenditure for food, or on guides and animal viewing activities. The total expenditure of tourists will be dealt with in a later section.

The Park's cost recovering capacities from tourism has dropped, largely because of the closure of the golf course and TAT accommodation facilities in 1991. This closure received widespread publicity in the press and was often referred to in news headlines as "The Closure of Khao Yai". Many tourists took this to mean that the park was closed for rehabilitation, resulting in a decline in visitors.

Services and outdoor recreation areas allowed by the Park are limited, comprising only 13.8 percent of the Park's total area. The Park operates lodging for a maximum of 920 people and camping facilities which can accommodate up to 1000 visitors (RFD Management Plan, n.d.). A visitor center with visual and video displays can house 150 people. There is also an open meeting hall for up to 500 people. The park offers 12 hiking trails and two observation towers (Figure 2.1). Recommended tourist sites in the Park are mainly the waterfalls and observation towers. A private operator also runs animal viewing tours each night.

Ecotourism is now a regular feature of the Park. In the dry season, trekking tours start from Nang Rong Fall in Nakhon Nayok at the southeast border of Khao Yai.

Three trails are offered from Nang Rong Fall :

(1) Khlong Ruam/Tad Ta Phu trail (3 days/2 nights). This is the more difficult and hence less popular trail.

(2) Khlong Ruam/Pha Ta Baek (2 days/1 night).

(3) Mae Plong Fall (2 days/1 night). This last trekking trail has been the most popular and is suitable for families as well.

The maximum number of trekkers allowed per day is 100. The visitors trek in groups of 10. Local residents are hired as porters. The Tambon (subdistrict) Council earns income by renting out camping equipment. The Park provides training to local guides. The training is comprised of three days of lectures and three days of trekking. Porters are also instructed to carry garbage out of the park.

It is apparent from the preceding discussion that the Khao Yai National Park is indeed a national treasure. How the Thai people perceived the benefits and express them in economic terms are the subject of the following discussions.

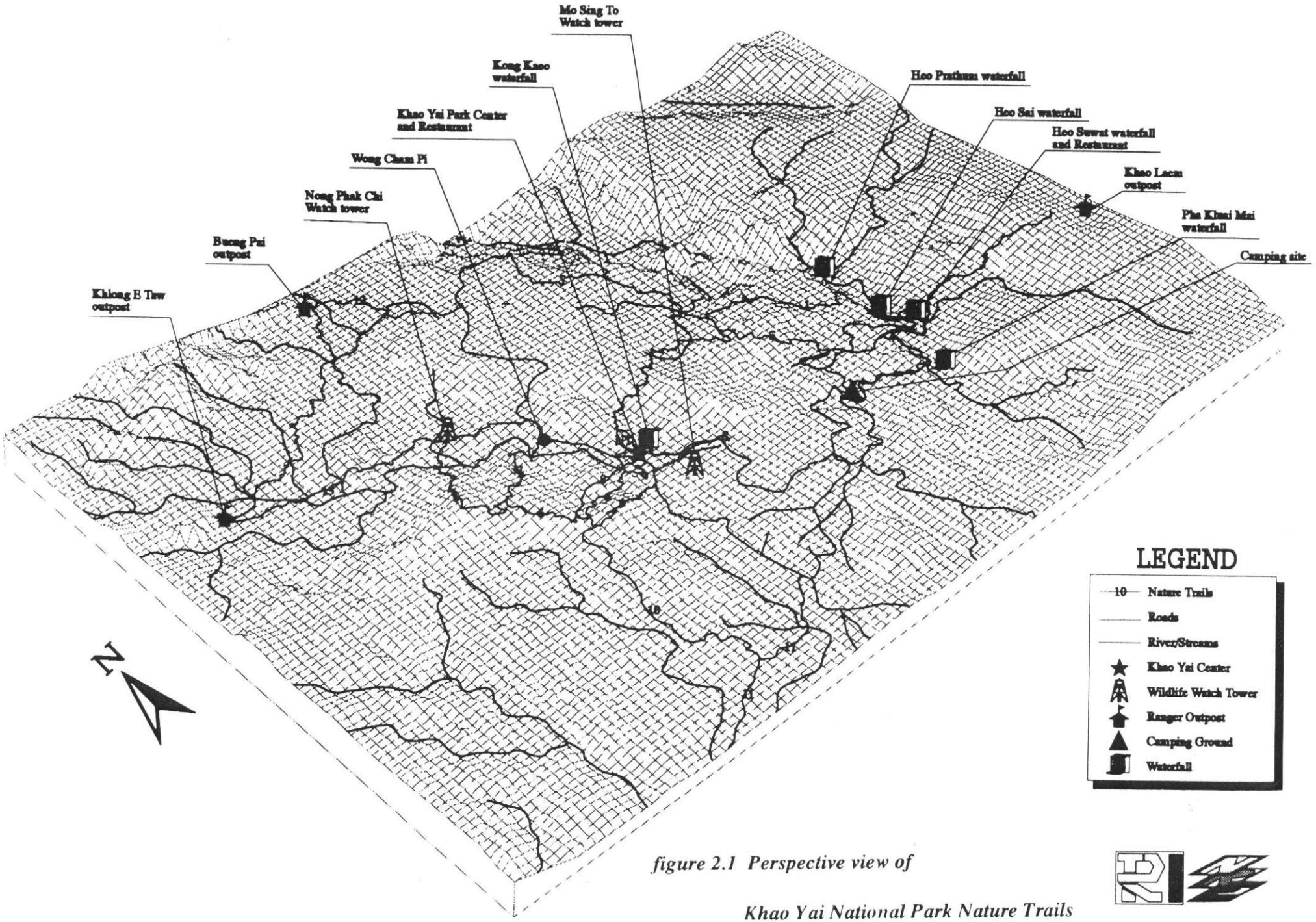
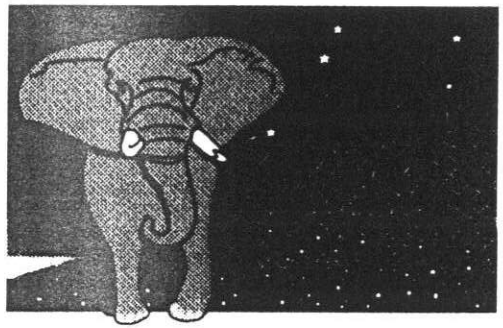


figure 2.1 Perspective view of

Khao Yai National Park Nature Trails



DESCRIPTION OF KHAO YAI NATURE TRAILS

There are 13 commonly hiked nature trails around the Park headquarters.

Nature trail: This is a looping trail at the back of the visiting center beyond the swinging bridge. This trail is short and easy to follow. It offers information on the types of flora one can expect from Khao Yai. There are 8 stop points; however, it is not worth stopping, as the markers are not readable (degraded signs). There are also wooden benches for resting as the trail is situated on a sloping terrain. The first part of the trail is a steady climb while the second drops rather steeply, but is manageable. The trail ends some distance away from the starting point but back to the banks of the river. Best for leisure walking and bird watching. Hiking time is 1 hour.

Trail 1: Known as *Kong Kaeo - Heo Suwat* trail, this trail starts as a part of the Nature Trail (see above). It is an 8-km long, 4-5 hr hike through forested areas where you can see all sorts of flora and fauna. Towards the end it passes by two waterfalls (Heo Prathum and Heo Sai), and terminates at the Heo Suwat waterfall.
Note: The trail is marked with red paint to guide, but be aware that it intersects with trails 2 and 3.

Trail 2: Also known as the *Kong Kaeo - Elephant Salt-lick* trail, this trail starts as Trail 1 and branches off about 4-km from the start. It then heads to the salt lick area, and ends near the road to Pak Chong. This trail is a 6-km long, 4-5 hr hike through a rugged terrain of forest and grassland (where the saltlicks are located).
Note: The trail is marked with blue paint, but it can be tricky, especially in the grassland.

Trail 3: The *Kong Kaeo - Pha Kluai Mai* trail. This trail also starts as Trail 1, and then branches off about 4km from the start. This is a 5-km, about 3-5 hr hike through a rugged, forested terrain. The trail ends near the road to Heo Suwat and about 300 m north of the camping ground.
Note: The trail is marked with yellow paint.

Trail 4: Known as the *Pha Kluai Mai - Heo Suwat* trail, this is a 3-km long paved stretch — about 1.5-2 hr hike. It follows the Lam Takhong river, cutting through some undergrowth. A kilometer away from the camping ground is the Pha Kluai Mai (Orchid) waterfall
Note: The trail can be slippery when wet, especially in steep areas.

Trail 5: The *Heo Suwat - Khao Laem grassland* trail. It starts across the Lam Takhong river perpendicular to Trail 4. This is a 4-km long one-way trail through rugged and steep terrain of forests and grasslands. The 1-2 hr hike ends with a spectacular view of the Khao Laem mountain and grassy valleys.
Note: The trail is extremely difficult, often steep and slippery, and sparingly marked with blue paint. To return, the same trail must be followed.

Trail 6: Also known as the *HQ - Nong Phak Chi* trail, this trail starts across the road from the restaurant near the headquarters. It is a 4-km long, 3-4 hr hike through forest with undulating terrain and some grassy patches. The trail intersects with Trails 9, 8 and 7, and ends at the wildlife watch tower overlooking a water reservoir about 1km from the road. Best for seeing various flora and fauna.
Note: The trail is marked with red paint to guide. Be on the lookout for guide posts for direction.

Trail 7: Known as the *HQ - Wang Cham Pi* trail. This trail starts as Trail 6 from the park restaurant end, branches off some distance away, and then heads to Wang Cham Pi. It is a 3.5-km, 2-3 hr hike through undulating forest area. Best for observing various flora and fauna.
Note: The trail is marked with blue paint as guide. Look out for guide posts for direction.

Trail 8a: Also known as the *HQ looping trail.* This trail is 2.5 km long, a hike of about 1-2 hr, cutting through forests. The trail starts off as Trail 6, and then branches off, ending at the workers' quarters opposite the park headquarters.
Note: The trail is marked with yellow paint. Look out for the direction post.

Trail 8b: Known as the *Kong Kaeo - Golf Course* trail. This trail is a 1.5-km long, 1-2 hr hike following the Lam Takhong river. The trail starts behind the visiting center across the river and ends around the golf course area. Ideal for leisure walk and bird watching early in the morning.
Note: The trail is unmarked but easy to follow.

Trail 9: Known as the *HQ - Mo Sing To* trail. this trail is a 2-km long, 1-2 hr hike through undulating forested and grassy areas. It starts off similar to trail 6, then branches off to Mo Sing To. The trail ends at a water reservoir near the road. Along the way, it intersects with trail 10.
Note: The trail is marked with blue paint; watch out for the direction posts.

Trail 10: *HQ - TAT Restaurant* trail. This trail starts off as trail 6 then branches off. It is a 5.5-km long, about 2-4 hr hike through undulating forest area, though the last stage is mostly grassland. It intersects with trail 11 and ends behind what was once the TAT restaurant.
Note: The trail is marked with red paint.

Trail 11: Known as the *TAT Restaurant - Ta Da Phu Waterfall* trail. This trail starts off behind the TAT restaurant, following a dirt track through the grassland. It is a 4-km long, about 5-6 hr hike through undulating forest area but most of the time it follows the river until it reaches the waterfall.
Note: The trail is unmarked and the same route must be taken to return.

Trail 12: The *Dan Chang - Bung Pai - Klong E Tow* trail. This trail starts across the road from the *Dan Chang* sign. It is divided into 2 stages. The first, Dan Chang-Bung Pai stage, is a 1.5-km, 1-2 hr hike cutting through dense forest on undulating to steep slopes. It also intersects a trail going to Nong Pak Chi (unsurveyed). This stage ends at an outpost situated in the midst of a grassland. Stage 2 (to Klong E Tow) starts from Bung Pai cutting through undulating to steep forest areas, and is a 3-4 km, 2-3 hr hike. This stage ends at another outpost in the middle of a grassland.
Note: Trail marked with red paint. Manageable but beware of wildlife.

Trail 13: *Nong Pak Chi - Klong E Tow* trail. This trail starts from the wildlife watch tower, passes through grassland and forested areas of undulating slope. It is 2-km long, 1-2 hr hike.
Note: Trail marked with red paint. Manageable but beware of wildlife.

All trails were originally made, and some are still being used, by elephants. For convenience, most of the trails were marked with color codes. It is not guaranteed, however, that the trails will remain as they are over time. Trails can change depending on various factors. To be safe, hire a guide to lead you through difficult trails. Always be prepared...be alert of wild animals, pack extra food and drinks for long trips, take a first-aid kit along, and never venture out alone.

RESPECT THE FOREST.

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Thailand Development Research Institute
Natural Resources and Environment - GIS

III. Evaluating the Benefits of Khao Yai National Park: A Conceptual Framework

There are practical reasons for estimating the economic value of a National Park such as Khao Yai. Most importantly for policy makers, it can provide a standard means of measuring and comparing the benefits derived from the investment of public funds. Just as policy makers demand cost/benefit analyses for investments in infrastructure and other public works, so should the costs and benefits of protecting a natural reserve be estimated. This type of exercise allows policy makers to rank such investments and set priorities among and between National Parks in Thailand.

3.1 Measuring of Benefits

Use and Non-Use Value

In valuing a national park, direct consumptive benefits such as recreation and tourism are generally the first to be recognized, but benefits of an environmental resource need not be limited to its *direct use value.* A national park also provides significant functional benefits in the form of ecological services such as carbon sequestration, watershed protection, or as a habitat for biodiversity. Such benefits are considered part of an environmental resource's *indirect use value.* For Khao Yai National Park, the biodiversity and hydrofunction values have been outlined earlier. Forested areas can also serve as carbon sinks, as growing trees sequester carbon into their biomass. This value is not significant in Khao Yai however, as it has not received a major reforestation program. The forest is mature, with no significant net gains or losses of carbon.

Krutilla (1967) gave reasons why people may place some value on an object despite the fact that they do not derive any benefit from direct physical interaction (consumptive use) with or indirect use of that good. For example, people may want to conserve a natural resource for their future use (known as *option value*). Option value is a

value placed by an individual on an object (or in this case an environmental resource) that the individual may possibly wish to use in the future. In order to avoid the risk of losing that opportunity, the individual is willing to pay a premium (known as option price) to keep the option available in the future. The option price has two components: the expected use value and the option value. Option value is the economic value in excess of the expected use value.

Theoretically, the sign and the existence of option value remain ambiguous and controversial. Freeman (1993), among others, argued that since the option value is an algebraic difference between the expected value of consumer surplus and the option price, both being alternatives for measuring the same welfare change, the difference could not be treated as a separate component of value. The US Environmental Protection Agency on the other hand listed option value as one of the benefits accrued from a natural resource.

In addition to the above use values, non-users of a park may also place value on it. For example, people may wish to bequeath an environmental resource to their offspring or future generations (*bequest value*). Second, people may simply enjoy the thought that a resource exists. Others may want to maintain the resource for the benefit of others, including non-human species. This latter value is called *existence value*. Therefore, the total value of a park consists of both use and non-use values (Figure 3.1).

Total Economic Value = Direct Use Value + Indirect Use Value +
Option Value + Bequest Value + Existence Value

3.2 Method of Measurement

For market goods, we assume prices are a good approximation of the value a consumer places on a commodity. The total value or the benefit of a good to an individual can be measured by the area under his or her demand curve. Each point on the demand curve corresponds to the maximum amount of money that a consumer is willing to forgo for that particular unit of output. The total benefits or value of a good to the society can therefore be approximated by total area under the aggregate demand curve.

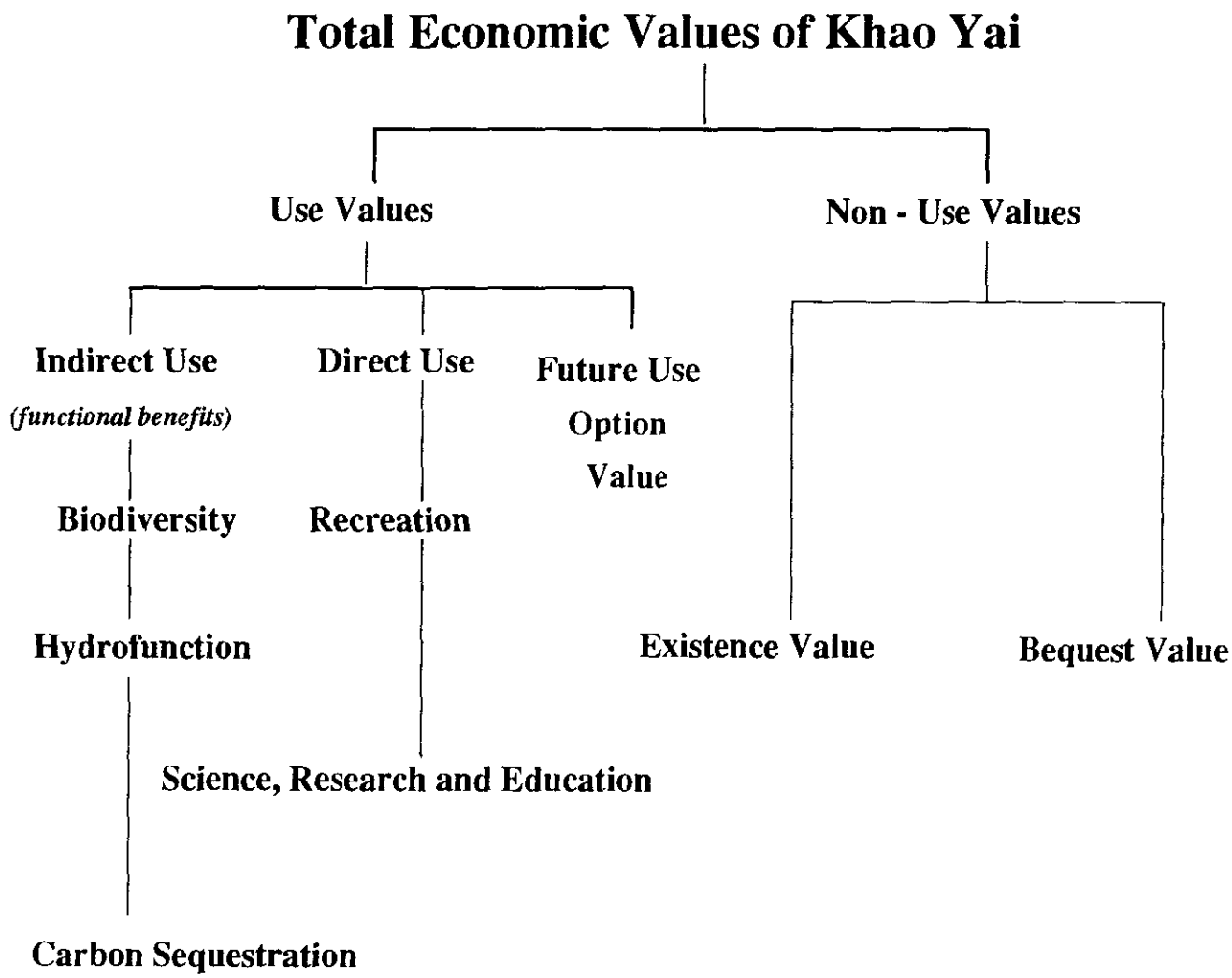

Figure 3.1 Total economic values of Khao Yai

For a non market good such as a national park, a surrogate market or a hypothetical market needs to be constructed to derive the maximum amount of money a consumer is willing to pay (WTP) to prevent — or the minimum he or she is willing to accept (WTA) to allow environmental degradation. To estimate benefits of Khao Yai, the *contingent valuation* method (CVM) will be used to measure the total economic value and the *travel cost* method (TCM) will be used to measure recreation value.

Contingent Valuation Method (CVM)

Contingent valuation is a survey method in which respondents are approached directly and presented with a scenario depicting how a certain situation may be changed. The respondents are asked to indicate, in monetary terms, how much they would be willing to pay to avoid the change in the situation or how much they would be willing to accept in compensation for the change in the situation, such that their utility remains unchanged.

In a good CV survey, the scenarios and the method of payment must be designed in such a way that respondents feel that the hypothetical situation is real. Visual aids and information about substitutes are essential in helping respondents arrive at WTP and WTA. To avoid extreme values, starting and ending values are incorporated into the questionnaire.

Travel Cost Method (TCM)

TCM was originally conceived by Hotelling in a personal letter written to the Director of the U.S. National Park Service. Hotelling asserted that, although the value of recreation goods is not reflected by the market, visitors coming from different locations do bear different costs or pay different prices for the same quality of goods or services. Therefore, the costs incurred by visitors could be used to develop a measure of the recreation value of the sites visited. Based on this concept, Clawson (1959) and Knetsch (1966) have developed empirical models for estimating the economic value of outdoor recreation services.

TCM forms part of the wider household production function (HPF) framework in which models are used to investigate changes in the consumption of commodities which are substitutes or complements for a particular, in this case environmental, good. The demand function estimated by the TCM is an uncompensated ordinary demand curve incorporating income effects, and the welfare measure obtained from it will be that of Marshallian consumer surplus.

3.3 Literature Review

Since contingent valuation can be used to measure both use and non-use values, its application is wide ranging, from water quality (Carson and Mitchell, 1993) and selection of sanitation technologies to the values of wildlife and nature conservation. In the latter category, which is directly related to this study, a large number of studies have been undertaken in developed countries. The issue of concern has been to estimate the option and non-use values and to discover what determines the size of these values.

Schulze et. al. (1983, cited in Munasinghe, 1994) used the contingent valuation method to assess annual household willingness to pay to preserve visibility in the Grand Canyon National Park. They discovered that the non-use value constitutes a large component of the total value of the Park, and that the WTP for preservation of the Grand Canyon (existence value) through increased electricity bills was greater than the use value bids (in this case, the increase in the fee to ensure visibility of the Grand Canyon).

Another study on the benefits of wilderness conducted by Walsh et. al. (1984), attempts to estimate option, existence and bequest values of Colorado wilderness to Colorado households. Users were found to have higher option values than non-users and existence value increases with income but at a decreasing rate. Option value was positively related to income but existence and bequest values were not sensitive to income. Existence values were more related to the respondents' feelings of "the importance of preservation of natural scenery, ecosystem and genetic strain". Bequest value was found to be more related to inter-generational transfer rather than to the number of children in the households. Bequest value was found to be highest for retirees.

Contingent valuation is often undertaken concurrently with the travel cost method in order to cross-check the size of the measured benefits. Knetsch and Davis (1966) used CVM to estimate the maximum benefits of Pittson Woods in Northern Maine and discovered that the results using both the CVM and the TCM were quite close, with the CVM estimates slightly higher. Bishop and Heberlein (1979) use both methods to evaluate goose hunting permits but came up with diverging results.

In developing countries, only a few studies on national parks have adopted CVM and TCM. In the Costa Rican rain forest (Tobias and Mendelsohn, 1991), visitation was found to be highly related to socioeconomic variables such as education and the population density of the area of origin of the visitors. On the basis of the value of the

visitors' consumer surplus (US$35 per household per year), the Net Present Value (NPV) of the park was estimated to be 100 to 200 percent greater than the land acquisition cost of the park.

Another Costa Rican study related to national parks investigated the possibility of raising revenue for the national parks by adjusting entrance fees for local and foreign visitors (Baldares C., Manuel, J. and Laarman, 1990). A total of 860 respondents were interviewed on site. Unlike other studies, this study attempted to inquire into the fairness issue, i.e., what local visitors thought to be a fair fee for both themselves and foreign visitors. The same question was put forward to foreign visitors. The analysis revealed that the determinants of the WTP for entrance fees included origin (local or foreign), characteristics of the protected areas (three national and one private park), number of family members visiting the park, main purpose of visit, perceived satisfaction, number of previous visits, number of visits to other protected areas, duration of visit and socio-economic variables. Income and age showed positive correlation with fees in the foreign but not in the local group. Foreigners who came to conduct scientific research were willing to pay a higher fee. However, the authors did not recommend charging a higher fee for this group unless they were allowed to have a greater access to the more restricted areas of the park.

The recommended policies included raising and differentiating fees between local and foreign visitors in the three most popular National Parks (Poas, Manuel Antonio and Cahuita). However, the differences in WTP between parks were not sufficiently large to warrant fee differentiation among parks.

The best CVM study for the valuation of a protected area to date is the study of Montadia Park in Madagascar which reflected both the cost of protected areas to native residents and the benefits perceived by foreign tourists. The first CV survey dealt with the willingness to accept (WTA) of surrounding villagers for the loss of the use of the Park. Respondents were asked to state the amount which would make them as well off as they would have been if they were allowed to harvest forest products and engage in shifting cultivation. Since the compensation was in kind (kilogram of rice), the relevant compensation concept is the equivalent surplus. When translated into dollars term and grossing over the population, the loss of villagers' welfare totaled US$67 million for a period of 20 years under an assumed 10 percent discount rate. The contingent valuation and travel cost studies of the WTP of foreign visitors suggested a NPV of US$796 million of benefits from a 10 percent improvement in the facilities. Net benefits from the creation of a new park were estimated at 2.16 million using the contingent valuation method. These results, by allowing for a more

complete cost-benefit analysis, were useful for the government's investment allocation and compensation decisions.

Contingent valuation studies in developing countries are often constrained by financial budgets. An application of the CVM and TCM for elephant preservation in Kenya in 1989 employed only a small sample of 53 tourists and 22 tour operators who were requested to fill in the questionnaire by themselves. Important presurvey procedures and sampling design were not reported. As a result, the results could only be taken as a rough approximation of the true value.

The Kenyan study utilized the travel cost method to derive the total consumer surplus of foreign tourists for a safari. Values ranged from US$82 to $218 million depending on the assumptions of visitation levels. The visitors indicated that the elephants contributed to 12.6 percent of their total pleasure. Further, in response to the question on how much they would be willing to pay to maintain the elephant population, nearly two-thirds said they would pay a maximum of US$100 added on to their safari costs if the money would be used to successfully maintain the elephant population at its current level. Respondents reported that if the elephant population was to decline by another 50 percent, at least one-half of the tourists would no longer find Kenya an attractive safari destination for either one's self, one's family, or to recommend to friends. Tour operators believe there would be only a 10 percent decline in the number of tourists. Although there is a large discrepancy in perception between visitors and tour operators sampled, the finding suggests that countries which experience a loss of elephants in the next decade will lose visitors and tourists dollars to those countries which are willing to make the effort to preserve elephants. It remains unclear, however, exactly how much a country should be willing to spend on the protection of elephants.

In Thailand, the first contingent valuation and travel cost study (Grandstaff and Dixon, 1980) to evaluate consumers' benefit from a park were conducted in 1980 for Lumpinee Park, a public park in heart of Bangkok. The sample consisted of 187 visitors interviewed on site and 225 respondents interviewed in their homes in the 17 districts of Bangkok. The estimates of the user's value from both methods were very close, i.e. 13.2 million baht for TCM and 13 million baht for CVM. The social value, i.e. the value identified by those interviewed in their home, amounted to 16.6 million baht. It was not clear from the study whether the social value referred to the total option value or to the existence value. The study also did not provide a validity test of the WTP bids.

3.4 Studies Related to Khao Yai

A number of studies have employed the CVM and TCM to compute the value of the recreational resources and wildlife in Thailand, but neither of these methods were directly used to measure the total benefits of Khao Yai. The study on the existence and option value of wild elephants in Thailand suggested that the average maximum willingness to pay for wild elephants was 181 baht per year (Dobias et. al., 1988).

On the basis of this figure, Dixon and Sherman (1990), assuming that Khao Yai contributed to the continued existence of 10 percent of the wild elephants in Thailand, computed the option and existence value of Khao Yai at 122 million baht per year. The study however may be upwardly biased because the Dobias study relied on self-filling questionnaires at the entrance gate.

The following discussions present the first major attempt in Thailand to empirically assess the total benefits of a national park. As mentioned earlier, Khao Yai National Park is particularly an appropriate choice for the study. It is a relatively well-known park, both domestically and internationally. Its scale and proximity to very large urban centers would enhance its importance overtime as a recreational option, a store of biodiversity, as a source of high quality water and so on. Evaluating these benefits is important information for policy makers as this is a starting point for public investment allocation decision.

IV. Estimating Non-Users' Benefits: A Contingent Valuation Survey

We start by estimating the non-use values using the CV method. The CV of Khao Yai National Park aimed to estimate its total economic value, including its ecological functions. In this study users are defined as those who have visited the Park and non-users are those who have never visited the Park before. For the non-users, the total benefits of the Park may consist of an option value and the passive use values such as existence or bequest values. The two groups may hold different values because of different experiences they have had with the good. We hypothesized that users place higher value on the Park than the non-users.

4.1 Survey Methodology

The following subsections explain sampling design, questionnaire development and pretesting, and major features of the questionnaire.

The total sample size was determined by the available budget. At the planning stage we targeted a total of 1,000 samples for domestic users and 1,000 for domestic non-users. The actual numbers collected were 948 for users and 1,057 for non-users.

Sampling of Non-Users

For non-users, a stratified random sampling method was adopted. All of the (then) 73 provinces of Thailand were ranked in order of per capita gross income in 1990 and were grouped into high, medium and low income clusters. The present survey does not cover the sample of non-users living in rural areas, only urban samples are included. The urban population is defined to include those residing in the municipality and sanitary districts of a given province. It was decided that approximately 40 percent of the samples should be from Bangkok, the capital city, which accounts for 39 percent of gross national product. The

remaining 60 percent of the samples were split between four provinces. Two criteria were used to select these four provinces, distance from the park and provincial income.

- **Distance from Khao Yai**

One of the provinces, Nakhon Nayok, was randomly selected from the four provinces in which the park is located. The other three provinces were randomly selected, one each from the groups of provinces which are less than 410 km. from Khao Yai, between 411 and 600 km. from Khao Yai and more than 600 km. from Khao Yai. The three provinces chosen were Udon Thani, Phitsanulok and Phang Nga (Table 4.1).

Table 4.1 Location of questionnaire survey of non-users.

Province	*Distance from Khao Yai (km.)*	*Per Capita GPP (baht/head)*	*Respondents*	
			Number	*Percent*
Bangkok	195	131,572	397	37.6
Nakhon Nayok	66	23,390	163	15.4
Phang Nga	983	34,808	166	15.7
Udon Thani	432	12,327	165	15.6
Phitsanulok	403	18,153	166	15.7
Total	-	-	*1,057*	*100*

Source : TDRI survey, 1994.

- **The four provinces have to represent the low, medium and high income provinces.**

The non-users were interviewed at public office buildings, hospitals, parks, markets, department stores, shopping malls, bus and train stations, airports, and large residential areas such as apartments and dormitories.

Of the total 1,057 non-users, only forty-four (4.2%) had never heard of Khao Yai (Table 4.2). Thirteen percent knew of Khao Yai National Park but had no intention to visit. These two groups (17%) comprise the people who hold existence value. About 47

percent never visited Khao Yai but intended to visit Khao Yai in the unknown future, the remainder were uncertain.

Table 4.2 Non-users classified by knowledge of the Park.

Knowledge of Khao Yai	*Number*	*Percent*
Never heard of Khao Yai	44	4.2
Know of Khao Yai with no intention to go	140	13.2
Never visited Khao Yai but intend to visit	501	47.4
Uncertain	372	35.2
Total	*1,057*	*100.0*

Source : TDRI survey, 1994.

Questionnaire for Non-Users

The questionnaire for the non-users contained four major components:

1. Visitors' knowledge of Khao Yai and its substitutes,
2. Willingness to pay and methods of payment,
3. Socioeconomic characteristics of respondents, and
4. Evaluation of the quality of the response.

Respondents were informed that the survey was a joint effort of the Royal Forest Department and Thailand Development Research Institute. The scenario of environmental degradation was presented using visual cards. The details of the description of the scenario are attached (see the questionnaire under the section on willingness to pay). Respondents were reminded of the availability of substitutes i.e., other National Parks.

4.2 Profile of Non-Users

Slightly more than half of the non-users are women (Table 4.3) and about half of the respondents are married. More than one third of the non-users interviewed are between 21 and 30 years old. The next largest group falls between the ages of 31 and 40 years. The average age of the total sample for non-users is 32. Since the locations of our survey are mostly in urban or district centers, the two largest groups of respondents are businessmen (25.7%) and public servants (23.6%). Another large group of respondents are students (16%) followed by employees in the private sector (9.8%). Unpaid family workers and farmers accounted for only 3.6 and 3.8 percent in our sample.

Table 4.3 Willingness to pay by socio-economic characteristics of respondents.

Characteristic	Average WTP (baht)		Distribution (%)	
	Users	Non-users	Users	Non-users
1. Sex				
Male	753	217	68.6	46.7
Female	681	153	31.4	53.3
2. Age				
12-20	810	220	18.6	15.5
21-30	821	243	46.4	37.0
31-40	481	144	22.2	25.4
41-50	699	88	8.6	12.8
51-60	857	254	3.1	5.9
>60	430	161	1.1	3.4
3. Marital status				
Single	776	245	65.0	47.1
Married	617	147	34.2	51.1
Widowed/Divorced	1,927	87	0.8	1.8

Table 4.3 (continued).

Characteristic	Average WTP (baht)		Distribution (%)	
	Users	Non-users	Users	Non-users
4. Occupation				
Farmers	210	58	1.8	3.8
Wage-earners	718	92	9.1	16.0
Housewife	952	112	2.2	3.6
Public servants	592	149	22.2	23.6
Military men	-	150	-	0.6
Retirees	2,333	219	0.3	1.5
Students	878	229	22.9	16.0
Commerce/own business	902	247	16.0	25.7
Employees in the private sector	785	340	25.4	9.8
5. Education				
No education	133	133	0.3	2.1
Primary	699	84	11.8	26.5
Secondary	823	232	33.2	33.4
Vocational	798	180	20.8	16.6
Bachelor degree or higher	744	244	33.9	20.7
Others	-	289	-	1.1
6. Monthly income *(baht)*				
None	-	138	-	4.8
< 2,500	415	111	3.6	15.6
2,501-7,500	625	169	30.8	48.9
7,501-15,000	708	260	39.0	21.1
15,001-25,000	876	274	13.8	6.1
25,001-50,000	792	428	8.2	2.5
> 50,000	1,467	370	4.0	0.9

Table 4.3 (continued).

Characteristic	Average WTP (baht)		Distribution (%)	
	Users	Non-users	Users	Non-users
*7. Current residence**				
Own house	-	201	-	64.2
Rented house	-	188	-	22.9
Friend's/relative's	-	165	-	4.7
Government lodging	-	164	-	6.1
Employer's	-	108	-	1.4
Dormitory	-	75	-	0.6
8. All sample	*730*	*183*	*100*	*100*

Note: * *Users, who were questioned at the park, were not asked about their residency status.*

Source: *TDRI survey, 1994.*

The non-users sample consists of a high proportion of educated respondents. About 38 percent have more than secondary school education i.e., vocational (16%) and university education (21%).

Almost half of the non-park users interviewed earn a monthly income between 2,500 and 7,500 baht. This proportion is considerably higher than the actual share of this income category national. Two thirds of them own their house.

The non-user sample represents an urban population. Therefore because the socio-economic characteristics of our sample differ from those of the total population, it is not possible to use the sample average willingness to pay (WTP) figure to project national value. Our total benefits figure only corresponds to the total value of Khao Yai held by urban residents.

4.3 Non-Users : Willingness to Pay to Protect Khao Yai National Park.

This section discusses the WTP bids obtained from our survey of non-users in an effort to measure the non-use or existence value for Khao Yai National Park. In the process, an interviewer begins by describing the exact nature of the good being valued and the magnitudes of WTP bids obtained. We then turn to develop a framework to test the validity of these bids and examine the result of our test of validity.

1. The National Park: What is being valued?

The purpose of this survey effort was to quantify welfare changes associated with the destruction of Khao Yai National Park in terms of passive-use values for the Thai population. Before the contingent valuation scenario was presented, enumerators asked respondents to carefully consider their financial obligations and limitations (i.e., their budget constraints). To call to mind a substitute good, enumerators asked respondents to remember that Khao Yai is but one of many national parks in Thailand. Enumerators then established the WTP scenario for the park in three parts: they 1) described the general features of the park, 2) described threats to the park, and 3) described an institutional mechanism designed to prevent the park from being destroyed. Enumerators employed visual aids, in the form of photographs and cartoons, to more clearly convey these components. The following three excerpts were taken from the survey instrument presented in Appendix A.

1.) "Khao Yai is one of Thailand's largest national parks that is enjoyed by over one million visitors each year. Not only is it one of the largest watersheds in the Northeast but it is also a habitat to many plants and animals in the ecosystem. Khao Yai has many beautiful features such as mountains, tropical forest and water falls as well as a number of rare species of plants and animals such as gibbons, horn-bills, tigers, guars and elephants."

2.) "At present, however, the park is facing a number of serious threats such as poaching, encroachment, and forest fires. In addition, there are competing demands on Khao Yai for other purposes such as commercial logging and human resettlement. Yet, there is a paucity of funds and manpower to defend against these threats."

3.) "Assume that, in order to protect the park from complete destruction and to preserve it for our enjoyment and that of future generations, a Park Authority would be

established under the direction of the Royal Forest Department and an international organization (such as the World Wildlife Fund). This Authority would be financed completely by private contributions from its membership."

Enumerators then asked respondents "Would you be willing to become a supporting member of the organization and make an annual financial contribution of 250 baht to protect the park?"

Respondents were given four response options: 1) to become a member and make an annual contribution, 2) to become a member but make a one-time only contribution, 3) to become a member and explain why they would not pay anything, and 4) to not become a member and explain why. Several methods of payment were permitted such as an automatic transfer from their bank account, annual income tax deductions, checks mailed to the funds bank account, *etc.*, although none of these payment mechanisms appeared to be more preferred than another overall.

2. Willingness to pay to protect the Park

The average annual willingness to pay of the non-users for the sample was 183 baht (n = 1,056). Out of this sample, 452 were willing to pay nothing for the park. Of those willing to pay nothing 107 said they would be willing to pay "from time to time" while 54 protested the proposed program, claiming "it would be inefficient" or "it was the wrong solution." Excluding the protest bids the average WTP for the entire sample is 201 baht. On the upper end of the sample distribution, only the top five percent of respondents were willing to pay more than 500 baht annually.

We also explored the way in which respondents' WTP varied with their knowledge of the national parks and their expectations about future consumption of Khao Yai in particular. Economic theory suggests the greater a respondent's knowledge of a good the better his or her ability to assess its value. First, enumerators asked respondents whether they were familiar with the concept of ***a national park***. Those who knew what a national park was were willing to pay on average 227 baht (n = 638), those who had heard the term but did not know it well were willing to pay on average 151 baht (n = 366), while those who had never heard of a national park were willing to pay 54 baht (n = 54).

Second, enumerators asked respondents whether they had heard about ***Khao Yai*** in particular and about their expected future use of Khao Yai. (We excluded those who had previously visited Khao Yai from this sample.) The purpose of asking about expected use

of the park is to separate those who are willing to pay for the park's existence value from those whose stated WTP may include, in addition, an option price (or option value) component because they expect to visit the park someday. Those who had never heard of Khao Yai were WTP on average 81 baht (n = 44), those who had heard of it but did not expect to go were WTP on average 132 baht (n = 140), those who had heard of it and were uncertain about whether they would go were WTP on average 156 baht (n = 372), while those who had heard of it and did plan to go were WTP on average 244 baht (n = 501)

3. A Framework for validating stated WTP bids

A standard way of evaluating the theoretical validity of WTP bids is to evaluate the systematic variation in those bids with respect to hypotheses developed from economic theory and cultural norms concerning the consumption of a national park. We consider respondents' WTP to be a function of three groups of factors: 1) their socio-economic characteristics, 2) the amount of information they have on the good being valued, and 3) the specific features of the interview during which their WTP was elicited. Below we will consider each group of factors and provide a hypothesis for the expected correlation of each variable with respondents' WTP.

The variables representing socio-economic characteristics in this study are the respondent's:1) income level, 2) educational level, 3) age, 4) gender and 5) marital status (Table 4.4). These variables may influence a respondent's willingness to pay in various ways. First, the Park may be considered a "normal" good and therefore WTP tends to correlate positively with a respondent's income level. Since the relation between WTP and income may not be linear, accordingly, an income-squared term is added to test for nonlinearity in the relationship. It should also be noted that income is, at best, an imprecise measure as it is expressed in term of income range; thus we have added the number of working members in the family in model specification on the ground that this variable may improve the accuracy of the influence of income to some extent. Second, the Park provides a host of services, such as watershed protection, carbon sequestration, and serving as a reservoir of genetic materials; it is conceivable that respondents with more formal education tend to understand these functions better than the less educated groups and accordingly their WTP may be higher.

Table 4.4 Description of commonly used variables.

Variable	*Description*
Income (individual and not household)	An interval variable of six categories increasing in baht.
Education	An interval variable of six categories.
Age	A continuous variable increasing in years.
Sex (female)	Equals 1 if female, 0 if male.
Marital status	Equals 1 if single, 0 if otherwise.
No. of employed family members	A continuous variable.
Information	Dummy variable taking value 1 if the respondents have read about Khao Yai, 0 if otherwise.
Presence of listener	Equals 1 if a listener is present, 0 if otherwise.
Quality of interview	Equals 1 if quality is rated excellent, 0 if otherwise.
Dummy for starting point	Equals 1 if starting high bid, 0 if otherwise.
Service variables: Cleanliness of toilets Road Conditions Park Information Food Services Trails and Viewpoints Wildlife Towers Satisfaction	These variables are rated as follows; 1= Poor, 2 = Fair, 3 = Good, 4 = Excellent.
Preferred activity variables: Walking Hiking/Trekking Picnicking Bird watching Wildlife watching Visiting waterfalls Camping Photography Viewing scenery	Equals 1 if the visitor plans to undertake the activity, 0 if otherwise.
Nearby province	Dummy variable for those residing in the four provinces where Khao Yai is located.
Province (Phang Nga)	Dummy variable for those living in the provinces furthest away from Khao Yai in this sample.

The next three hypotheses are based on the way in which cultural norms affect the distribution of preferences for the protection of wilderness areas. First, it is conceivable that younger respondents may value the park higher than the older respondents, given the same income level and social status. Young respondents have more years of remaining life expectancy and thus a higher option value; in addition social awareness about the environment, which is apparently on the rise, may influence the younger cohorts more than the older groups. Second, male respondents tend to appreciate wilderness and natural attractions more than their female counterparts. Culturally, Thai males are more associated with outdoor activities than females. Finally, we expect married respondents' WTP value to be relatively less than single respondents as their priorities shift towards a consumption bundle associated with the family, i.e., less concerned with existence values and more concerned with direct consumption.

The second group of factors that influence respondents' WTP are taste, preference and information, i.e., WTP depends on respondents' knowledge of the good they are to value. *Ceteris paribus*, we might expect that those who know of the park's attributes and those who are fond of nature hiking and camping will be willing to pay more to protect the park than their counterparts. Three variables are formed from the survey and included in the model specification, 1) preferred activity, i.e., those who expressed attachment for hiking and camping activities, 2) those who 'know' or are 'aware' of Khao Yai National Park and have read about Khao Yai, and 3) a dummy variable indicating distance from Khao Yai. Those who live near the park tend to have more information and a stronger sense of ownership than the people who live far away. This distance variable also suggests a possibility of stronger substitution effects from nearer national parks for those residing in provinces further away from Khao Yai. The dummy variable indicated whether or not the respondent lived in Phang Nga province, the furthest from Khao Yai. As knowledge of the attributes of national parks and Khao Yai increases, we expect that respondents' WTP will also increase for this normal good.

The third group of factors that may influence respondents' WTP is the interview environment. It is well known that if respondents do not think carefully their stated WTP bids will not accurately represent their value of the good (Mitchell and Carson, 1989). In this case we employed two variables. The first variable is the enumerator's subjective evaluation of the quality of the interview with respect to the respondent's understanding of the questions, willingness to participate (attentiveness), and effort when responding. The second variable is whether a third party was listening during the interview which might affect the

respondent's stated bid. There are at least two possible hypotheses for the latter variable. It might be argued that 1) respondents do not want to appear 'cheap' and thus may overstate their bids, or that 2) respondents believe they are in a bargaining context and do not want to pay higher than other people and strategically state their WTP on the low side (a free-riding attitude). The two hypotheses are, however, contrasting and inconsistent. Given the rising popularity of environmentalism in Thailand, we feel the former hypothesis may be more relevant.

4. Testing the validity of the WTP bids

Simple descriptive statistics and estimates by appropriate statistical tests are used to illustrate the relationship and to test the hypotheses. We begin our analysis by inspecting Table 4.3, which presents the way in which WTP varies with the socio-economic characteristics of the respondent. Notations and definition of all variables are given in Table 4.4.

From Table 4.3 it should be clear that, on average, respondents' monthly income, level of education, and knowledge of national parks are positively correlated with WTPs, which is the expected relationship. Age and WTP are negatively correlated, although very slightly. Gender and marital status are also correlated with WTP in the predicted direction. The weaknesses of the simple cross-tabulation (in Table 4.3) are that it does not present the magnitude of correlation among these variables, nor it does control for the influence of other factors at the same time.

Ordinary Least Squares (OLS) and Tobit regression estimates are employed for purpose of capturing all variables and for statistical testing. OLS is not an appropriate technique in this case because many respondents (42.8%) expressed zero WTP. In our survey, there is no information for separating those who are willing to join the bidding game. Tobit regression is thus a more appropriate technique in the case where the dependent variable (in this case WTP) is censored at certain level (e.g., zero), or there is threshold level of influence. OLS estimations of censored data assume a linear relationship between the predictive and independent variables, thus giving negative values (in the case where the data is censored at zero). Tobit analysis, on the other hand provides non-negative predictions of WTPs.

The two estimated models are based on 638 samples, i.e., those respondent who knew *ex ante* what a national park was.

Our estimation results showed that:

- Income and WTP are positively correlated, the variable income-squared is not significant.
- The number of working family members is found to be statistically significant.
- Age of respondent influences WTP.
- Older respondents tend to be less willing to pay to protect the park than the younger cohorts.
- Male respondents tend to bid higher in WTP than female counterparts.
- Marital status and education do not seem to have any influence on WTP.
- Knowledge of Khao Yai is an important factor, i.e., the group of respondents who know about the national parks or in particular Khao Yai tend to have a higher WTP.
- Distance does not affect WTP, although Phang Nga respondents' WTPs tend to be lower than other non-users.
- The variables representing the interview environment, i.e., quality of the interview and the presence of listener, do not seem to influence WTP.

Regarding the estimation techniques, the Tobit analysis seems to perform better than OLS in terms of fitness.

5. A Discussion of possible biases

In the context of this study, potential biases may derive from 1) a poor understanding of the good, 2) the form of the payment mechnism, or 3) the influence of the starting point and the elicitation format chosen. We will discuss each of these in turn.

Every effort was made to provide a clear understanding of the good being valued. Not only did enumerators describe Khao Yai National Park in detail, they also employed visual aids. However, as noted above, *ex ante* knowledge of a national park affected a respondent's WTP a great deal.

With respect to aggregating the national benefits of the park, it may be unjustified to exclude those who have little or no knowledge of national parks; i.e., we have to take this qualification as given. As a result, until more Thais better understand the purpose and quality of their National Park system a degree of uncertainty will persist about the total

benefits from passive use. It is, however, encouraging that more than half of the respondents knew about national parks and gave meaningful answers.

The second source of potential bias may arise from the payment vehicle. Respondents may object to the form or frequency of payment required. We accommodated this concern by allowing the respondents to state both their preferred frequency and form of payment. Interestingly, only a few (n = 48) wanted to make only a lump sum payment while a variety of other forms of payment were chosen.

The third source of potential bias arises from the starting point and type of elicitation format employed (Boyle *et. al.*, 1986 and Altaf and Deshazo, 1994). No split-sample design was used to test for starting point bias in the non-user survey. Rather a single-value closed-ended question was employed followed by an open-ended question. An examination of the park user survey (in a later section) shows that a starting point could affect the stated bid by between 200 and 300 baht for an average bid of 794 baht. A similar range of plus or minus 30 percent of the average bid of 197 baht is likely to apply to the non-users but this cannot be confirmed.

A related source of potential bias arises from the elicitation format itself. Altaf and Deshazo (1994) have shown that when a closed-ended question is followed by an open-ended question respondents have a high likelihood of anchoring on the value to which they said "yes" last. In this sample, the value of the closed-ended question was 200 baht. Over 50 percent of respondents with positive bids answered 200 baht when asked what their maximum WTP was. In theory, we assume that WTP bids are normally distributed and thus such a concentration of bids on one value is unlikely. The effect of this bias may be on the low side, it is likely that many of those respondents who stated 200 baht as their maximum WTP may be willing to pay even more.

In conclusion, our findings suggest that the non-use value of Khao Yai exist and is significantly different from zero. People who have not visited the Park also perceived benefits from Khao Yai and are willing to pay a positive financial contribution in addition to the current taxes to protect Khao Yai National Park.

Table 4.5 Estimation for contingent valuation model of non-users' WTP.

Variable	*OLS*		*Tobit*	
	coefficient	*t-stat*	*coefficient*	*t-stat*
Constant	55.754	0.445	-134.463	-0.783
Income	$0.719 * 10^{-2}$	3.086	$0.972 * 10^{-2}$	2.965
Age	-3.439	-1.961	-8.205	-2.326
Female	-70.767	-1.846	-86.920	-1.522
Marital status (single)	31.325	0.789	7.656	0.103
Education	-1.468	-0.805	-2.288	-0.945
No. of employed family members	48.923	1.942	69.742	3.624
Information (print media)	71.202	2.275	129.612	2.037
Activity preference (hiking & camping)	40.057	1.576	49.544	0.789
Province dummy (Phang Nga)	-48.930	-1.788	-89.052	-1.118
Quality of interview (good)	145.566	5.542	256.669	4.473
Presence of listener	12.834	0.470	70.705	1.036
No. of observations	638		638	
R-squared	0.09		-	
Adjusted R-Squared	0.08		-	
F-test (11,626)	5.7512		-	
log-likelihood	-4840.23		-3341.1	
Constant Log-L (for=0)	-4870.91		-4870.91	
Mc Fadden R-Squared	-		0.314	

Source : TDRI, 1994

V. Estimating Park Users' Benefits

In addition to the contingent valuation survey of non-users and the Travel Cost (TC) estimation of recreational value, the contingent valuation method was used to estimate park users' willingness to pay to protect Khao Yai National Park. Visitors were interviewed by a group of trained enumerators; the survey was taken between March and May of 1994. This section explains the research design, the nature of questions posed, and the data analysis.

5.1 Park User Survey Methods

Sampling of Park Users

In this study, park visitors were interviewed on site at Khao Yai. The number of domestic visitors interviewed was 948 persons.

Questionnaire for Users

The main subjects of the questionnaire for park users were:

1. Visitors' recreational behavior and their evaluation of park services,
2. Socioeconomic characteristics of the respondents,
3. Travel cost and expenditure,
4. Willingness to pay, method of payment and
5. Interviewers' evaluation of the quality of the response.

The same scenario presented to non-users was presented to the users and they were likewise informed that this study was undertaken jointly between the Royal Forest Department and Thailand Development Research Institute.

The users' questionnaire consisted of three types based on the starting bids; 1) closed-end low value, 2) closed-end high value, and 3) open-ended. A single bid game was used in the interviewing process. The distribution of the park users by the three types is shown in Table 5.1. The portion of the closed-end low value and high value starting bids accounted for 40 and 29 percent respectively; the remaining 31 percent were open-ended type questionnaires.

Table 5.1 Number of users classified by the starting bidding value.

Valuation Method	*Number*	*Percent*
Closed-ended / low value	383	40
Closed-ended / high value	279	29
Open ended	286	31
Total	*948*	*100*

Source : TDRI survey, 1994.

5.2 Park User Profile

Park users tend to be a self-selected group of individuals who have similar preferences. Since they are self selected, their socio-economic characteristics tend to be different from the non-users. Typical or average park users in our sample are single, well educated, relatively young (about 29 years), and have a relatively high income. About two-thirds of the sampled park users are men (Table 4.3), and 65 percent of them are still unmarried.

The three largest occupational groups that visited Khao Yai are employees in the private sector (25.4%), students (22.9%) and public servants (22.2%). The group wage earners account for almost 10 percent of the sample.

A majority of visitors are educated. Over half (54%) have at least a secondary education. One third of the sample has a university education, while only 12 percent had only primary or no education at all.

The park users also tend to be relatively better off than most Thais, i.e., two-thirds of the park users earn at least 7,500 baht per month in personal income.

The group of park users interviewed in this study came from 47 provinces all over Thailand confirming the fact that the popularity of the park is nationwide. One third of the respondents were visiting Khao Yai for the first time. Forty-two percent of the sample said they had visited the park last year; and 18 percent said they had visited the park often (more than four times last year). This implies that a large proportion of park visitors are frequent-users and national park enthusiasts.

5.3 Estimating Recreational Benefits : A Travel Cost Study

Recreation is the most direct and concrete benefits of a national park. The travel cost model is a commonly used method to value recreational demand. It is based on the premise that park visitors are rational, i.e., their expected utility from the trip should be at least equal to the travel cost and the opportunity cost of their time. In an effort to value the recreational benefits provided by Khao Yai National Park, we gathered information on the traveling costs and elapsed time for each individual sampled These data are useful to formulate a Trip Generation Function (TGF), from which the consumer surplus associated with each trip made to Khao Yai can be estimated later.

Specifying the Trip Generation Model

We assume that the number of visits is influenced by: 1) travel cost (round-trip) to Khao Yai, plus the opportunity cost of time and the entrance fee, which every visitor must pay, 2) the socio-economic features of the visitor, 3) the quality of services at the site, and 4) the types of amenities at the site. First, we construct the variable called the travel cost, which includes round-trip expenses, entrance fee, and the implicit cost of travel time. Other expenses such as food and lodging are not included in the travel cost in this study. The implicit cost of time is not obvious and a subject of much debate in the literature. In principle, it is safe to say that higher wages imply higher opportunity costs of time. It may be, however, misleading to take wage rate as the opportunity cost of time in this context, because leisure time and working time are not equivalent. A traveller derives satisfaction (utility), and his or her earning foregone while traveling may not truly represent the opportunity cost of time. It is common among researchers to use a portion of the wage as representative of the cost of time;

in this case we multiplied their travel time by one quarter of their hourly wage, based on their stated monthly income, as the implicit cost of time.

Multiple-site visits pose another theoretical complexity in applying the travel cost model; fortunately, most of our sample visitors said that Khao Yai was their primary destination and did not stop over at other sites. To avoid bias and inconsistency, we excluded those visitors who visited or planned to visit other sites from the estimated equation.

For travel cost method, the information of only those with the single purpose of coming to Khao Yai were analyzed of 948 samples of park visitors, 948 samples were analyzed and only 865 respondents (83%) indicated that Khao Yai was their major destination.

Of 948 samples, we used the 763 samples that were ranked by our interviewers as being of 'good' and 'very good' quality. Table 5.2 Describes statistics related to the respondents.

Table 5.2 Visitors' travel statistics.

Items	*Mean values*
Number of visits(times/year)	1.88
Time cost(baht/person/round-trip)	110.65
Transport cost & entrance fee(baht/person/round-trip)	133.11
Travel cost(baht/person/round-trip)	243.76
Food & accommodation(baht/person/day)	312.57
Income(baht/person/month)	14,007

Source : Analysis by TDRI

Two estimation techniques are used to estimate the travel cost model, i.e., the OLS, and the Poisson regressions. Poisson regression is of particular relevance in this case, because of the distribution of the dependent variable (the number of trips) which is of a count data type (0,1,2,3...). In our sample, the mean value of the number of trips is 1.88 times/year.

The trip generation model has visitation rate (number of trips per year) as the dependent variable. The independent variables socio-economic variables, travel cost, use for park amenities and quality of services. Income, as usual, is expected to have positive effect on the number of trips; in other words, recreation is a normal good. Travel cost may be considered the price of recreation and is assumed to be negatively related to the visitation rate. Quality of park services may be another factor influencing trip frequency, i.e., those who judge the quality of services to be low are likely to take fewer trips. It should be noted that a self-selection problem might have influenced the visitation rate and thus biased it downward. Descriptive statistics from the survey suggest that only repeat visitors rated the quality of many of the services as poor. This self selection may distort the measured relationship between service quality and visitation rates. We also expect that a visitor's demand for those activities or amenities that are unique to Khao Yai would be associated with higher visitation rates.

Table 5.3 presents the results of this estimation. (See Table 4.4 for a definition of all variables.) The findings confirm that:

- Income has a positive impact on the number of visits.
- Travel cost adversely affects the visit frequency.
- Males tend to visit the park more frequent than females.
- Age is not a statistically significant variable, and this implies that age is not prohibiting factor to visit Khao Yai.
- Living in the nearby provinces, apart from the lower cost of traveling, influences visit frequency -- it is conceivable that this variable may reflect taste and preference of visitors; these group of visitors may know the value of the park better or have stronger sense of belonging.
- Campers and bird watchers tend to visit the park more frequently. This reflects the combination of taste and preference, as well as the fact that Khao Yai is an internationally well-known site for bird watching.
- Quality of park services, specifically food service and toilets, are highly statistically significant, implying that they might have strong impact on the number of park visits.

With respect to the choice of estimating techniques, both OLS and Poisson regressions yield consistent coefficients, but the Poisson results are preferable for at least two reasons: 1) Poisson regression seems to fit the count data better than the OLS as indicated by the goodness of fit statistics, and 2) the predictions from the Poisson regression visit are

always positive, whereas OLS estimates are sometimes negative. For the trip generation model is impossible to have less than zero number of visits to the park.

Table 5.3 Regression estimates for the visitation rate.

Variable	*Poisson*		*OLS*	
	coefficient	*t-stat*	*coefficient*	*t-stat*
Constant	-0.8904	-5.234	-0.8234	-1.168
Income	$0.2343 * 10^{-4}$	9.680	$0.309 * 10^{-4}$	2.663
Education	$0.4850 * 10^{-1}$	4.736	$0.823 * 10^{-1}$	1.815
Female	-0.7145	-10.031	-1.1290	-3.952
Nearby province	0.6556	10.551	1.5179	5.175
Travel Cost	$-0.203 * 10^{-2}$	-8.079	$-0.149 * 10^{-2}$	-2.499
Food & accommodation	$-0.545 * 10^{-3}$	-4.62	$-0.469 * 10^{-3}$	-1.429
Camping	0.3082	5.204	0.6314	1.997
Bird watching	0.2128	3.824	0.4065	1.468
Quality of toilets	0.2676	9.301	0.4578	3.505
Quality of food service	0.1543	6.187	0.2196	1.941
No. of observation	763		763	
R-squared	-		0.12	
Adjusted R-squared	-		0.11	
F-test (10,752)	-		10.0775	
Log-Likelihood	-1924.7		-2058.068	

Note : Dependent variable: last year's visitation rate.

Source : TDRI, 1994

Estimating Consumer Surplus from the Travel Cost Models

Estimating the consumer surplus per trip can be done by integrating under the demand curve for trips (i.e., trip generation function). It is simple to show that the consumer surplus per trip, assuming the linear relation between visitation and travel cost, is equal to:

$$CS_i = \frac{(\alpha + \beta p_i^0 + \delta x_i + \varepsilon_i)^2}{-2\beta} = \frac{(\overline{N})^2}{-2\beta}$$

$\overline{N}$ represents the average number of visits annually, which is 1.88 times from our samples. Coefficient β represents the slope of the fitted curve and shows the negative relation between travel cost and visitation rate (more detail in Bockstael and Strand, 1987 , and Smith, 1990). Based on our data and estimates, the consumer surplus for an average traveller is 868.8 baht annually (according to Poisson estimates) and 1,190.8 baht (OLS). These estimates imply that the consumer surplus from Khao Yai visitors, which at present total about one million persons each year and tend to increase over time, may be valued in the range of 800 million baht per year. This estimate should be considered the lower bound because the travel cost, as taken here, is a minimum requirement and does not cover all expenses.

5.4 Analysis of Park Users' WTP to Protect the Park

In the following section we describe the exact nature of the 'good' being valued and the magnitudes of WTP bids obtained. In addition, we develop a framework to test the validity of these bids and examine the result of our test of validity. In the final section, potential biases are discussed.

1. The National Park: What is being valued?

The park users' survey was handled in exactly the same fashion as the non-users' survey, with the respondent receiving warnings to consider their financial limitations, as well as the same description of the park and threats to its well being (again using visual aids). The survey instrument for park users is presented in Appendix B.

However, in order to test for biases associated with the starting bid, enumerators then asked respondents either:

"Would you be willing to become a supporting member and what is the maximum you would be willing to pay for yourself to Protect the Park from destruction?"

or

"Would you be willing to become a supporting member of the organization and make an annual financial contribution of (500 or 1000) baht to protect the park?"

As in the non-user survey, respondents were given four response options: 1) to become a member and make an annual contribution, 2) to become a member but make a one-time only contribution, 3) to become a member and explain why they would not pay anything, and 4) to not become a member and explain why. Several methods of payment were permitted such as an automatic transfer from their bank account, annual income tax deductions, checks mailed to the funds bank account, *etc.*

2. Willingness to pay for the Park

The average annual willingness to pay for the use and passive-use values of the park was 730 baht per respondent. Of this sample, there were 310 persons whose WTP was zero, and about half of this number may be considered protest bidders; that is, they did not contribute because they distrusted the funding scheme or did not agree with the scheme for some reason (e.g., they thought it would not work, or that it should be the responsibility of government rather than the citizens to protect the national park, etc.). As discussed below in sub-section 5, the elicitation format affected the average WTP a great deal, from 534 baht for the open-ended question to 1,071 baht for the high closed-ended question. As result of these formats and starting point effects, all subsequent analysis of the total economic value of the park should incorporate a sensitivity analysis which considers bids that vary ± 200 baht from the average (i.e., 530 and 930 baht).

3. A Framework for validating WTP bids

As with the survey of non-users, we confirm the theoretical validity of WTP bids by evaluating the systematic variation in those bids with respect to the hypotheses developed from economic theory and cultural norms. It is conceivable that respondents' WTP may be influenced by five groups of factors: 1) their socio-economic characteristics, 2) the

specific features of the interview during which their WTP was elicited, 3) taste and preferences which are expressed through variables such as the frequency of visitation, the duration of stay, and likelihood of camping, etc., 4) the perceived quality of the park services, and 5) their demand for amenities of the park, for which there are only few substitutes or unique in some respects. The hypothesis of the first three groups are similar to those for the non-users. In contrast to our evaluation of the passive-use value, for total economic value we must consider the consumer's level of satisfaction with and demand for consumption-oriented attributes of the park. The relationship between these factors and WTPs are hypothesized and discussed below.

The first two factors are the same for non-users, and were discussed in Chapter 4. The third factor, taste and preferences, may be slightly different for park users. We expect that those stay overnight or stay longer tend to have more time to appreciate the nature and thus are relatively more willing to pay for the Park.

The fourth and fifth factors relate only to park users. We expect that those respondents who feel the park's services are poor may be willing to pay less than those who feel satisfied with the quality of services in the park. We also hypothesize that those visitors who come to the park to enjoy amenities for which there are few substitutes (i.e., wildlife, trekking, etc.) tend to be willing to pay more than those who seek to enjoy the less unique features of Khao Yai.

Finally, we expect those residing in the four provinces where Khao Yai is located to feel more attached to Khao Yai and hence are more willing to pay to protect Khao Yai.

4. Testing the validity of the WTP bids

We tested the above hypotheses using first simple descriptive statistics and cross-tabulation techniques and later on equation estimates by OLS and TOBIT models. Table 4.3 presents the cross-tabulation of WTP according to the socio-economic characteristics of the respondent. Notations and definition of all variables are given in Table 4.4.

Before examining the results in Table 5.4 we wish to point out that, as in the case of passive-use value models, the models presented below are designed to test the validity of the results by examining the systematic relationship between WTP bids and other variables.

While it is certainly possible to construct models to forecast WTP due to the definition of dummy variables in these models they are not developed to forecast WTP.

Table 5.4 Estimation for contingent valuation model of park users.

Variable	OLS		Tobit	
	Coefficient	t-stat	Coefficient	t-stat
Constant	935.539	3.243	561.094	1.330
Income squared	$0.2075 * 10^{-6}$	2.475	$0.2654 * 10^{-6}$	4.025
Age	-11.5937	-2.333	-17.4414	-2.384
Sex	-65.5152	-0.822	-62.2716	-0.565
Marital status	-20.7364	-0.202	-38.0263	-0.266
Education	-2.0223	-0.193	-0.2509	-0.015
Nearby Province	-88.5488	-0.963	-124.085	-1.115
Starting bid-high	483.8570	5.659	423.747	3.843
Length of stay	73.8841	1.147	99.8020	1.435
Presence of listener	-16.1099	-0.223	-8.5152	-0.085
Quality of interview	202.5970	2.686	279.071	2.609
Satisfaction score	-3.9373	-0.359	5.2901	0.318
Bird watching	94.0445	1.139	169.835	1.547
Trekking\hiking	23.4556	0.284	17.9564	0.158
Visiting water fall	-90.7395	-0.865	-51.5955	-0.312
Viewing scenery	-64.7936	-0.816	-77.8441	-0.636
No. of observations	943		943	
R-squared	0.09		-	
Adjusted R-squared	0.07		-	
F-test (15,927)	5.9161		-	
Log-Likelihood	-7923.186		-5760.3	
Log-Likelihood (Constrained=0)	-7966.249		-7966.249	
Mc Fadden R-Squared	-		0.277	

Source : TDRI, 1994

The results for each model bear out our hypotheses, demonstrating a high level of correlation between WTP and the explanatory variables in the direction predicted for the income and age variables. Other socio-economic variables turned out to be insignificant. The starting bid value and the environment of the interviews have clearly affected park users' WTP. None of the variables related to the quality of services and the availability of the amenities are significant.

5. Potential biases

A well known source of potential bias arises from the starting point and type of elicitation format employed (Boyle *et. al.*, 1985, and Altaf and Deshazo, 1994). In this study, it is confirmed that different starting points did affect respondents' WTP bids. The average bids are as follows:

open-ended	534 baht (n = 381)
low closed-ended	658 baht (n = 284)
high closed-ended	1,071 baht (n = 278).

The second source of potential bias may arise from the payment vehicle. Respondents may object to the form or frequency of payment required. We accommodated this concern by allowing the respondent to state both their preferred frequency and form of payment. A variety of forms of payment were chosen, including over 80 respondents who wanted to pay in kind with labor.

Our findings suggest that park users are willing to pay an impressive sum to protect Khao Yai and the consumer surplus of the travelers are significant. Such large welfare gain of park users suggest additional avenues for extracting conservation fund (over and above the user charge) for Khao Yai. This issue will be taken up again in the final chapter.

VI. Aggregating Benefits from Use and Non-Use Values at the National Level

To what extent is Khao Yai National Park valued by both park users and non-users? This section illustrates the aggregation of the benefits from our surveys at the national level. In brief, we are applying the WTP results obtained from our survey samples on a national scale, to determine national benefits. This is important for national policy considerations, e.g., for planning and budget allocation, because 1) aggregate benefits of the park would help to justify the cost of protection, and 2) it provides a means of comparing the benefits from the allocation of scarce public funds.

6.1 Urban Non - Users

Strictly speaking the local non-user population consists of all Thais who have never visited Khao Yai National Park; they live everywhere, in both urban and rural areas. However, due to the scope of our field survey, we are limited to drawing inferences from the urban non-users only. The number of urban residents in Thailand in 1993 was 16.48 million, some of whom had visited Khao Yai before. To obtain the number of urban residents who have never visited the Park, the ratio of non-users to total respondents approached during the interviews were computed from the survey. As expected, these ratio vary by zone, i.e., 80 percent in Zone one (Bangkok and four provinces around Khao Yai), 90 percent in Zone 2 (provinces which are 100 to 410 km from Khao Yai), 85 percent in Zone 3 (provinces which are 411 to 600 km from Khao Yai) and 95 percent in Zone 4 (provinces which are more than 600 km from Khao Yai) -- this pattern is commonly observed, i.e., the percentage of people who have visited Khao Yai tends to decrease the further away one moves from the park. Applying these ratio to the total number of urban residents, we then obtained the number of urban residents who have never visited Khao Yai, which amounted to about 14 million persons.

This population of non-users was distributed into different income classes using national income distribution information obtained from the national socio-economic survey conducted in 1990 by the National Statistical Office (NSO).[1] There is a large group of people (7.4 million) who had no income and had to be dropped from the sample. The remaining sum (6.6 million) is the number of non-users who are able to pay to protect Khao Yai. This last figure was then multiplied by the range of WTP and mean values in each income class.

The value of benefits of Khao Yai to non-users is the sum of the product of each income class' average WTP times the population of non-users in each income class. A portion of respondents who had no income may still willing to pay to protect Khao Yai, probably with income transferred by other earners. Excluding this from the aggregation, the group of people who are willing to pay but have no income therefore provides lower estimates. The value of Khao Yai National Park as perceived by the urban non-users is estimated to be about 1 billion baht per year (Table 6.1).

6.2 Park Users

Park users are those people who have previously visited Khao Yai. We know from Khao Yai National Park statistics that the number of visitors is about 1 million persons each year. However, this figure includes those who have visited Khao Yai in the past, so simply summing the number of visitors over the years would lead to an overestimation. From our survey, we obtain the percentage of park users by zone, and this information is taken as basis for the estimated number of Khao Yai park users. The number of park users was estimated to be 2.3 million person for 1994 (column 3 in Table 6.2). By multiplying the number of the users with average WTP in each income class and summing across all classes, the total benefit of Khao Yai expressed through WTP can be estimated, which amounted to 1,696 million baht per year (Table 6.2).

From this exercise, it may be concluded that the total recreational, environmental and biodiversity benefits of Khao Yai National park, from both park users and

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[1] The sample was grouped by income, as opposed to other socio-economic variables, because of the statistically significant relationship between income and WTP as determined by our regression analyses. Other variables, such as age, sex and education, were not consistently significant.

urban non-users, total 2,705 million baht per year. This number may be considered a conservative estimate as it excludes the rural non-user group from the questionnaire survey. It also excludes those who do not have income but are willing to pay.

This estimated park benefit is not static; it is likely to change over time, depending on information about the park, educational level, environmental knowledge, and the total number of park users, all of which are likely to rise in the future.

Table 6.1 Total annual benefits of the Khao Yai National Park as perceived by non - sers.

Monthly income (baht)	*Average WTP* (baht) (1)	*Number of Respondents Sampled* (n) (2)	*Standard deviation of WTP* (3)	*Non-Users by income class* persons(4)	(%)	$^{*}Z_{(\alpha /2)} \times (3)/(2)^{1/2}$ (5)	*Range of WTP for Khao Yai* (million baht) (6)=[(1)±(5)] • (4)	*Average Value of Khao Yai* (million baht) (7) = (1) * (4)
No income	-	-	-	7,371,504	52.13	-	-	-
<2,500	111	165	183.60	3,137,358	22.19	36.81	232.7 - 463.7	348.2
2,501-7,500	150	516	265.61	2,712,469	19.18	30.11	325.2 - 488.5	406.8
7,501-15,000	260	224	693.77	679,606	4.81	119.42	95.5 - 257.8	176.6
15,001-25,000	274	64	767.92	155,433	1.10	247.17	4.2 - 81.0	42.5
25,001-50,000	428	26	504.95	57,781	0.41	254.95	9.9 - 39.4	24.7
>50,000	370	10	374.31	25,743	0.18	305	1.7 - 17.4	9.5
Total	*(avg)183*	*1,005*	-	*14,139,893*	*100.0*	-	*669.2 - 1347.8*	*1,008.7*

Note : $^{*}Z_{(\alpha /2)}$ *; Confidence Interval = 99% ,*
α *= 0.01* $[\alpha /2 = 0.005]$ *; So* $Z_{(\alpha /2)} = 2.575$ *(From Standard Normal Table)*

Sources : TDRI Survey and NSO

Table 6.2 Total annual benefits of the Khao Yai National Park as perceived by park users.

Monthly income (baht)	*Average WTP (baht)* (1)	*Standard Deviation of WTP* (2)	*Distribution of Users from Sampling (3)*		*Park Users by income class (persons)* (4)	$^{*}Z_{(\alpha/2)} \times (2)/(n)^{1/2}$ (5)	*Range for Value of Khao Yai (million baht)* (6)=[(1)±(5)] * (4)	*Average Value of Khao Yai (million baht)* (1) * (4)
			persons (n)	*(%)*				
<2,500	415	685.82	34	3.6	84,081	303.0	9.4 - 60.4	34.9
2,501-7,500	625	1,016.90	291	31.0	724,029	153.5	341.4 - 563.6	451.8
7,501-15,000	708	956.74	368	39.2	915,546	128.4	530.6 - 765.7	644.1
15,001-25,000	876	1,406.70	130	14.0	326,981	317.7	182.5 - 390.3	276.8
25,001-50,000	792	961.57	77	8.2	191,517	282.3	97.6 - 205.7	151.7
>50,000	1,467	2,279.10	38	4.0	93,423	952.7	48.0- 226.0	137.1
Total	*(avg)730*	-	*938*	*100.0*	*2,335,577*	-	*1,209.5 - 2,211.7*	*1,696.4*

Note : $^{*}Z_{(\alpha/2)}$ *; Confidence Interval = 99% ;*
α *= 0.01 [*$\alpha/2 = 0.005$*], So* $Z_{(\alpha/2)} = 2.575$ *(From Standard Normal Table)*

Sources : TDRI Survey, NSO and RFD

VII. Other Benefits and Costs

Other major benefits of Khao Yai National Park include its handling of through-traffic, serving as a base for scientific research and education, and its capacity to sequester carbon. These benefits, if they exist, offer substantial opportunities for revenue sharing through appropriate pricing of tolls and research fees. Carbon sequestration on the other hand, offers the potential for reducing costs through a carbon offset program with international industrial plants or power utilities. However, as indicated earlier, carbon sequestration is an insignificant factor in Khao Yai. Therefore, this chapter only examines the benefits derived from through-traffic and scientific education and research.

Setting aside productive land for national parks incur opportunity costs of putting the land into alternative use and of forgoing revenue from timber and non-timber products. This chapter examines, as data permits, some of the opportunity costs related to both.

7.1 Economic Benefits of Through-traffic

The road which links the two gates of Khao Yai is a shortcut (82 vs. 133 km.) for traffic from Prachinburi in the Eastern region of Thailand to Saraburi, which is the gateway to the Northeastern region of Thailand. There is an on-going debate over closing the road as a throughway by forcing visitors to exit from the same gate through which they enter. The proponents of keeping the road open point out the economic benefits of the shorter route through the park and the subsequent savings in transportation costs. A ban on through-traffic would also discourage those tourists who wish to continue to destinations on the far side of the park. Opponents of the road claim that the road was designed without due consideration for the natural habitat of wildlife in the park and that late-night traffic often endangers animals. Deer and some other animals have allegedly fallen prey to traffic every one or two years but no official records are available.

To ascertain the economic benefits of through-traffic, a separate questionnaire was designed to trace the origin, destination and the purpose of the trip from drivers. The information was collected between March 12 and 20, 1994 between 08.00 and 17.00 hours. 739 questionnaires were collected. In addition, several truck and other-type vehicle drivers were interviewed.

Road Users Profile

During our survey, about 46 percent of the vehicles that entered Khao Yai National Park from one gate exited through another, but 19 percent of these vehicles came to Khao Yai for tourism purposes. Therefore only 27 percent all vehicles that entered Khao Yai used the Khao Yai road for purely through-traffic purposes. Only 4.46 percent of all vehicles were six wheeled trucks. This proportion is consistent with the Park's annual statistics between 1991 and 1993 which indicates that about 2 to 5 percent of all vehicles entering Khao Yai were six wheeled trucks. Most of the through-traffic vehicles are passenger cars and utility pick ups that use Khao Yai road as a shortcut. Most traffic (81 percent) occurs over week-ends.

The vehicles that pass through Khao Yai are usually empty because the road through Khao Yai is hilly and winding. The truck drivers prefer to use Khao Yai for the return trip when they can drive faster and thereby save one hour. However, the depreciation costs of passing through Khao Yai are higher when the working life of the vehicle is taken into account. Table 7.1 confirms that passing through Khao Yai incurred higher costs for delivery of goods. For empty trucks and utility pick-ups the costs of going through Khao Yai versus making a detour are not significantly different.

For non-truck users, the cost comparison of going through Khao Yai and making a detour is similar to empty trucks. The slightly higher costs are compensated for by the scenic beauty along the Khao Yai route.

Ten-wheeled trucks and motorcycles with more than two passengers are not allowed to enter the park. All vehicles pay the entrance fee only once a day. Income from vehicle entrance fees constitutes the largest proportion of the Park's revenue and averaged 2,868,202.5 baht between 1990-1993. Passenger cars contribute the largest share (43 to 54 percent) of the entrance fee. Six-wheeled trucks accounted for very small proportion of fees (2 to 4 percent).

Table 7.1 Cost comparison between traffic through Khao Yai and detour (baht/trip).

Item	Without goods		With goods	
	Through Khao Yai	Detour	Through Khao Yai	Detour
Wages	200	200	200	200
Depreciation	121.53 1/	81.02 2/	486.11 3/	162.04 4/
Petrol 5,6/	174.25	226.10	215.25	282.63
Entrance fee	25	0	25	0
Time cost	0	35	0	35
Total	**520.78**	**542.12**	**926.36**	**679.66**

Notes : *1/ Assumption of working life = 8 years*
2/ Assumption of working life = 12 years
3/ Assumption of working life = 2 years
4/ Assumption of working life = 6 years
5/ Petrol consumption = 4.4 km/liter for passing through Khao Yai
6/ Petrol consumption = 8.0 km/liter for detour

Sources : Interviews

Revenue from Entrance Fees

The Park has different entrance fees for each vehicle type as follows :

	baht per vehicle
Bicycles	5
Motorcycles	10
Cars and Pick-ups with no more than 7 passengers	25
Vans (not exceeding 20 passengers)	60
Small Coaches	150
Big Coaches	200
Six-wheeled trucks	30

Source : Khao Yai National Park

The cost to the park of maintaining the roads is approximately 3 million baht per year. On the basis of RFD records from the past three years, about 3,000 trucks pass through Khao Yai each year generating an income of about 90,000 baht, a small fraction of total revenue.

Contrary to general expectations, traffic through Khao Yai generates no net private economic gain, and this is confirmed by the low level of through-traffic. The current vehicle entrance fee policy encourages large group tours or student groups. Fees for visitors and vehicles are not separated. In fact fees are charged according to vehicle type. This policy should be dropped and visitors entering Khao Yai should be charged individually and the fee for vehicles should be charged separately. Six wheeled trucks and commercial vehicles carrying goods should be banned from using Khao Yai as through-traffic. The current policy of closing the park highway between 24.00 to 06.00 hours. should be continued.

Table 7.2 Park revenues from vehicle fees.

Type of vehicle	*Revenue by type of transportation (percent)*		
	1991	*1992*	*1993*
Bicycles	0.02	0.05	0.02
Motorcycles	14.68	7.01	3.67
Passenger cars not exceeding 7 people	51.59	54.22	43.25
Van utility vehicles with more than 7 passengers	16.41	22.67	16.39
Small coaches	7.88	7.27	13.27
Trucks	3.12	2.43	4.32
Big coaches (50 persons or more)	6.31	6.32	18.92
Total	*100.0*	*100.0*	*100.0*

Source : Khao Yai National Park

7.2 Educational and Scientific Benefits

The park operates a camping ground and youth dormitories but does not keep separate records for tourism and educational purposes.

Khao Yai is well known internationally as a research site for wildlife, especially gibbons. Between 1976 and 1988, cumulative research funds stood at 7.9 million baht, according to the National Research Council (Table 7.3). After 1988, two more studies were conducted in Khao Yai, one on gibbons and the other on climate change and tree rings. The total funding of these projects was not revealed.

The figures in Table 7.3 should not be interpreted as the value of research conducted in Khao Yai. Rather, this represents the flow of expenditure from which Khao Yai could extract more revenue from improved services. It should be noted that this amount is not necessarily spent entirely in Khao Yai. However, the flow of 12.5 million baht over 12 years implies that scientific research could be a significant source of income.

Table 7.3 Scientific research funding for topics related to Khao Yai (1976-1988).

Research funding	*baht (1992 prices)*
Wildlife	
Gibbons	*1,713,538*
Hornbills	*3,282,283*
Elephants	*33,045*
Other	*7,541,127*
Total	*12,569,993*

Source : The data was originally compiled by Dobias(1986). These yearly expenditures are converted into 1992 prices.

Domestic research funding reflects the relatively dismal status of the search for knowledge related to biodiversity and forest ecology in Thailand. The RFD has a very small budget for research. In 1988, 12,500 baht was allocated for research in Khao Yai. The Park has no specialist on either plants or wildlife. The management plan of the Park was subcontracted to Kasetsart university. The establishment of National Parks has been

considered an avenue for preventing deforestation rather than for preserving the parks for educational and scientific purposes.

As interest in biodiversity increases, demand for park services in research and education will increase, but at present the Park has no support facilities such as a library and computers. One of the bungalows or a section of the exhibition hall could be turned into a research center equipped with a library and office equipment. A set of past studies should be assembled and held in the library. A special hourly charge for the use the computers and office equipment could be established. Environmental NGOs could be invited to provide educational materials or to run part of the exhibition hall. Some NGOs could lead educational tours during summer vacation.

In the long run, Khao Yai could be upgraded into a nature education center for youths. The Park's proximity to large cities and towns and its abundant biodiversity make Khao Yai very suitable for field studies by students and scientists.

7.3 Other Benefits

Revenue from ecotourism which may accrue to the local communities is often cited as important income and employment opportunities from National Parks. Six villages were selected from the 224 villages that surround the park to study in-depth village-park interaction. A researcher stayed at each village for at least two weeks to obtain information regarding settlement history, the use of forests, income and employment opportunities related to tourism and the establishment of the Park. Appendix C provides details of the sampling procedure and detailed findings.

Surprisingly, our study suggests that income to local communities from ecotourism was small, about 1,000 baht per year, five percent of what they could have earned from extraction of forest resources. The villagers attributed the poor earning to the small number of tourists and the short trekking season.

Earnings from tourism industry (i.e., resort, hotels, golf courses and restaurants) are higher, ranging between 2,800 and 3,500 baht per month per employee, but the employee must have at least a secondary education. The total of the number of employees is not known howerer, but the total amount would be significant.

7.4 Opportunity Cost of Khao Yai National Park

An alternative use of Khao Yai would be agriculture. Rural land prices could be taken as a proxy for the stream of income from agriculture. The research staff member visited the six villages also obtained land transaction costs. The price of land varies widely depending on access to roads and the availability of title deeds. The prices of rural agricultural land ranged between 20 and 30,000 baht per rai while land suitable for resort areas in the future fetches much higher prices -- up to 1 million baht per rai. If we use the conservative figure for agricultural land, the opportunity cost of Khao Yai is estimated at 27,200 (1.36 M rai x 20,000 million baht).

7.5 Foregone Benefits of Villagers

Another substantial part of the costs include forgone revenue from timber and forest products. These revenues used to be the main source of income but they are declining because of the establishment of the Park. Appendix C provides details of the types of resources extracted and their prices.

From the interviews, the income loss of households ranged from 10,000-20,000 baht. Multiplying the number of households around the park (16,490) with the lower bound of non-forest income gives the estimated loss of annual income from forest products owing to park establishment of 165 - 330 baht per year or at 10 percent discount rate, The net present value is estimated at 1,650-3,300 baht.

The figures of 10,000 - 20,000 baht per year from a variety of uses of forests (land, timber, fuelwood fruits, vegetables, medicines, wildlife and valuable " aromatic wood ") appear reasonable in light of figures given by other studies in Thailand (Tongpan, et. al., TDRI, 1990) and elsewhere (Godoy et. al., 1993) This can been seen by converting the total lost earnings to per rai basis: 30 million baht/1.4 million rai = 214 baht per rai or just under US$ 9 per rai (or 54 per ha.). Studies such as Godoy et. al. and Panyotou (1992) report figures in the range of US$ 45 - US$ 50 (early 1990s) for comparable countries such as Indonesia, Malaysia and Sri Lanka.

In conclusion, through - traffic does not provide major economic benefits, nor has ecotourism not generated substantial benefits to the surrounding communities. On the other hand, the welfare loss of surrounding villages could be substantial but has not been

compensated for or even considered while urbanites enjoy increased welfare from the establishment of the Park as measured by their willingness to pay. For the sake of equity, the government should devise a policy to extract revenue from these benefits and use it to create better income and employment opportunities for the losers. This issue will be discussed again in the final chapter.

VIII. The Cost of Park Maintenance

Khao Yai National Park provides three types of services: forest protection, tourism services and other services. The last category includes services provided to educational and scientific communities and conferences. This category of services has been negligible, but it is likely that the scientific value of the park will increase in the future with increased interest in biodiversity. For now, however we will consider the cost of the last category of services as part of tourism services.

In the past, the expense records of the Khao Yai National Park Authority were not classified by types of services. Starting in fiscal year 1995 (October 1994 to September 1995), the Park began to separate the budget according to service types. On the basis of this proposed budget, the past operating expenses of tourism and protection services can be estimated. The depreciation of capital equipment and buildings are allocated according to actual services provided. Depreciation rates used here are in accordance with standard accounting practices, i.e., a straight-line method with a life span of 20 years for buildings and 5 years for equipment. The cost of park maintenance is distinguished between fixed and variable costs. Salaries and wages are considered annual expenditures and, similarly, office supplies are considered non-durable and thus listed under current expenditures.

The total cost of providing protection and tourism services to the Park (including capital costs) in 1994 was 12 million baht but the revenue generated from Park's entrance fee, fines, and service charges was only 4.8 million baht. This indicates that the cost-recovery of the Park operations is only 40.0 percent and suggests that Khao Yai, like all other national parks, is far from being self-financing and is heavily subsidized from the government budget, which is ultimately the burden of taxpayers in general. Khao Yai Park's level of cost - recovery has been deteriorating over time, from 50.3 percent in 1991 to 40.0 percent in 1994 (Table 8.2).

A. Forest Protection. The annual total cost for this service was between 6 and 8 million baht between 1991 and 1995 (Table 8.1). The average cost was between 4 and 6 baht per rai. The area under the responsibility of the Park is 1.36 million rai.

B. Tourism Services. The total annual cost for this service was between 3 and 5 million baht for the same period. This amounted to an average total cost of 3 and 5 baht per visitor. Distinguishing between forest protection and tourist services is mainly for sake of classification; ultimately we need to consider both items together, as both services are inextricably linked. Tourists will no longer enjoy visiting the Park if there is no forest protection. When both costs are combined, the average cost amounted to 9.1 baht per rai, and to 16.9 baht per tourist (as of 1993).

The costs above do not include the cost of road maintenance, which is approximately equal to the revenue from entrance fees. The road was built and maintained by the Department of Highways, and thus the maintenance costs have not appeared in the Park's operation cost. As from 1993, the two government agencies reached an agreement whereby the road and the costs of its upkeeping has been transferred to the Park. As of now the road requires little maintenance, but sooner or later the road will need resurfacing and other major repairs and thus the costs will rise rather sharply (see last column in Table 8.2).

It should be emphasized that we do not advocate that the Park must achieve full cost-recovery. This is, in fact, a very complex issue and there are many good reasons to subsidize public goods for the promotion of nature education, income distribution, etc. The cost study, however, is useful information for park management and government planning. It may be desirable to subsidize the fixed costs (e.g., overhead capital) and have the variable costs borne by park users. Should the Park be able to develop the capacity and flexibility to initiate service charges, fees should be set to recover average total cost. At the very minimum, the Park may consider designing the user charge to be sufficient to cover the average variable cost, which is about 12 to 13 baht per tourist as of 1993.

Table 8.1 Cost of maintaining Khao Yai

A. Cost of protection

(Unit : baht)

Item	*1991*	*1992*	*1993*	*1994*	*1995*
Variable costs	4,669,755	5,940,601	6,688,478	6,694,893	7,393,882
Fixed costs	1,132,962	1,140,262	1,375,462	1,077,962	1,412,262
Depreciation of buildings	170,162	170,162	170,162	170,162	332,062
Depreciation of equipment	962,800	970,100	1,205,300	907,800	1,080,200
Total cost	*5,802,717*	*7,080,863*	*8,063,940*	*7,772,855*	*8,806,144*
Average total cost *	*4.3*	*5.2*	*5.9*	*5.7*	*6.5*

*Note : * baht/rai : The total area of Khao Yai is 1,355,468.75 rai*

Source : Khao Yai National Park

B. Cost of tourism services

(Unit : baht)

Item	*1991*	*1992*	*1993*	*1994*	*1995*
Variable costs	2,382,551	3,030,948	3,412,522	3,415,795	3,772,425
Fixed costs	507,748	512,648	827,448	823,071	842,288
Depreciation of buildings	461,048	461,048	461,048	456,671	444,188
Depreciation of equipment	46,700	51,600	366,400	366,400	398,100
Total cost	*2,890,299*	*3,543,596*	*4,239,970*	*4,238,866*	*4,614,713*
Average total cost *	*2.86*	*3.75*	*5.81*	*5.19*	*n.a.*
Average variable cost *	*2.36*	*3.21*	*4.68*	*4.18*	*n.a.*

*Note : * baht/tourist*

Source : Khao Yai National Park

C. Total cost

Items	*1991*	*1992*	*1993*	*1994*	*1995*
Variable costs (baht)	7,052,306	8,971,549	10,101,000	10,110,687	11,166,307
Fixed costs (baht)	1,640,710	1,652,910	2,202,910	1,901,033	2,254,550
Depreciation of buildings	631,210	631,210	631,210	626,833	776,250
Depreciation of equipment	1,009,500	1,021,700	1,571,700	1,274,200	1,478,300
Total cost	***8,693,016***	***10,624,459***	***12,303,910***	***12,011,720***	***13,420,857***
Average total cost(baht/rai)	***6.4***	***7.8***	***9.1***	***8.9***	***9.9***
Average total cost (baht/tourist)	***8.6***	***11.2***	***16.9***	***14.7***	***n.a.***

Source : Khao Yai National Park

Table 8.2 Costs and revenue for Khao Yai National Park

(Unit : baht)

Items	*1991*	*1992*	*1993*	*1994*	*1995*
Revenue					
1. Operating revenue	4,370,957	4,211,960	3,767,323	4,809,510	n.a.
- Entrabce fees	3,588,597	3,730,445	3,451,648	4,165,925	n.a.
- Fines	412,180	349,750	285,300	206,750	n.a.
- Accommodations	370,180	131,765	30,375	436,835	n.a.
2. Allocated budget	6,556,400	8,686,000	11,471,710	12,118,000	19,832,000
Total park revenue	10,927,357	12,897,960	15,239,033	16,927,510	n.a.
Costs					
1. Cost of protection	5,802,717	7,080,863	8,063,940	7,772,855	8,806,144
2. Cost of tourism service	2,890,299	3,543,596	4,239,970	4,238,866	4,614,713
3. Road maintenance	-	-	-	-	8,032,728
Total cost	8,693,016	10,624,459	12,303,910	12,011,720	21,453,585
Cost - recovery (%)	50.3	39.6	30.6	40.0	n.a.

Note : Cost - recovery = Operating revenue/Total cost

Source : Khao Yai National Park

IX. Evaluating Park Services

National parks in Thailand are known to be important recreation sites for the lower and middle income groups who comprise the majority of the population. Providing good park services could increase public welfare considerably and is an important function of park management. Providing good services would also increase the public appreciation of the park.

Our empirical findings suggest that park visitors are mainly "repeat tourists." Only 35 percent of the 948 respondents were visiting Khao Yai for the first time. About 15 percent have visited Khao Yai more than ten times. Slightly more than eight percent of the respondents visited Khao Yai more than five times in 1993. For repeat tourists, park amenities and services are important incentives for increasing their willingness to pay for the conservation of the Park.

9.1 Preferred Activities

Both park users and non-users do not differ significantly in their preferred activities in the park. Thais tend to prefer less strenuous activities. The most favorite activities tend to be waterfall and scenery viewing (Table 9.1). Leisurely walks are generally more preferred than trekking. More intense nature appreciating activities such as bird and wildlife watching, and trekking and are enjoyed by small groups accounting for less than ten percent of both the users and non-users.

Table 9.1 Percent of respondents classified by most favorite activities.

Activity	Percent of Respondents					
	Rank 1		Rank 2		Rank 3	
	User	Non-User	User	Non-User	User	Non-User
Leisurely walks	18.1	19.5	14.7	12.3	16.9	10.6
Trekking	9.8	13.9	6.0	7.1	5.3	5.9
Bird-watching	3.0	4.0	5.5	5.7	4.5	7.1
Wildlife watching	8.0	6.4	5.5	6.7	4	6.1
Visiting waterfalls	22.5	14.1	24.5	18.7	17	15.3
Scenery viewing	19.7	19.5	18.7	21.7	14	14.7
Camping	5.0	4.7	3.2	3.1	2.6	4.5
Picnicking	3.7	2.5	3.4	4.5	3.3	6.1
Photography	6.9	8.0	6.8	11.7	9.8	15.0
Swimming	-	1.9	-	0.9	-	0.4
Video watching	0.1	-	0.2	-	0.1	-

Source: TDRI Survey, 1994

9.2 Evaluating Park of Services

Park amenities and services which are most frequently utilized are tranquillity, cleanliness, road safety and garbage bins. Apart from road conditions, most major amenities mentioned earlier were rated either good or very good by half of the visitors or more (Table 9.2). Road conditions were rated poor by the majority of users. Park information was not required at any great intensity but visitors felt that there should be more sites where information could be found. This is easily solved if there are small service centers at the entrances.

9.3 Requirements of New Services

More than two thirds of the visitors expressed their demand for more animal observation towers, suspension bridges, bird watching sites and the development of new attractions (Table 9.3). About half of the visitors demanded transport services from the entrance to the service centers, the expansion of the camping site and improvement in the facilities at the camping site.

The majority of the tourists who demand additional services are willing to pay user charges for each service. Except for the development of new sites, very few visitors were resistant to paying additional charges for new services.

In conclusion, park visitors currently expect a narrow range of services from the Park and consequently felt that apart from road conditions, the services provided were quite adequate although the quality of services could be improved. Contrary to the general attitude adopted by the government, park visitors are very willing to pay for individual and incremental man-made services provided by the Park Authority.

Table 9.2 Evaluation of park services.

Services	Level of Satisfaction				
	Non-users (% of respondents)	Users (% of users)			
		Very good	Good	Fair	Bad
Accommodation	63.5	10.1	56.9	26.6	6.4
Food/beverages	32.1	2.6	43.9	47.6	5.9
Rest rooms					
- adequacy	15.2	3.1	42.6	40.4	13.9
- cleanliness	18.9	1.7	28.7	48.3	21.3
Road conditions	1.1	0.7	17.5	27.2	54.6
Garbage bins	4.6	5.9	47.3	30.1	16.7
General cleanliness	0.7	4.0	55.8	31.2	9.0
Information service					
- Maps	65.2	3.6	43.0	26.7	26.7
- Tourist sites	53.0	4.7	48.9	30.7	15.7
- Audio visual service	89.5	5.0	54.0	28.0	13.0
Information service sites					
- Adequacy	38.1	0.5	28.8	36.5	34.2
- Quality of services	51.8	5.1	52.5	25.1	17.3
Animal observation tower	85.3	2.8	64.0	28.0	5.2
Animal viewing (night)	86.1	5.3	56.8	26.5	11.4
Tranquillity	0.3	14.3	61.5	16.4	7.8
Safety	2.3	3.8	60.3	29.4	6.5
Scenery viewing sites	27.8	8.9	57.2	26.3	7.6

Note: Number of sample = 948

Source: TDRI survey, 1994

Table 9.3 Demand for new services.

Type of service	*% of those demanding new service*	*Demand by payment method (% of respondents)*		
		Paid with entrance fee	*Individual user charge*	*Unwilling to pay any fee for incremental services*
Animal observation - platform	75.0	24.6	48.0	2.4
Suspension bridge and - bird watching site	71.7	26.6	41.5	3.6
Sightseeing transport- within the park	52.3	12.9	39.0	0.4
Transport service from- maingate to the tourist- center	44.1	11.5	31.8	0.8
Camping site (space)	52.1	11.8	38.6	1.7
Improved facilities at- camping site	53.7	10.4	42.5	0.8
Development of new- attractions	66.0	30.0	29.5	6.5

Note: Number of sample = 948

Source : TDRI survey, 1994

X. Reconsidering the Entrance Fee

The Royal Forest Department has not increased the current entrance fee at Khao Yai in over a decade. The current fee structure is not rational in the sense that the same individual may pay vastly different amounts depending on the mode of transportation he or she uses to enter the park. (Differentiating payment by vehicle type makes sense for a toll road, but not for visitors to enjoy park services and amenities.) Currently, the average entrance fee is about 5 baht per person which is comparable to the fee charged for most government-run parks and tourist services. It has been shown in chapter 8, that the actual cost of servicing tourists exceeded the user charge by 80 percent. In this section, we examine visitors' stated willingness to pay a higher park entrance fee for the current level of services and for an improved level of services.

10.1 WTP a Higher Entrance Fee for Current Services

As part of the same survey of park visitors described above, enumerators said to visitors:

"Now I would like to ask you about the value of the Park. Please answer only for yourself. Your response will not affect the fees paid by either Thai or international visitors."

Then enumerators asked respondents either

"What is the maximum you would be willing to pay for yourself if the Park Authority were to increase the entrance fee?"

or

"Assume that all Park services remain at their current level. If the Park Authority needs to increase the entrance fee, would you be willing pay (50 or 100) baht for yourself?"

The average WTP was 22 baht per person per visit. There were 259 out of 946 respondents who refused to pay any increase in the entrance fee. Interestingly, there were only 17 protest bids representing visitors who felt the government should subsidize the service. Most of those unwilling to pay an increase in the fee felt it was simply "too expensive."

While the entrance fee bids do not require the same extensive testing and validation that the contingent valuation bids did, it would be useful to understand the determinants of these bids. Conceptually, the entrance fee may be considered the price of a multi-attribute good (the park) which provides several services (such as rest room facilities, roads, park information materials, trails and viewing points, etc.) and amenities (such as waterfalls, birds for watching, lush jungle, camping, etc.). Therefore, when we construct a model to explain visitors' WTP a higher entrance fee, we must consider aspects of not only respondents' income and their interview environment but also features of their consumption patterns (such as frequency and duration) as well as features of the good they will consume.

Similar to the WTP model presented earlier, the model for the entrance fee includes the variables: visitor's income, dummy for starting points, dummy for the presence of a listener, the duration of visit.

For these variables, we posit the following hypotheses. Assuming the park is a normal good, relatively higher incomes should be positively correlated with WTP. For psychological reasons discussed in Chapter 5, we expect the dummy variable on the starting point to be positively correlated with WTP. Since the park is a public good (perhaps even a merit good) we would expect a presence of the listener to be positively correlated with WTP. A longer visit may indicate a stronger preference for the good and thus should be positively correlated with WTP.

In addition we examine the effects of the quality of services and amenities demand on the WTP an increased entrance fee. These variables are: quality of park roads, quality of trails/view points, quality of maps, availability of trash receptacles, demand for hiking, demand for bird watching, demand for waterfalls, demand for scenery.

For all of the services we expect WTP to be positively correlated with their perceived quality. Similarly we expect the demand for amenities within the park to be positively correlated with WTP.

We present the results in Table 10.1 Of those variables with significant t-statistics (5 percent level), all have the correct sign, except the demand for park amenities. Income correlates positively with WTP only at the higher levels, however other key variables are measured with a high degree of confidence and are in the predicted direction. The variables for viewing scenery and waterfalls are highly significant with incorrect signs. Perhaps those people who view water falls and scenery are inactive tourists who treat national parks like public parks. In Thailand there is no entrance fee for public parks.

10.2 WTP Increases in the Entrance Fee for Improved Services

We then examined visitors' WTP a higher entrance fee in return for a higher level of service. After the same statement given above, enumerators told visitors:

"Assume that the Park Authority planned to make improvements in the following services:

1) Quality of existing roads,
2) Collection of litter and general cleanliness of the Park,
3) Provision of park maps and information, and
4.) Better enforcement of park rules."

Enumerators then asked the visitor either

"What is the maximum you would be willing to pay for yourself if the Park Authority increases the entrance fee after making the following improvements?" _____

or

"Would you be willing to pay an increased entrance fee of (50 or 100) baht after the above improvements were implemented?"

The average WTP a higher entrance fee for the improved services was 44 baht. Interestingly, only 58 people refused to pay any increase in the entrance fee when improved services were provided — remember that 259 refused to pay any increase for the current level of service. There were only nine respondents who gave protest bids, four of whom said they

paid taxes that should cover the improvements and seven of whom did not believe the improvements would occur.

Table 10.1 OLS estimation WTP a higher entrance fee for current and improve service.

Variable	*Current level of service*		*Improved level of service*	
	Coefficient	*t-stat*	*Coefficient*	*t-stat*
Constant	22.1510	5.020	43.4580	5.868
Nearby province	-5.3759	-2.788	-8.9719	-2.772
Starting bid high	8.2183	4.278	19.3234	5.993
Income	$-0.411 * 10^{-3}$	-1.799	$-0.325 * 10^{-3}$	-0.847
Income squared	$0.105 * 10^{-7}$	2.714	$0.113 * 10^{-7}$	1.735
Length of stay	1.9728	1.624	2.8233	1.385
Presence of listener	-3.6537	-2.088	-7.6659	-2.611
Quality of interview	0.2244	0.124	3.0368	0.999
Bird watching	3.0299	1.575	2.1107	0.654
Trekking / Hiking	0.6813	0.348	1.2292	0.374
Visiting waterfalls	-8.3397	-2.923	-11.6437	-2.432
Viewing scenery	-2.1705	-1.004	-6.3841	-1.759
Satisfaction score	1.2342	3.880	1.6027	3.002
No. of observation	938		938	
R-squared	0.09		0.09	
Adjusted R-squared	0.08		0.08	
F-test (12,925)	7.4661		7.9356	

Source: TDRI, 1994

Here we use the same model and set of hypotheses that we used for the OLS estimation of WTP for current services. The results for the two estimations (Table 10.1) are very similar. The complete model's R^2 is 0.09. These results strongly suggest the possibility of extracting higher revenue from user charges.

In Thailand it is customary that public parks in the urban areas have no admission charges and user charges for all national parks are set at 5 baht per head regardless of actual cost of maintenance and protection resulting in resource degradation. This practice ignores the willingness to pay of visitors which varies with the natural beauty and endowments of individual parks and forgoes opportunities to increase income for the park. We strongly recommend that the Royal Forest Department reconsider its single-price policy and allow each: park to establish it's own price for the admission. Our findings for Khao Yai suggest that when appropriately priced, the increase in income, assuming that the 27 percent of users (who protested the fee increase) would cease to visit the park, the new entrance fee would generate income totaling 15 million baht to the Park. This would pay for the cost of both tourism services and protection. For low income groups, the Park could allow free admission on Children's day, Labor Day and some religious days.

XI. Estimating WTP and Entrance Fee of Foreign Visitors

What are other avenues for national park financing? Ecotourisim has been advocated by the Thai government as a new avenue for seeking foreign exchange from tourism. Khao Yai is one of the parks that has potential for attracting foreign tourists as it is well known as an international bird watching site. However at present, the number of foreign visitors to Khao Yai is not large and accounts for only about 1.5 percent of total visitors to Khao Yai.

A total of 51 foreign visitors to Khao Yai and 102 foreign tourists who have not been to Khao Yai were interviewed using questionnaires similar to those used for the Thai visitors. Foreign visitors were interviewed at the site (Khao Yai) and non-users were interviewed at the international airport in Bangkok prior to their departure. We hypothesize that foreign WTP exists but is lower than the WTP of Thai nationals.

As expected WTP of both foreign users (551 baht) and non-users (121 baht) are below those of their Thai counterparts (730 and 183 baht respectively), especially with respect to relative levels of income. Of the foreign park users, about 40 percent were not willing to pay any amount at all. Foreign non-users were willing to pay on average only 121 baht per year to protect Khao Yai. This is not surprising as almost 70 percent of the non users have never heard of Khao Yai. Another six percent knew of Khao Yai but indicated no intention to visit the park (Table 11.1)

The validity test for the non-users' sample is provided in Table 11.2. Income and age are the only two socio-economic variables used. Both variables have the correct signs. In addition, those who have read about Khao Yai showed a greater willingness to pay. For non-users, the quality and the environment of the interview have somewhat affected WTP but not the starting bid value.

Table 11.1 Foreign non-users classified by knowledge of the park.

Knowledge of Khao Yai	Number	Percent
Never heard of Khao Yai	69	67.6
Know of Khao Yai and no intention to go	6	5.9
Never visited Khao Yai but intentded to visit	16	15.7
Uncertain	11	10.8
Total	**102**	**100.0**

Suorce: TDRI survey, 1994

Table 11.2 Estimation for contingent valuation model of foreign non-user.

Variable	OLS		Tobit	
	Coefficient	t-stat	Coefficient	t-stat
Constant	208.752	2.008	-118.013	-0.316
Income	$0.238 * 10^{-2}$	2.219	$0.67 * 10^{-2}$	1.962
Age	-6.972	-2.125	-16.343	-1.689
Information	132.231	1.969	472.602	2.382
Preferred activity (trail&camping)	58.314	1.245	85.386	0.487
Quality of interview	100.326	1.557	281.297	1.815
Presence of listener	-34.251	-0.841	-53.858	-0.293
No. of observations	80		80	
R-squared	0.17		-	
Adjusted R-squared	0.10		-	
F(6,73)	2.5195		-	
Log-Likelihood	-551.0324		-243.91	
Constant Log-L (for=0)	-558.5569		-558.5569	
Mc Fadden R-Squared	-		0.563	

Source : TDRI, 1994

For foreign visitors (Table 11.3), dummy variables for the amenities in the park used by foreign park visitors and the duration of their visit have been included. None of these variables are statistically significant. This could also reflect the fact that they were not very impressed with the amenities.

Table 11.3 Estimation for contingent valuation model of foreign park user.

Variable	*OLS*		*Tobit*	
	Coefficient	*t-stat*	*Coefficient*	*t-stat*
Constant	-573.705	-1.549	-1394.97	-2.184
Income squared	$0.149 * 10^{-6}$	2.632	$0.23 * 10^{-6}$	2.544
Age	25.664	3.145	35.034	2.804
Starting bid-high	-37.552	-0.207	-106.387	-0.361
Lenght of stay	-64.081	-1.219	-68.366	-0.807
Bird watching	-25.950	-0.159	-15.911	-0.060
Trekking \hiking	188.926	0.911	178.087	0.583
Water fall viewing	58.391	0.293	-12.144	-0.033
Quality of interview	452.231	2.952	878.146	2.725
Presence of listener	-487.441	-2.238	-823.906	-2.930
Viewing scenery	-87.521	-0.410	-45.836	-0.168
No. of observations	51		51	
R-squared	0.42		-	
Adjust R-squared	0.27		-	
F(10,40)	2.889		-	
Log-Likelihood	-394.2083		-259.53	
Constant Log-L (for=0)	-408.0691		-408.0691	
Mc Fadden R-Squared	-		0.364	

Source : TDRI, 1994

When foreign visitors were asked what they were willing to pay to enter Khao Yai, they expressed a willingness to pay a much higher entrance fee or user charge than Thai visitors i.e., 125 baht versus 22 baht for the entrance fee at current service level and 143 baht versus 44 baht for the entrance fee if services were improved (Table 11.4).

Table 11.4 WTP of Foreign Visitors.

Item	Non Users	Users
Number of tourists interviewed	102	51
Average WTP to protect Khao Yai (baht/year)	121	551
Percent of WTP bids equal to zero	68.6	41.9
Average WTP to increase entrance fee at current service (baht/year)	-	125
Mode WTP for entrance fee at current service (baht/year)	-	50
Average WTP to increase entrance fee after services are improved (baht/person)	-	143
Mode WTP for entrance fee after services are improved (baht / person)	-	100

Source : TDRI Survey, 1994.

On the basis that there are 12,000 foreign visitors a year on average (for the last three years), the increase in entrance fee from 5 to 50 baht would increase Khao Yai's revenue by 600,000 baht or 20 percent of the current yearly average. For foreign tourists who demand greater access to the protected areas or library services (which do not exist at present) a user fee up to 150 baht could be charged. We strongly recommend that Royal Forest Department seriously considers differential pricing for entrance fee. The increment in income from foreign tourism could be used to finance biodiversity research which is grossly underfunded. Increased knowledge of the biodiversity of the park would enhance the values and benefits of Khao Yai for future generations.

XII. Summary of Findings, Conclusions and Policy Recommendations

With advancing deforestation and growing environmental awareness, governments around the world have been expanding their protected areas and national parks in an effort to preserve a representative part of their natural endowment and its biological diversity. Thailand has been in the forefront of conservation efforts, expanding its national park area by over 40 percent between 1987 and 1992. At present, protected areas account for about 15 percent of the country's total land area and there are efforts under way to increase the protected area to 25 percent. As in other countries, the budget allocated to effective protection of the national parks and other "protected areas" does not increase proportionately. The result is that the expansion of protected areas is accomplished at the expense of effectiveness of protection. Even where protection budgets are increased proportionately, resources might still be inadequate because protected areas and even national parks in the developing world have been historically underfunded and underprotected. Encroachment, logging, and wildlife poaching in national parks in developing countries is not uncommon.

Governments are generally reluctant to allocate more funds to conservation and forest protection because the benefits are not very obvious (and are often underappreciated) while the opportunity costs are generally high because of other pressing development priorities. It is therefore of critical importance that the benefits from nature conservation and protection be estimated in order to determine the level of public expenditure that is justified by the public goods aspect of conservation. Furthermore, some of the benefits of conservation, such as recreation and tourism, are of a private-good nature or can be priced despite their public good aspects. Hence, part of the costs of conservation and protection can be financed through the appropriate pricing of access or entitlement to benefits.

Khao Yai, Thailand's oldest and most popular park, was used as a case study of how the benefits from nature conservation can be estimated and used as a basis for developing financing mechanisms for effective protection and improvement. The first

objective was to determine the total economic value of the Park, which consists of both direct and indirect values as well as option and existence values. The second objective was to propose revenue-increasing measures to appropriate part of the Park's economic value to finance the Park's protection and service provision. The third objective was to identify management options and Park improvements that would increase the benefits from the Park and could be self-financed.

The direct use value of the Park includes ecotourism, biodiversity prospecting, and educational and scientific tourism. The indirect use value includes watershed protection, carbon sequestration, and micro-climatic benefits. The value of these benefits are measured by the beneficiaries' willingness to pay to ensure the continuation of these benefits rather than to do without them. In addition, both users and non-users of park services may be willing to pay for preserving the option to use the Park in the future (option value) or even for its mere existence (existence value).

Ideally, one estimates all these values and sums them up to arrive at the total economic value of a natural asset such as the Khao Yai Park. Unfortunately, time, budget, and data constraints limited our detailed investigation to the direct use value of the Park, primarily as a source of ecotourism services and secondarily as a source of educational and scientific services. The value of the Park as a watershed, its favorable micro-climatic effects, its carbon sink function, and its potential for biodiversity prospecting have not been assessed, but are believed to be considerable. We did, however, assess both the option and existence values of Park visitors as well as those of non-visitors.

12.1 Main Findings

Our main findings, based on interviews with park officials and a survey of 948 users and 1057 non-users, employing the travel cost and contingent valuation methods, are as follows:

1) The cost of Park maintenance and protection has risen by 25 to 30 percent annually during recent years while cost-recovery over the same period has dropped from 51 to 30 percent.

2) The current direct cost of providing services to tourists (6 baht) exceeded the user charge the entrance fee (5 baht). When the indirect cost of providing tourism

services (i.e., cost of protection of wilderness) is included, the total cost of providing services to tourists amounts to 9 baht per head.

3) Using the travel cost method which provides an estimate of direct benefits to park users, we found that visitors' total willingness to pay per visit was 1,420 baht, of which 240 baht was travel cost, 310 baht was expenditure for accommodations, food, and tour guides and 870 baht was consumer surplus or the visitors' net gain or satisfaction from the visit.

4) Thai visitors to Khao Yai are on average willing to pay 22 baht per head per trip to enter the Park, compared with a current entrance fee of 5 baht per head per trip.

5) Thai visitors of Khao Yai are further willing to pay an average of 730 baht per head per year to ensure the continued existence of Khao Yai and to preserve their option to use it in the future.

6) Thai non-visitors, on the other hand, are willing to pay an average of 183 baht per head per year for the option and existence value provided by the Park. The average option value for those expecting to visit the Park in the future was estimated at 196 baht/year.

7) The total economic value of Khao Yai to Thai visitors and non-visitors taken together stands today at 3,080 million baht per year or a present value of 30 billion baht assuming a 10 percent discount rate. This is clearly a lower bound since many other significant benefits have been left out and our the population surveyed include only urban residents. Based on projected GNP growth of 8 percent per annum and income elasticity of 0.3, the total economic value of the Park is expected to grow over time at the rate of 2.4 percent per annum.

8) The services that visitors reported to be inadequate and in need of improvement included road maintenance, the number and cleanliness of toilets, the availability of waste receptacles and the availability of information on park trails, flora, and fauna.

9) The users' average willingness to pay for access to Khao Yai rises from 22 baht to 44 baht per head per trip for improved services such as road improvements, increased cleanliness, and upgraded information.

10) Two-thirds of the park visitors express demand for more animal observation towers, suspension bridges, bird watching sites and the development of new

attractions. About half of park visitors surveyed expressed demand for transport services from the entrance to the service centers and expansion and improvement of camping sites; contrary to general government attitude, park visitors were willing to pay for individual and incremental, man-made services provided by the park.

11) Income from vehicle entrance fees (about 3 million baht) accounts for 80 percent of the park's revenues and suffices to finance the maintenance of roads for traffic using Khao Yai as a thorough-fare. However through-traffic generates little net economic benefit (0.5 to 0.6 million baht); the 3,000 trucks that use Khao Yai as a thorough-fare each year are responsible for much of the road damage, noise and air pollution in the Park, yet contribute only 90,000 baht or 3 percent of the total entrance fee revenues.

12) The opportunity costs of Khao Yai Park's 1.36 million rai of forest, in terms of net present value of forgone harvests of forest products is estimated between 1,650 and 3,300 million baht. The opportunity cost of the land, given current land price of 20,000 baht per rai (for the least accessible and untitled land in the vicinity of the park) is at least 28,000 million baht. It is worth noting that the estimated economic value of the park (in net present value terms) compares favorably to these opportunity costs despite the omission of substantial additional benefits from conservation.

13) While only a few foreigners (non-Thai citizens) visit Khao Yai, accounting for only 1.5 percent of the total number of visitors, their willingness to pay to access Khao Yai (50 to 125 baht per/person/trip) is two to five times as high as that of Thai users for the current level of service. For an improved level of service they are willing to pay 100 to 143 baht/person/trip. The non-use values of both users and non-users are respectively 551 baht/person/year and 121 baht/person/year.

14) The creation and protection of the park, while beneficial to the society at large, has resulted in significant loss of income and employment opportunities, due to reduced access to forest resources (for agriculture, timber and other forest products) worth about 165 - 330 million baht annually. Only limited employment opportunities were created by the park for local people, mainly as trekking porters and as employees in hotels, golf courses, and restaurants in areas adjacent to the Park's entrance.

12.2 Conclusions

A number of conclusions may be derived from the above findings. First, the Park is clearly underpriced and underutilized. Second, Government subsidization of about two-thirds of the Khao Yai budget is inadequate to offset capital and operating costs not covered by park revenues, thus resulting in poor maintenance and gradual deterioration of facilities. Furthermore scientific research on the biodiversity and forest ecology of the Park is grossly underfunded.

Third, Park encroachment and poaching, while declining because of stricter enforcement and increased dependence on commercial agriculture and urban employment, is clearly a response to the substantial welfare loss suffered by the 224 villages in the proximity of the Park; their loss was not offset by the meager employment opportunities for local people created by the Park. In this sense, the creation of the Park was regressive as it transferred wealth from low-income villagers to resort-owners, tour-operators and better-off tourists.

12.3 Policy Recommendations

The above findings and conclusions have several important policy implications for the pricing of the services of Khao Yai Park and its protection and management. After careful consideration of each policy implication in light of the political, economic, and social realities of Thailand, we advance the following policy recommendations:

1) The entrance fee for Thai visitors to the Park should be raised from the current 5 baht to 20 baht per person per visit in line with the visitors' average willingness to pay. Based on an average of 1 million visitors eash year and an estimated 27 percent drop in visits due to rate increase, we project fee revenues at the level of 15 million baht, an amount sufficient to cover the cost of Park protection and current levels of service provision including maintenance of facilities. The revenues can be further increased (without a drop in visitors) by differentiating the entrance fee according to the number of nights of stay: those who stayed longer than a day were found to be willing to pay 4 baht more per person per trip.

2) The entrance fee for foreign visitors should be set at least at 50 baht per person per visit and possibly higher (the mean WTP justifies a 125 baht fee but the mode was only 50 baht). A differential entrance fee between local residents and foreigners is common in

countries with significant ecotourism such as Kenya and Costa Rica, as both the WTP and the demand elasticity vary significantly, because of different income levels and preferences.

3) In addition to raising the entrance fee, the Park Authority may attempt to capture a larger share of the visitors' expenditures during the stay in the Park by providing additional services such as low-impact lodging, improved food services, and transit between the entrance and the park center. The Park Authority could also attempt to capture a part of the visitors' substantial consumer surplus (870 baht per visit) through a differentiated yet simple tariff structure.

4) Significant expenditures up to 2.2 million baht a year are justified for improving Park protection and tourist facilities. In particular, road improvements, proper waste disposal, improved sanitation, increased information services, and Park rule enforcement will increase visitors' willingness to pay and justify a second increase of entrance fees to at least 40 baht per person per trip.

5) All food, drink, souvenir and other concessions could be awarded through a competitive bidding process, subject to specified rules of operation, to maximize Park revenues.

6) A refundable deposit for bottles, cans, plastic bags, and packages of food and drink sold by the concessionaires is recommended to encourage return after use and reduction of littering. The concessionaire should agree as part of the bidding price to accept and refund the deposit on similar items found within the Park regardless of their origin. Simultaneously, the Park Authority should institute a heavy fine for littering within the Park.

7) We strongly recommend the establishment of a Khao Yai Protection Fund which would solicit contributions from Park users and non-users, both local and foreigners, for the specific purpose of protecting the Park from poaching, encroachment and forest fires. Our study suggests that up to 3 billion baht per year can be raised from domestic sources alone. Another option is to issue transferable conservation rights and to market them widely at home and abroad to foundations, NGOs, corporations, nature lovers, and the general public. The proceeds from such a fund should be earmarked for the protection and expansion of the Khao Yai Park as well as the support of scientific research on its forest ecology and biodiversity.

8) In light of the limited economic benefits from through-traffic and the likely disturbance to the wildlife, the option of closing the road to through-traffic should be

considered. Alternatively, the road could remain open to through-traffic but six-wheel trucks should be excluded and all vehicles allowed should be charged both a vehicle toll (at the current rate) and an entrance fee per person (including the driver) at the proposed higher rate. This policy would discourage through-traffic except for persons with a high opportunity cost of time or a high appreciation for the scenic route through the Park.

9) The Park Authority may want to undertake further studies of the feasibility and financial viability of investments in animal observation towers, suspension bridges, bird watching sites, transport services from the Park entrance, new camp sites, and other attractions. Our study suggests that visitors would be willing to pay the cost of using such facilities as a user charge. We have not, however, estimated the rate of the charge and the level of use that would justify these investments. Further study in this regard is needed and can be most appropriately undertaken or sponsored by the Park Authority.

10) Further research is needed to estimate the watershed and micro-climatic benefits of the Khao Yai Park and to explore the scope for a possible watershed charge on the beneficiaries in order to augment the Khao Yai Protection Fund. Similar watershed charges have been implemented in Indonesia and Costa Rica, among other places.

11) We recommend investigation of the potential market demand for bioprospecting in Khao Yai, including willingness to pay, potentially interested parties, and the experience of other countries (e.g., Costa Rica) with bioprospecting arrangements and their implementations in practice.

12) Finally, further research in needed to investigate how a larger share of the economic benefits of ecotourism could be distributed to the populations of the 224 villages around the Park, especially in those villages in which the opportunities for commercial agriculture and urban employment are limited and hence, the incentives for poaching and encroachment are high. One possibility is to use a part of the Khao Yai Protection Fund to finance the development of new income and employment opportunities in villages with intense forest use, such as the sampled villages in Prachinburi, Saraburi and Nakhon Nayok. Given the findings that 1) the value of the land as a national park is in the competitive range with other land uses and 2) the existence of significant additional benefits from carbon sequestration, we recommend that the Park Authority explore opportunities for jointly implementing carbon offset projects financed by developed country utilities in degraded areas of the Park and in surrounding lands of low opportunity cost. Already, there is a pilot-project of thiskind in the area sponsored by the United States Agency for International Development.

Such projects promise to generate employment opportunities and other local development benefits as well as global environmental benefits.

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Appendices

Appendix A

Non-User Survey

for the Project

Green Finance: A case Study of Khao Yai National Park

Conducted by the

Royal Forest Department

and the

Thailand Development Research Institute Foundation

May 1994

<u>Important</u> : Before starting the interview, make sure that the respondent has never been to Khao Yai

Introduction *: I am conducting a tourist survey on behalf of the National Park Division of the Royal Forest Department and the Thailand Development Research Institute. Your opinion and the information provided will be used to improve the management of Khao Yai National Park. Therefore, your honest response essential for the success of this project and for the future of Khao Yai.*

Sampling Point: ❍ 1. Airport ❍ 2. Pattaya ❍ 3. Other (specify)

Country of Residence:_____

Name of Interviewer: _____ **Date** _____

Reviewed by _____

Part I General Information

1. Gender of respondent: ❍ 1. Male ❍ 2. Female

2. Age:_____ years

3. Marital status: ❍ 1. Single ❍ 2. Married ❍ 3. Widower / Separated / Divorced

4. Occupation:

   ❍ 1. Government employee ❍ 2. Business person ❍ 3. Private employee
   ❍ 4. Laborer ❍ 5. Student ❍ 6. Retired
   ❍ 7. Non- working spouse
   ❍ 8. Other (specify) _____

5. Education:
   ❍ 0. None ❍ 1. Primary ❍ 2. Secondary
   ❍ 3. Technical diploma ❍ 4. Bachelor or higher degree
   ❍ 5. Other (specify) _____

6. Monthly Income
   ❍ 0. None
   ❍ 1. 0-2,500 Baht (US$0-100)
   ❍ 2. 2,501-7,500 Baht (US$101-300)
   ❍ 3. 7,501-15,000 Baht (US$301-600)
   ❍ 4. 15,001-25,000 Baht (US$601-1,000)
   ❍ 5. 25,001-50,000 Baht (US$1,001-2,000)
   ❍ 6. 50,001 Baht (US$2,001) and above

7. Number of members in the household: _____ persons (include only those who actually live together for longer than six months a year)

8. Number of earning members in the household: _____persons

9. What is your status in the household?
   ❍ 1. Head (go to Q.13) ❍ 2. Spouse ❍ 3. Son/Daughter
   ❍ 4. Relative ❍ 5. Live-in ❍ 6. Other (specify) _____

10. What is the occupation of the household head?
    ❍ 1., Government employee ❍ 2. Business person ❍ 3. Son/Daughter
    ❍ 4. Laborer ❍ 5. Student ❍ 6.Retired
    ❍ 7. Non-working spouse ❍ 8.Other (specify) _____

11. What is the highest level of education of the household head?
    ❍ 0. None ❍ 1. Primary ❍ 2. Secondary
    ❍ 3. Technical diploma ❍ 4. Bachelor or higher degree
    ❍ 5. Other (specify) _____

12. In which of the following income brackets dose the ,monthly income of the household head fall?
    - ❍ 0. None
    - ❍ 1. 0-2,500 Baht (US$0-100)
    - ❍ 2. 2,501-7,500 Baht (US$101-300)
    - ❍ 3. 7,501-15,000 Baht (US$301-600)
    - ❍ 4. 15,001-25,000 Baht (US$601-1,000)
    - ❍ 5. 25,001-50,000 Baht (US$1,001-2,000)
    - ❍ 6. 50,001 Baht (US$2,001) and above

13. Is your current residence a..
    - ❍ 1. house owned by yourself? ❍ 2. a rental house?
    - ❍ 3. a relative's/friend's house ❍ 4. Other (specify) _____

Part II: Information about Khao Yai

14. Have you even heard the words "National Park" And do you know their meaning?
    - ❍ 0. No, I've never heard of it.
    - ❍ 1. Yes, I have,but do not know its meaning.
    - ❍ 2. I know its meaning
    - ❍ 3. Other (specify) _____

15. Have you ever heard about "Khao Yai National Park" And do you expect to visit there in the future? (inquire until a clear answer is reached)
    - ❍ 0. No, I've never heard of it (go to Q.18)
    - ❍ 1. Yes, I expect to visit there in the future
    - ❍ 2. Yes, but I do not expect to visit there in the future
    - ❍ 3. Yes, but I cannot tell I will visit it or not
    - ❍ 4. Other (specify) _____

16. How did you first learn about Khao Yai? (tick in more than one box if required)
    - ❍ 1. Print media ❍ 2. Friends/relatives/family ❍ 3. Radio
    - ❍ 4. Television ❍ 5. Travel agencies ❍ 6. TAT brochures
    - ❍ 7. Other (specify;e.g. school, club)

17. Has anyone in your family visited Khao Yai?
    - ❍ 1. Yes ❍ 2. None ❍ 3. Don't know/Not sure

18. Apart from Khao Yai, have you visited any other natural recreation area in Thailand?

❍ 1. Yes (specify the name of the most frequently visited place) _____
Province _____

❍ 2. No

❍ 3. Other (specify)_____

19. If you have chance to visit a national park, What activities would you like to do there,and rank three of these in the order of their importance to your visit to a national park.

Activity	*Planned (check box)*	*Rank*
1. Leisure walk		
2. Trekking/hiking		
3. Bird-watching		
4. Wildlife watching		
5. Visiting waterfalls		
6. View scenery		
7. Camping		
8. Picnicking		
9. Photography		
10. Other (specify)		

Part III. Willingness to pay

Interviewer : Before asking the next questions, tell the respondent that the purpose of these questions is to find out the value of Khao-Yai National Park to the respondent for policy input and management approach. Remind the respondent to value the park on the basis of constraint and taken in to account substance goods. *Allow the respondent sufficient time to think before answering. Do not make any suggestions about possible answers.*

20. Khao Yai is one of Thailand's largest national parks that is enjoyed by over a millionvisitors each year. It is also one of the most important watersheds in the Northeast, that helps maintain a balance in the natural ecosystem. Khao Yai has many beautiful natural features such as mountains, tropical forests and waterfalls, and a number of rare species of plants and animals such as gibbons, horn-bills, gaurs and elephants.

At present, however, the park is facing a number of serious, such as poaching, encroachment, forest fires, and a competing demand to use Khao Yai for other purposes such as commercial logging and human resettlement, as well as paucity of budget and manpower for park improvement.

Assume that in order to protect the Park from these threats and to save it for our as well as the coming generations, the Park authority and international organization (such as the World Wildlife Fund) have decided to set up a fund and appealing to people to become members and contribute a certain amount each year to the fund.

Would you be willing to become a supporting member of this organization and make an annual financial contribution of **US$ 10 (~250 Baht)** to the fund to protect the Park?

❍ 1. Yes, I am willing to become a member, and contribute _____baht/year

❍ 2. Yes, I am willing to become a member, but I can contribute only one time ___ Baht

❍ 3. Yes, I am willing to become a member, but I will not make any financial contribution, because _____

_____

_____

❍ 4. No, I am not willing to become a member, because _____

_____

_____

21. How would you like to make your financial contribution?

❍ 1. By auto-transfer from my bank account ❍ 2. By mail

❍ 3. Together with the annual income tax payment

❍ 4. By depositing to the fund's bank account

22. Please give your suggestions / remarks, if any, on Khao Yai National Park

_____

_____

_____

_____

To be filled in by the interviewer after the interview:

23. Please indicate the quality of this interview:

❍ 1. Excellent/Good ❍ 2. Fair ❍ 3. Poor

24. Were there listeners present during the interview?

❍ 1. Yes ❍ 2. No

25. Interviewer's remark / notes (if any): _____

_____

_____

_____

Appendix B

Park-User Survey

for the Project

Green Finance: A case Study of Khao Yai National Park

Conducted by the

Royal Forest Department

and the

Thailand Development Research Institute Foundation

February-March 1994

***Important*: Before starting the interview, make sure that the respondent is a visitor.**

***Introduction**: I am conducting a tourist survey on behalf of the National Park Division of the Royal Forest Department and the Thailand Development Research Institute. Your opinion and the information provided will be used to improve Khao Yai National Park. Therefore your honest response is essential for the success of this project and for the future of Khao Yai.*

Name of Interviewer: _____ **Date:** _____
Reviewed by: _____

Sampling Point: ○ 1. Heo Narok ○ 2. Heo Suwat ○ 3. Campsite ○ 4. Visiting Center

Valuation Method: **Open-Ended**

I. Visitor's Recreation Behaviour

1. Have you just arrived in Khao Yai?
   ❍ 1. Yes ❍ 2. Yes, and I intend to make just one stop in Khao Yai
   ❍ 3. No, I have been here for some time already ❍ 4. No, I am leaving
2. How many times have you visited Khao Yai, including this trip? _____times.
3. Excluding this trip, how many times did you visit Khao Yai during the last one year? _____times.
4. How did you first learn about Khao Yai? (tick in more than one box if required)
   Through:
   ❍ 1. Print media ❍ 2. Friends/relatives/family ❍ 3. Radio
   ❍ 4. Television ❍ 5. Travel agencies ❍ 6. TAT brochures
   ❍ 7. Other (specify; e.g. school, club) _____
5. Apart from Khao Yai, have you visited any other natural recreation area in Thailand?
   ❍ 1. No (*Go to* **Q. 7**)
   ❍ 2. Yes (specify the most frequently visited location) _____
6. What transportation mode(s) did you use to visit the place mentioned in Q. 5 above?
   ❍ 1. Air ❍ 2. Train ❍ 3. Bus (air-con./ordinary)
   ❍ 4. Rented vehicle (specify type, e.g., car, pick-up truck, van, etc) _____
   ❍ 5. Private vehicle (specify type, e.g., car, pick-up truck, van, etc) _____
   ❍ 6. Other (specify) _____

7. Please indicate the activities you have done or planned to do in Khao Yai during the present trip, and rank three of these in the order of their importance to your visit to Khao Yai.

Rank	*Activity*	*Done/Planned*	*Problems/Suggestions*
	1. Leisure walk		
	2. Trekking/hiking		
	3. Bird-watching		
	4. Wildlife watching		
	5. Visiting waterfalls		
	6. View scenery		
	7. Camping		
	8. Picnicking		
	9. Photography		
	10. Other (specify) _____		

8. Which of the following places in Khao Yai are you familiar with and which do you plan to visit, or have visited, during the present trip? (Use the map if required.)

Place	*Known*	*Visited*	*Mode of travel*	
			On foot	*By car*
1. Restaurants:				
a. near park headquarters				
b. others				
2. Visiting Center				
3. Park Headquarters				
4. Wildlife observation towers				
a. Maw Sing To				
b. Nong Pak Chee				
5. Waterfalls				
a. Kong Kaew fall				
b. Orchid (Pha Kluay Mai) fall				
c. Heo Suwat fall				
d. Heo Sai fall				
e. Heo Prathum				
f. Heo Narok fall				
g. Tad Ta Phu fall				
h. Tad Manaw fall				
6. Campsite				
7. View points				
8. Other (specify; e.g. trails)_____				

9. Please indicate the degree of your satisfaction with the Park services during the present trip.

Service	*Degree of Satisfaction*					*Comments/ Suggestions*
	Excellent	*Good*	*Fair*	*Poor*	*Not used*	
1. Lodging						
2. Restaurants						
3. Availability of toilets						
4. Cleanliness of toilets						
5. Road conditions						
6. Availability of litter bins						
7. Cleanliness in the Park						
8. Park information						
- maps						
- places of interest						
- slides/video						
9. Information centres						
- availability of centers						
- service						
10. Wildlife observation towers						
11. Night wildlife tours						
12. Peace and quiet						
13. Personal safety						
14. View Points						
15. Other services (specify)						

II. Preference and Willingness to Pay for Services

*(**Important:** Allow the respondent sufficient time to think before answering. Do not make any suggestions about possible answers. The purpose of these questions is to find out the value of the Park to the respondent and her/his willingness to pay for the use of the Park. This may be explained to the respondent if she/he wishes to know the purpose.)*

Now I would like to ask you about the value of the Park. Please answer only for yourself. Your response will not effect the fees paid by either Thai or international visitors.

10. Assume that all the Park services remain at their current level. If the Park authority needs to increase the entrance fee, would you be willing to pay the increased entrance fee, and if so, what is the maximum amount you would be willing to pay for yourself?

❍ 1. Yes, I am willing to pay a maximum of _____ Baht/person

❍ 2. No, the entrance fee should remain the same because_____

11. Assume that the Park authority plans to make improvements in the following:

1. The quality of existing roads,
2. Collection of litter and general cleanliness in the Park
3. Park maps and information , and
4. Enforcement of Park rules

To make these improvements, the Park authority needs to increase the Park entrance fee. Would you be willing to pay the increased entrance fee, and if so, what is the maximum amount you would be willing to pay for yourself?

❍ 1. Yes, I am willing to pay a maximum of _____ Baht/person
*(**Important:** If the answer to Q. 10 is "Yes", the amount above should be higher than that for Q. 10)*

❍ 2. No, the entrance fee should remain the same because _____

_____

12. Now assume that the Park authority is planning to provide some new environment-friendly facilities in the Park. In order to provide these, the Park authority may have to implement user charges for these facilities. For the following facilities, please indicate whether or not you would use the facility and whether or not you would be willing to pay a modest user fee to enjoy the facility.

❍ 1. Yes, I am willing to pay for the following facilities. *(Please tick in the appropriate box/es)*

Facility	***Would Use***	***Willing to Pay***		***Not Willing to Pay***
		As part of entrance fee	***As separate User Fee***	
Tree-top observation platform				
Hanging bridge for bird-watching				
Park tour by Park vehicles				
Shuttle bus service between points of interest inside the Park				
More camping sites				
Fully-furnished camping site/s				
Accessibility to wider area				
Others (specify) _____				

❍ 2. No, I do not want any further developments in the Park because, _____

_____

_____

_____

_____

_____

_____

13. Khao Yai is one of Thailand's largest national parks that is enjoyed by over a million visitors each year. It is also one of the most important watersheds in the Northeast, that helps maintain a balance in the natural ecosystem. Khao Yai has many beautiful natural features such as mountains, tropical forests and waterfalls, and a number of rare species of plants and animals such as gibbons, horn-bills, tigers, gaurs and elephants.

At present, however, the Park is facing a number of serious threats, such as poaching, encroachment, forest fires, and a competing demand to use Khao Yai for other purposes such as commercial logging and human resettlement, as well as paucity of budget and manpower for park improvement.

Assume that in order to protect the Park from these threats and to save it for our as well as the coming generations, the Park authority and an international organization (such as the World Wildlife Fund) have decided to set up a fund and are appealing to people to become members and contribute a certain amount each year to the fund.

Would you be willing to become a supporting member of this organization and make financial contribution to the fund to protect the Park?

❍ 1. Yes, I am willing to become a member and make an annual contribution of _____Baht.

❍ 2. Yes, I am willing to become a member, but not willing to make any financial commitment because, _____

_____

❍ 3. No, I am not willing to become a member, because _____

_____

III. General Information About the Visitor

14. Gender of the respondent: ❍ 1. Male ❍ 2. Female

15. Age:_____years

16. Marital status: ❍ 1. Single ❍ 2. Married ❍ 3. Widower / Separated / Divorced

17. Occupation:

❍ 1. Government employee ❍ 2. Businessperson ❍ 3. Private employee

❍ 4. Labourer ❍ 5. Student ❍ 6. Retired

❍ 7. Non-working spouse ❍ 8. Other (specify) _____

18. Education:

❍ 1. None ❍ 2. Primary ❍ 3. Secondary

❍ 4. Technical diploma ❍ 5. Bachelor or higher degree

❍ 6. Other (specify) _____

19. Monthly income (*if student or unemployed, record parents' or spouse's income*)

❍ 1. 0-2,500 Baht (US$0-100)

❍ 2. 2,501-7,500 Baht (US$101-300)

❍ 3. 7,501-15,000 Baht (US$301-600)

❍ 4. 15,001-25,000 Baht (US$601-1,000)

❍ 5. 25,001-50,000 Baht (US$1,001-2,000)

❍ 6. 50,001 Baht (US$2,001) and above

20. Present address in Thailand: City:_____Region:_____

Nationality:_____Country of residence:_____

IV. Travel Information and Expenditure

21. Are you visiting Khao Yai

❍ 1. Alone

❍ 2. With family/relatives, total _____ people

❍ 3. With a group of friends, total _____ people

❍ 4. In a group of Students, total _____ people

❍ 5. Others, (specify) _____ total _____ people

22. Are you on tour?

❍ 1. Yes, (specify the name of the tour company) _____

❍ 2. No.

23. Is Khao Yai your primary destination?

❍ 1. Yes

❍ 2. No (name the primary destination) _____

24. Did you make any stops on the way to Khao Yai, or are you going to make any on the way back?

❍ 1. Yes (specify the names of the places) _____

❍ 2. No

25. What transportation mode(s) did you use to visit Khao Yai? (tick one or more)
    - ❍ 1. Air ❍ 2. Train ❍ 3. Bus (air-con./ordinary)
    - ❍ 4. Rented vehicle (specify type, e.g., car, pick-up truck, van, etc) _____
    - ❍ 5. Private vehicle (specify type, e.g., car, pick-up truck, van, etc) _____
    - ❍ 6. Other (specify) _____

26. Where did you enter Khao Yai?
    - ❍ 1. Pak Chong Gate (north) ❍ 2. Prachinburi Gate (south)
    - ❍ 3. By trail (specify provincial origin of the trail _____)

27. How long did it take you to reach Khao Yai, excluding the time spent during recreational and overnight stops? _____hours _____minutes

28. Are you staying overnight?
    - ❍ 1. Yes, _____nights
    - ❍ 2. No (*Go to* **Q 30**)
    - ❍ 3. I do not know yet (*Go to* **Q 30**)

29. If you are staying overnight, where are you staying?
    - ❍ 1. Lodge inside the Park ❍ 2. Park Youth Camp
    - ❍ 3. Campsite ❍ 4. Lodge outside the Park (Specify name)_____
    - ❍ 5. I do not know yet

30. Please indicate your expenditure (or estimate thereof) in Khao Yai:

Transportation (one way)	_____	Baht
Park Entrance Fee	_____	Baht/person
Lodging	_____	Baht/person/night
Food and Drinks	_____	Baht/person/day
Information leaflets, etc.	_____	Baht
Souvenirs	_____	Baht/person
Tour guide	_____	Baht/person
Night wildlife tour	_____	Baht/person
Photofilm, developing charges, etc	_____	Baht/person
Renting of tent, etc.	_____	Baht/person
Package tour charges	_____	Baht/person/day
Others (specify)	_____	Baht/person

31. Please give your suggestions / remarks, if any, on Khao Yai National Park.

_____

_____

_____

To be filled in by the interviewer after the interview:

32. Please indicate the quality of this interview:
❍ 1. Excellent/Good ❍ 2. Fair ❍ 3. Poor

33. Were there listeners present during the interview?
❍ 1. Yes ❍ 2. No

34. Interviewer's remarks / notes (if any): _____

_____

_____

_____

Appendix C

Village-Park Interaction

Poaching and park encroachment (deforestation for agricultural land) are often rated among the greatest threats for national parks. On the other hand, most villages were in existence long before the Park boundaries were established. The establishment of the Park has deprived the villagers of their traditional right to the use of the forest and its land resources. At the same time, a national park may offer new employment opportunities as park rangers, eco-tour guides and as small entrepreneurs. The development of tourist resorts adjacent to the Park could also create employment as caddies at golf courses, waiters and waitresses in hotels and restaurants, etc.

The objective of the village component is to investigate the interaction between the villagers and the Park to ascertain qualitatively the net welfare change as a result of national park establishment. In valuing the benefits of the National Park, the welfare loss of surrounding villagers needs to be taken into account. A study of the negative impact of Montadia Park, Madagascar on the livelihood of neighboring villages indicated that the loss was evident and significant. However, owing to budget constraints, a thorough study of welfare loss by conducting a WTA study could not be undertaken in Khao Yai. Moreover, simmering land disputes in an adjacent National Park and increased enforcement of the National Park Law have prevented accurate and truthful interviews; nor could the safety of our researchers be assured. It was finally decided that only a qualitative village-Park interaction study could be conducted to throw additional light on the benefits and costs of the Park to villagers.

It is widely assumed that poverty is a major cause of deforestation and bioresource degradation. Earlier in-depth village level case studies (Anand and Mingarn 1991) of three villages in Northern Thailand suggest that both rich and poor villagers were involved in extraction of forest resources. Richer farmers and local leaders were important supporters for forest resource extraction. They usually advanced capital for poor villagers to make expeditions into the forests in search of timber and other products. Market access made possible by improved transport systems and connection with city dwellers stimulated more

rapid extraction. In areas where there is high tourism potential, the more coveted resource is land, not timber or other forest products.

The major issues investigated in this study include: the history of settlement, income and employment of households, the use of forests, and new employment opportunities offered by the Park. Police statistics on encroachment and poaching in the four provinces were also collected (Table C1).

To undertake the study, six villages were selected from the 200 villages that surround the Park. To select the six villages, data from the village survey section of the Community Development Survey sponsored by the Ministry of Interior were tapped. Villages were ranked according to their average income per household. Those with a Z score exceeding mean income plus two standard deviations were ranked as rich villages and those with a Z score more than two standards deviations below the mean were considered poor villages. The remainders were considered medium income villages. Two villages were randomly selected from each group. The final sample included two villages from Amphoe Nadee and Prachantakham of Prachinburi, two from Amphoe Muang and Sarika in Nakhon Nayok. In Saraburi, the case study is in Amphoe Kaeng Khoi. In Nakhon Ratchasima the village is in Amphoe Phraya Yen.

In-depth interviews were conducted with selected villagers. Villagers interviewed were chosen by sociometric method, i.e. villagers were asked who were considered as the poor, average and high income earners in the villages. Two of those with the highest frequencies from the rich group, three from the medium group and four from the low income group were selected for interviews. For all villages nine households were interviewed. Our researcher typically spent at least 2 weeks in each village to obtain the targeted samples. A total of 54 villagers were interviewed intensively. In fact, this type of study is often prepared as a background report before a WTA survey is undertaken. A statistical profile of the villages is provided in Table C1.

Table C1 Village profile.

	Prachinburi		*Saraburi*	*Nakhon Nayok*		*Nakhon Ratchasima*
Village	*I*	*II*	*III*	*IV*	*V*	*VI*
Population	784	447	504	159	843	367
No. of households	160	111	113	48	216	98
Income rank	poor	poor	medium	medium	rich	rich
Income from forest (%)*	2	16	45	29	19	0
*Forest use***	Medium	Intense	Intense	Intense	Medium	Little
% of offspring migrating for employment	23	54	35	31	0	14

Notes: * ***Income from extraction of forest resources could not be accurately collected owing to illegal nature of the involvement especially in village I***

** ***Judgment by our researcher to supplement income statistics***

Source: ***Ministry of Interior and Interviews***

Reported Encroachment and Poaching Cases

No evident trend emerged from the reported encroachment and poaching statistics. The number of reported cases depend not only on the efforts to encroach but also on the efforts of law enforcement (Table C2). The number of the reported cases are quite small considering the vastness of the area. There are fewer cases on wildlife. The province that reported cases most frequently is Prachinburi, followed by Nakhon Ratchasima. In 1993 Nakhon Nayok had no reported cases of encroachment or poaching.

Interviews with villagers revealed that the enforcement effort has intensified in the last four years in all six villages but enforcement was more stringent with forest encroachment than other activities. In the past, villagers were able to extract forest resources

with little government intervention. In many cases villagers claimed to have paid fines to Park rangers and the case was not taken to the police.

Table C2 Number of reported encroachment and poaching cases by legislative act

Item	Year					
	1988	1989	1990	1991	1992	1993
Forest Act	70	36	40	40	54	37
National Park Act	32	39	38	34	56	38
Wildlife Protection Act	9	8	3	2	12	4
Total	*111*	*83*	*81*	*76*	*122*	*79*

Source : Royal Forest Department

History of Settlement

The villages where the in-depth interviews were undertaken were settled between 1794 and 1951, long before the Park came into being. One of the villages visited by our researcher was moved from the heart of Khao Yai National Park in 1932. Before that time a large community of the size of a Tambon (sub district) was located in Khao Yai. As transport and road access were difficult then, Tambon Khao Yai was a breeding and protective ground for thieves and bandits. The government decided to abolish the sub district in 1932 and the villagers were forced to move out of Khao Yai. The Khao Yai National Park was later established in 1962. Thus for many generations Khao Yai has been a part of life of the villages surrounding the Park.

The history of the latter period of settlement, until around 1960, was similar. The villages began with a few settlers, most of them from the Northeast and from Laos. The Northeastern dialect is still used in some of villages. The earlier settlers engaged in subsistence agriculture and harvested timber and non-timber products for home consumption from surrounding forests.

As road access improved after the establishment of the Park in the 1960s, some villagers started growing field crops. In one village located near a timber concession area, lumbering for the concession company became a new economic opportunity which lasted for 15 years between 1963 and 1978.

The contact with urban communities increased with improved transport. During the 1970s, in two of the villages interviewed, large-scale land purchases by private enterprises, both domestic and a Japanese joint venture, have started. The sale of land has driven farmers deeper into the forests, some using the land which was gazetted under the National Park Law.

Sometime near the end of the 1970s, the Khao Yai National Park boundary was demarcated in a manner more visible to the surrounding public. Towards the end of the 1980s, the enforcement of National Park Law and environmental concern heightened. Villagers were fined and sent to the police more often. Conflicts with Park officials were on the increase and villagers have gradually been forced to look for new ways of life and new economic opportunities.

The Use of Forests

Forests are traditional source of food, medicine and fuel for the villagers living under a subsistence agricultural system. As the transport system improved in the 1960s, commercial activities began; but for villages around Khao Yai, construction timber was not the most sought after forest product. Until recently Mai Krisana (*Aquilarea crassna*), or scented wood which is used in the production of incense, yielded much higher income than timber. In five of the six villages visited by our research, scented wood was the major source of income. When the local supply was restricted and as the quality of the Thai wood declined, one of these villages became an international trading center. The current prices of forest products are listed in Table C3.

Table C3 The current prices of selected forest products

Item	Current prices
Aquilarea crassna (baht per kg.)	
- Grade A (Luk Klad)	30,000
- Grade B (Mai Lam Sao)	15,000
- Grade C (Mai Bak)	300-500
- Grade D (Mai Takhian)	120
Si Siad (baht per kg.)	12
Rattan (baht per piece)	1
Bee colonies (baht/hive)	500-1,000
Birds	
- Hornbills (baht/animal)	500-1,000
- Khun Thong	300-500
- Other	50-100
Timber	
- Mai Daeng (88 x 1" x 8")	225
- Makha/Chingchan (17" x 17" x 1.5")	75
- Yang (68 x 0.5" x 6)	225

Source : Survey by TDRI, 1994

The rate of timber extraction depends on the location of the village and its proximity to market connection. A village which is closer to urban centers with more employment opportunities and distant from more valuable sources of timber considers illegal lumbering an unworthy investment. Moreover without adequate "protection" (i.e., money paid to officials) from the market network, the effort invested may be futile. Apart from extracting timber for domestic consumption, interviewed villagers have claimed to stop illegal lumbering.

Honey and rare birds are other forest products that have brought supplementary cash to villagers. A hive can earn between 2,000-4,000 baht per year. A wild baby bird (Khung Thong), a species that can be taught to speak, fetches between 200-300 baht per animal. Other favorite rare birds are the hornbills whose prices could increase to about 1,000 baht with the establishment of private zoos in Bangkok. To acquire the birds, villagers observe the behavior of parent birds and collect the baby birds when the parents are away. This takes about three days.

The most coveted asset the forest can yield is land. The use of forest land depends on the price of crops. In the past farmers used to grow field crops such as maize, cassava and some paddy but in a much smaller area. In recent years, the prices of bamboo shoots induced farmers to grow bamboo both on their land and in the forests. Income from bamboo has become a major component of villager's income in at least five villages.

Although the Park was established in 1962, the boundary of the Park was not clearly marked until the 1970s. When the Park Authority started marking the boundaries in 1979, some villages found themselves entirely in the Park. After some negotiation, the Park authority agreed to redraw the boundaries to exempt the village from the Park area, but some of the land traditionally used by villagers remains in the Park. Another land use complication is that the National Park is a part of a larger forest reserve, and part of the villagers' land use may occur in this larger protected area.

In areas where the landscape is suitable for constructing a tourist resort, the price of land increased rapidly, including that believed to be in forest reserves. Many villagers sold their land and moved further into the forests and possibly the into Park. A few names of influential politicians were quoted as buyers of both titled and untitled land. With their connections, some politicians were able to receive titles retroactively.

Villagers interviewed do not think of Khao Yai as a recreation place. None of them wanted to pay to enter Khao Yai. They said they can enter Khao Yai for free at any time, and see no reason to bother going through the main gate.

Income and Employment Opportunities

All the villages are going through a transition either from subsistence to commercial agriculture and/or to communities that rely on wage employment. Despite the fact that people in all villages conceived of agriculture as their major employment, income

statistics indicate that a substantial proportion of income came from wage employment, either from local jobs or remittances from offspring. In the villages considered, about one quarter to one half of the village offspring beyond 15 years of age left the villages to seek urban employment. Even in a village where income from forests is high, dependence on wage employment is significant.

These transitions have different implications on village-Park interaction, especially on forest land use. Dependence on urban employment tends to lessen pressure on the forests. Commercial agriculture may exert more or less pressure on forests depending on the types of crops chosen. Conversion to intensive agriculture which requires more labor and capital will ease the need for forest land but expansion to extensive agriculture may lead to more deforestation. At present, the trend is towards the production of bamboo. An innovation in Park protection that would involve farmers in an acceptable forest management system may be necessary for the short run until the conversion to urban employment is complete.

For most of the individuals in the younger generation, the switch to urban employment is a preferred activity. For the generation beyond 35, the establishment of the Park has affected their livelihood substantially and park-related employment opportunities are relatively limited. In the first place, villagers prefer not to work for the Park as Rangers or other officials. They do not want to run into conflicts with their friends or relatives or be considered as a Park spy in the village. The Park Authority shares this opinion. It prefers to recruit officials and rangers from outside communities to assure discipline and decisiveness in law enforcement. The Park, however, is willing to train villagers to become forest guides and set up eco-tours.

At the time of the interview, three trekking trails from Nang Rong Falls have been arranged. It is noteworthy that new income and employment opportunities offered directly by the National Park are relatively limited and cannot compensate for the loss in forest income. To date only two cohorts of 40 persons each were trained as trekking porters by the RFD. A number of villagers interviewed indicated that while they used to earn about 10,000-20,000 baht per year from harvesting forest products, the income earned as a porter was only around 1,200 baht per year. They attributed the low figure to the small number of tourists and to the short trekking season, which lasts about 4 months from January to April. In 1994, each porter is paid 200 baht per day for carrying 15 kg. of luggage. In reality, the villagers claimed that tourists often took advantage of the porters by asking them to carry more than the agreed

upon weight. Of the 40 villagers that were trained by the RFD, only six or seven have rotated as porters.

Income and employment opportunities from indirect by related to the Park employment are more significant. These include working in resort hotels, golf courses and restaurants. The earnings are between 2,800-3,500 baht per month; but more importantly these income opportunities (except for caddies) are year-round. However, employers prefer younger workers with at least six years of education.

In conclusion, the income and employment opportunities lost to farmers were largely related to the reduced access to forest resources. In order of importance, these are: 1) land use for agriculture, 2) Mai Krisana, and 3) timber and other forest products, including animals. Mai Krisana, however, is increasingly difficult to extract due to the dwindling supply. Against these losses, a few new opportunities have emerged but the gain seems to be limited to certain groups. The popular belief that ecotourism could provide alternative income opportunities to villagers appears to be overly optimistic. Empirical evidence suggests that the direct income and employment opportunities created are restricted to a few villages while the welfare loss is more widespread. The indirect income and employment effects are more significant but are also limited to areas adjacent to the Park's entrance. In addition, the benefits of new opportunities are also restricted to the younger generations, leaving the older generations with reduced opportunities and forcing them to become more dependent on income remittances from their offspring.