Ecotourism in Suan Phung Nature Education Park:
Balancing Conservation with Economic Development

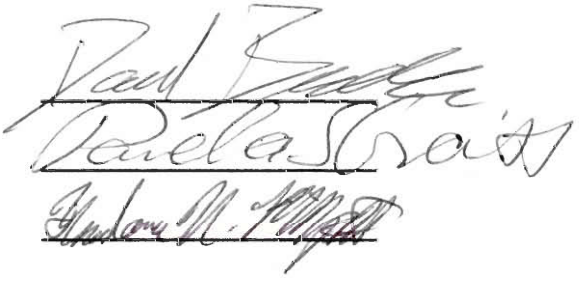
An Interactive Qualifying Project Report submitted to the faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the Degree of Bachelor of Science

Submitted by:

David Bresnick

Pamela Giasson

Theodore Phillips



Project Advisors:

Professor Joel J. Brattin
Professor Stephen J. Weininger

Sponsored by:

The Office of HRH Princess Maha Chakri Sirindhorn's Projects,
Bureau of the Royal Household

Project Liaisons:

Ajarn M.L. Siripastr Jayanta
Ajarn Luxsana Limsavarn

March 3, 2004
http://users.wpi.edu/~speakxj7/c04_eco.html
eco-c04@wpi.edu

Abstract

This project helps balance environmental conservation and economic development at Suan Phung Nature Education Park, in Ratchaburi province, Thailand. It includes research on ecotourism strategies such as Limits of Acceptable Change, sustainable practices, carrying capacity, and high-end tourism. The project provides recommendations to solve a variety of problems including poaching and illegal harvesting, water quality issues, negative impacts of tourism, and insufficient revenue to the local community. The project also considers future developments concerning these problems.

Acknowledgements

There were many people in Thailand who helped us in completing our project. First, we would like to thank The Office of HRH Princess Maha Chakri Sirindhorn's Projects for the opportunity to work in Suan Phung. We would also like to thank everyone working in the office for all of their time and effort. We appreciate all the assistance of the Suan Phung Nature Education Park staff and their hospitality. We thank Dr. Kumthorn Thirakhupt and Khun Tatsanawalai Utarasakul (Pu) who helped us gather information about water quality and Khao Yai National Park. Special thanks to our liaisons Ajarn Siripastr and Ajarn Luxsana. They were a tremendous help and a valued resource throughout our project. Finally, we must thank Professor Weininger and Professor Brattin for their guidance.

Authorship

	EXECUTIVE SUMMARY	David
1	INTRODUCTION	David
2	BACKGROUND	David
2.1	Suan Phung Conservation Area	Ted
2.1.1	Khao Jone Waterfall	Ted
2.1.2	Boe Klueng Hot Spring	Ted
2.1.3	Khao-Ka Jome Mountain	Ted
2.2	Existing Problems at Suan Phung Nature Education Area	Pamela
2.2.1	Problems at Khao Jone Waterfall	Pamela
2.2.1.1	Unfair distribution of profits	Pamela
2.2.1.2	Lack of communication with Ratchaburi province officials	Pamela
2.2.1.3	Lack of official staff, maintenance, and rules	Pamela
2.2.1.4	Questionable water quality	Pamela
2.2.1.5	Poaching, illegal harvesting, and logging	Pamela
2.2.2	Problems at Boe Klueng Hot Spring	Pamela
2.2.3	Problems at Khao-Ka Jome Mountain	Pamela
2.2.3.1	Poaching, illegal harvesting, and logging	Pamela
2.2.3.2	Lack of surveying, eco-research, and ecotourism plan	Pamela
2.3	Ecotourism Strategies	David
2.3.1	Limits of Acceptable Change	David
3	METHODOLOGY	David
3.1	Observations and Interviews	Ted
3.1.1	Suan Phung	Ted
3.1.1.1	Conservation staff	Ted
3.1.1.2	Tourists	Ted
3.1.2	Paa She Wildlife Sanctuary	Ted
3.1.3	Khao Yai National Park	Ted
3.1.4	Chulalongkorn University faculty and staff	Ted
3.1.5	EuroNatur	Ted
3.2	Case Studies	Pamela
4	RESULTS AND ANALYSIS	David
4.1	Recommendation for Assessing Water Quality	Ted
4.1.1	Heavy metal pollution	Ted
4.1.2	Agricultural chemical pollution	Ted
4.1.3	Bacterial pollution	Ted
4.1.4	Continuing water quality management	Ted
4.2	Recommendation for Combating Poaching and Illegal Harvesting	Pamela
4.2.1	Improvement of law enforcement	Pamela
4.2.2	Community based solutions	Pamela
4.3	Recommendation for Minimizing Negative Impacts of Tourism	Pamela
4.3.1	Park management plan	Pamela
4.3.2	Carrying capacity	Pamela
4.3.3	Limits of Acceptable Change	Pamela
4.4	Recommendation for Increasing Revenue to the Local Community	Ted

Table of Contents

List of Figures

EXECUTIVE SUMMARY

The Office of HRH Maha Chakri Sirindhorn's Projects, Bureau of the Royal Household, asked our team to help maintain a balance in the Suan Phung Nature Education Park between conservation of the park area and tourism. The park staff is concerned that tourists may damage the environment and the local community, and has chosen ecotourism as a method of balancing environmental conservation with economic development in the Suan Phung area. This balance will aid the local people economically while conserving the area in which they live.

The goal of our project was to assist the Royal Project staff in successfully implementing ecotourism strategies for three key park areas: Khao Jone Waterfall, Boe Klueng Hot Spring, and Khao-Ka Jome Mountain.

Figure I - Khao Jone Waterfall

Figure II - Boe Klueng Hot Spring

Figure III - Khao-Ka Jome Mountain

Park staff chose these areas because they have the most potential for attracting tourists, who bring in economic benefits but also expose the areas to environmental damage. We proposed plans for both sustainable economic development and environmental conservation at these attractions.

To attain these goals and provide useful recommendations, we interviewed staff and observed conditions at Suan Phung Nature Education Park and similar Thai parks, and analyzed relevant case studies as well. We asked staff in Suan Phung to explain present challenges and opportunities in order to gain a better understanding of the park's condition. We also observed the current environmental status of the park, along with the condition of the waterfall, hot spring, and mountain. Our team visited three other parks facing similar issues: Paa She Wildlife Conservation, located directly to the south of the Suan Phung Park; Erawan National Park in Kanchanaburi province; and Khao Yai National Park in central Thailand. At these parks, we interviewed staff members in order to determine how they coped with challenges and promoted ecotourism. We also observed park conditions and operations in these three locations and analyzed possible applications in Suan Phung.

Our team investigated case studies of parks facing similar challenges in the U.S., Thailand, Indonesia, The Philippines, and Australia. These studies included information concerning many problems similar those facing Suan Phung. We analyzed the studies to determine successful and unsuccessful methods used in solving these problems.

Using all this information, we were able to combine our knowledge of Suan Phung, the case studies, and similar Thai parks to formulate four recommendations for Suan Phung Nature Education Park. These recommendations address several key

challenges in the park including uncertain water quality, illegal poaching and harvesting, negative impacts from tourism, and insufficient revenue for the local community. The recommendations include methods for determining the presence, cause, and nature of a problem, possible steps to solve it, and future actions for park staff regarding the problem.

Water quality is important in Suan Phung Park, as many communities use the water for drinking and washing without any filtering or treatment beforehand. Suan Phung staff informed us of three concerns about water quality. The first regards several tin mines in the park, most of which are abandoned. The staff suspects that these mines leak traces of heavy metals into the ground water and nearby streams, potentially causing sickness in nearby communities. The next concern regards orange farms in the area, which use heavy quantities of pesticides and fertilizers. Scientists hypothesize that these chemicals infiltrate ground water and may cause health problems for nearby villagers. The final concern is the possibility of tourists contaminating village water supplies by swimming in Khao Jone Waterfall and Boe Klueng Hot Spring. It is likely that the tourists will introduce unsafe levels of bacteria into the water at these locations.

The current status of ground and surface water in the area is unknown, however, and scientists believe the water could be polluted by several sources. Through analysis of manuals, case studies, and governmental standards, we produced a list of recommendations for testing, monitoring, and treating water. In addition, we suggested future steps for park staff to take regarding water quality. This set of recommendations will help the communities within the Suan Phung Nature Education Park have access to clean water.

Our second recommendation was in response to the problem of local people

poaching, logging, and illegally harvesting indigenous flora and fauna. The Suan Phung Park area is government-owned conservation land and therefore it is unlawful to harvest plants, log, or hunt animals in the area. Unfortunately, there currently is no enforcement of these laws, as there are no park rangers and the community has limited concern for the environment. The goal of our recommendation was to help prevent or minimize illegal harvesting, logging, and poaching in the area by providing techniques used in similar parks. This recommendation contains two main suggestions.

The first involves an improvement of law enforcement in the park area. To achieve consistent enforcement, several possible approaches are feasible: drafting a set of laws for the public, building watchtowers, and imposing visible and consistent enforcement. Our second suggestion concerns community-based intervention as a method of protecting the environment by giving the local community a stake in its welfare. Ways to achieve local involvement include rewarding community members who report illegal activity, establishing enterprises that sustainably harvest natural resources, and most importantly, improving community education. In the future, park staff must make sure to include community members in park operations and in major decisions so that locals will feel a responsibility for the park area.

. Excessive tourism occurs when the negative impacts of tourists become too much for park staff to control. The third recommendation concerns the potential problem of excessive tourism in Suan Phung. Park staff is concerned that as the area begins to develop from tourism, the park will become overburdened by visitors and lose its unique attributes. Overuse of park resources can cause a wide range of problems including pollution, loss of local culture, environmental degradation, and

forest fires. A significant difficulty is that once mass tourism grips an area, it is nearly impossible to stop.

There are several strategies that Suan Phung staff can implement in order to curb this problem before it grows out of control. First, a solid park management plan is necessary. Staff can try setting up an ecotourism board with representatives from the community, park, government, and conservation groups. In addition, park staff can use the technique known as Limits of Acceptable Change to determine a carrying capacity in order to limit the number of tourists entering the park.

The fourth recommendation concerns another problem facing Suan Phung Nature Education Park regarding insufficient revenue given back to the local community. Local people have invested time and money into the Suan Phung area for years. Unfortunately, only a few businessmen see revenue from the popular sights in the area. These businessmen were quick to buy land and rights to the area's attractions, which generate the most income from tourism. Because of this problem, local schools are under-funded and significant poverty exists in the area.

We recommend that park staff implement high-end tourism in Suan Phung. This type of tourism attracts wealthy foreigners who are looking for pristine nature scenes and boundless landscapes. To attract these tourists, staff should offer nature outings such as guided hikes and camping hikes. High-end tourism will bring in significant cash flow, and locals can be trained to guide tourists for a fee. For high-end tourism to be successful, park staff, along with the community, must effectively promote packages and attractions. Finally, we propose future areas of work for Suan Phung Nature Education Park. Two examples of these projects include, determining indicators of water quality for Limits of Acceptable Change, and surveying the local community to obtain opinions on the park status and development plans. These

suggested future projects will further help Suan Phung Nature Education Park run smoothly and integrate the local community.

With proper use of ecotourism strategies, park staff and local residents can reach a proper balance between economic development and environmental conservation. This balance will ensure Suan Phung Nature Education Park's sustainability and proper operation well into the future.

1 INTRODUCTION

Thailand is a country that follows values established thousands of years ago when the current Thais first settled into the area. These values derive largely from the Buddhist religion and include an inherent respect for life and nature. Thais have seemingly also adopted a carefree attitude, and they apply it to everyday life. Over the years, visitors to Thailand from the United States and European countries have left behind western influences encouraging consumerism and the desire for wealth. In much of modern Thailand, economic development is an important concern. Thais have begun to put monetary values on almost everything, leading to exploitation of people, animals, and natural resources.

Many conflicts arise because of this change in attitude. One such conflict is between the conservation of culture and environment and the furthering of economic status. In many parts of Thailand, people sacrifice natural resources in order to accumulate wealth. This sacrifice has a profound impact on the environment as the people clear forests, poach animals, and fill the sky and water with pollutants. In addition, native cultures of the area suffer as people abandon their traditions in pursuit of profit. This issue has even spread to the remote hill tribes of Thailand, as many of the tribes now only produce crafts that are of interest to tourists. In order to remedy these problems, there must be a balance between conservation and economic advancement.

This issue of conservation versus economic development has arisen in the heart of the Ratchaburi province of Thailand. The Suan Phung Nature Education Park is a new park with few guidelines for ways to balance such concerns. HRH Maha Chakri Sirindhorn initiated the creation of this area with the goal of helping the local community economically through tourism, while conserving the native environment

and culture. In order to accomplish this goal, the park must achieve a balance; one possible strategy is ecotourism. One author defines ecotourism as "responsible travel to natural areas which conserve the environment and improve the welfare of the local people" (Hvenegaard 700). The term ecotourism includes many methods, objectives, and goals, all of which focus upon environmental conservation, while encouraging economic prosperity through tourism. Our goal was to help the Royal Project in balancing tourism, environmental conservation, and community development through a proposal of ecotourism-based strategies.

A staff of several men and women work for the Princess's project, and they evaluated methods to implement successful ecotourism in the park. The staff wanted to make the area profitable and sustainable, and they wanted local people to run, manage, and benefit from the park. The Royal Project staff spent significant amounts of time devising plans to apply ecotourism to various challenges at the park. They considered several ecotourism strategies and implemented the plans with varying degrees of success. For example, the staff has installed trails that blend well with the environment and are resistant to degradation; however, these trails are often too long for tourists to consider using in the hot and humid climate.

For the Suan Phung Nature Education Park to run successfully and sustainably, the park staff required assistance. There were several challenges facing the park, and we were to assess and categorize each of these challenges in order to propose useful solutions. The Royal Project staff had a good base of knowledge regarding park management and ecotourism strategies, but they required more research into specific problems and possible solutions.

The project staff asked us to propose recommendations to help implement successful ecotourism in the park. Specifically, the staff designated three points of

interest where ecotourism approaches would be useful in balancing tourism with conservation: Khao Jone Waterfall, Boe Klueng Hot Spring, and Khao-Ka Jome Mountain. When we created our recommendations for the Suan Phung Park each of these three places posed specific challenges that required specialized solutions. We traveled to similar parks and collected information, through interviews and observations, on challenges and solutions relevant to Suan Phung. We also examined case studies of comparable parks. Finally, our team reviewed multiple ecotourism techniques and tools, using the research to formulate recommendations for the Royal Project staff. These recommendations will be useful to park staff because the strategies and techniques proposed can help them to use ecotourism as a means to balance conservation with economic development. The Royal Project staff will evaluate our suggestions as to their best usage in assuring a successful and sustainable Suan Phung.

2 BACKGROUND

To understand the park area better, we examined Khao Jone Waterfall, Boe Klueng Hot Spring, and Khao-Ka Jome Mountain in detail, yielding information on tourism, the environment, and other distinctive features. Along with this data, we highlighted facts given by the Royal Project staff concerning several of the key problems regarding each of the three park attractions, along with some of the staff's suggested solutions. Finally, to offer thorough recommendations regarding ecotourism, we researched many strategies and concepts of ecotourism. This chapter provides a firm background on which to base our strategies for the Suan Phung Education Park, making the recommendations both detailed and complete.

2.1 Suan Phung Conservation Area

Suan Phung has many unique attributes that make it suited to attracting tourists, which underlines the importance of preserving the area. The park is home to four different watershed regions, each host to a range of wildlife and plant life (Figure 2.1). A watershed is a region determined by the pattern of water flow to form the water supply for an area. Any damage to the watershed at the source will affect the area it feeds. Each watershed source is of critical importance because pollutants will spread through the water system. These watersheds are key attractions for the region, and make the land hospitable for a variety of flora and fauna.

Our project focuses on three key areas in the central watershed area and border: the Khao Jone Waterfall, the Boe Klueng Hot Spring, and the Khao-Ka Jome Mountain. These areas are useful as tourist sites, but are important to preserve as they have key roles in the central area watershed and environment.

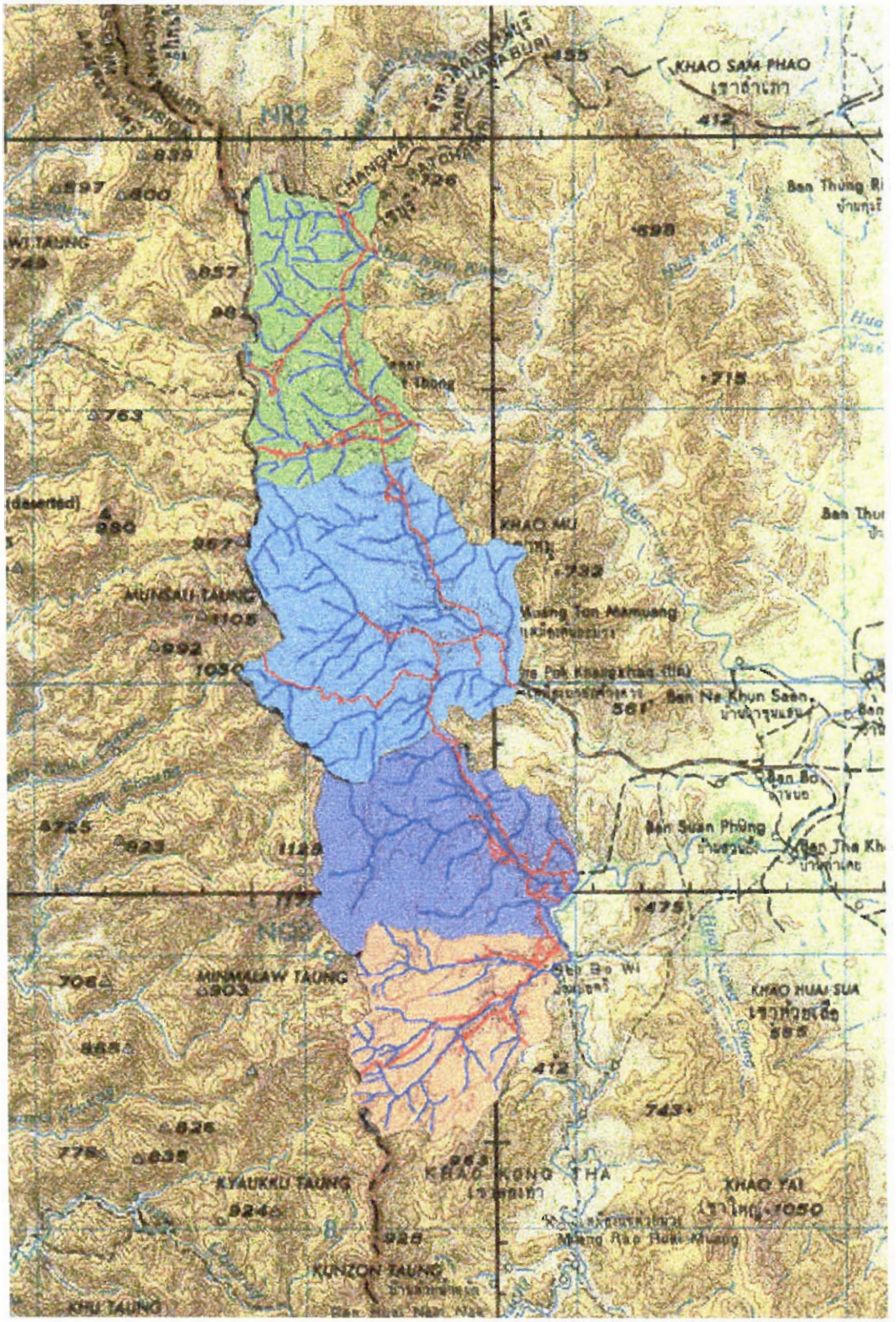


Figure 2.1 - Suan Phung Nature Education Park: four watersheds

2.1.1 Khao Jone Waterfall

Khao Jone Waterfall is already a tourist attraction, so it has already been partly developed by local businesses. A well-made stone trail from the park center to the waterfall provides a pleasant hike (Figure 2.2). In addition, a road access entrance to a parking area close to the waterfall businesses is a brief walk away from the waterfall. Local villagers set up this commercial area to take advantage of tourism; it is not part of the park design (Chakkrit).

Figure 2.2 - Stone trail

There are nine levels to the waterfall, but tourists looking to swim or picnic generally visit only the first two. The stone trail continues past these levels along the entire waterfall and nearby wilderness, eventually looping back to the park center (Figure 2.3). The complete hike is almost six kilometers long. Along the path are

stone tablets describing various environmental details, and deeper in the woods there are trail markers.

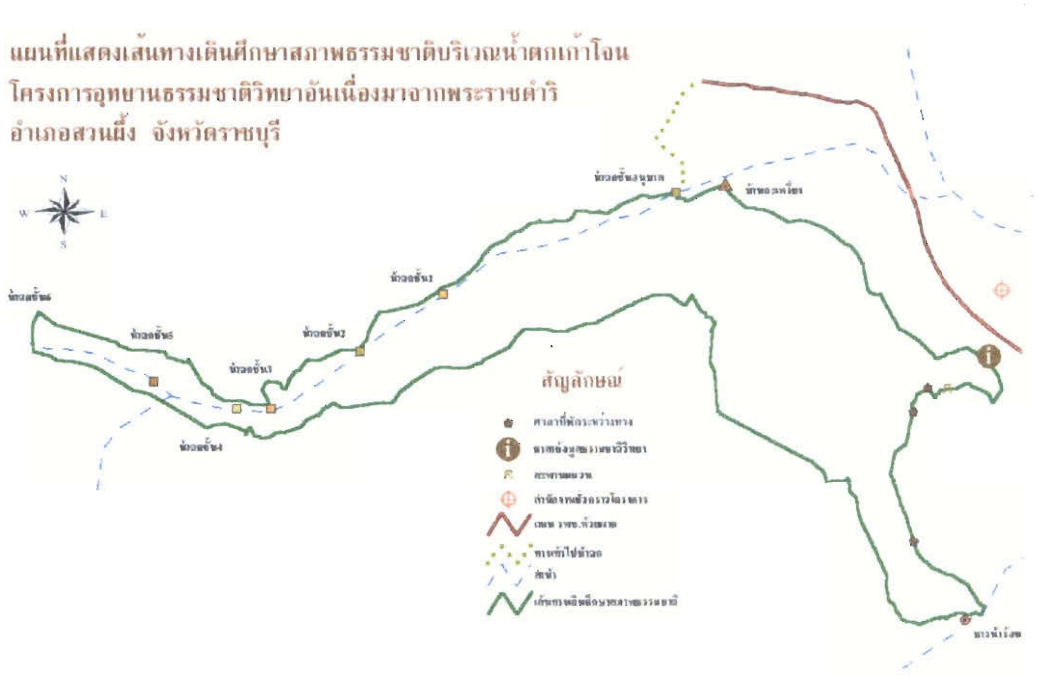


Figure 2.3 - Trail map

At the base of the waterfall, there are a few restaurants as well as several shops. Visitors to the area seem content to spend their time picnicking and swimming in the cool water of the falls.

This area hosts many different forest zones, and as tourists walk along the levels of the waterfall, they can notice a change in the types of plant life as the altitude changes. Besides plant life, there is a rich display of geological variety near the waterfall. The water in the waterfall itself is clear although it does not show a large population of water animals, perhaps due to the ever-changing speed, depth, and width of the waterfall stream. One level rumbles into a pool while another trickles from the shallows. During the dry season, the waterfall is low and the flow decreases to almost a complete stop (Sompop).

2.1.2 Boe Klueng Hot Spring

The Boe Klueng Hot Spring is also an established tourist attraction. It was discovered roughly 40 years ago by a mining engineer, whose family started a small resort there. The resort directed and piped the spring water into two pools for bathing; one is of natural style fed from a stream, and the other pool's water is piped from the source to a decorated bathhouse (Figure 2.4). There is also a restaurant and an open sided cabana with a place to lounge and read magazines. A children's playground, and covered outdoor dining section, complete the resort property.

Figure 2.4 - Feeding point for pipe to decorated bathhouse

A path goes to the main source of the hot spring water, where there is a sign telling the history of the hot spring resort and another stream from a hot spring further up the mountain. At the source of the hot spring the path meets another stone trail

from the park center that ends at the hot spring. Walking this trail is substantially more time-consuming than driving to the hot spring or even walking along the street from the park center (a 3-kilometer hike compared to a 500-meter walk). The environment surrounding the hot spring seems to be similar to the lower levels of the waterfall in both type and density of vegetation. The hot spring water itself is perfectly clear and there is only high temperature aquatic plant life present in the slower moving streams. To make a source for the pools the resort has dammed off a smaller pool to create a reservoir that also feeds into a pipe for the decorated pool area (Figure 2.5).

Figure 2.5 - Resivoir for resort baths

Further up the trail, into the woods, the area becomes more environmentally intact, but signs of fires near the trails are evident (Figure 2.6).

Bathing in the hot springs is said to have therapeutic effects and is the main attraction. Tourists to the hot spring pay a five-baht fee to view the spring if they enter through the resort entrance rather than the park trail. There is an additional twenty to fifty baht fee for those wishing to bathe in the resort's natural and decorated pools, respectively (see Appendix C for resort pamphlet).

Figure 2.6 - Ash from recent trail fire under fallen leaves

2.1.3 Khao-Ka Jome Mountain

Khao-Ka Jome Mountain is a largely untouched feature on the Thai-Myanmar border. Approximately ten square kilometers in size, the mountain has a three-kilometer hiking trail, a waterfall, many scenic viewpoints, and a wide array of wildlife. It can be reached by road only with a four-wheel drive vehicle. The

unpaved road, which connects a small Karen village to the border of Myanmar and back towards the park center, is pockmarked from erosion. Along the road in the mountains are two Thai border police stations. Near the first are both the hiking trail and the path to the waterfall. At the last station is an observation point with an almost complete 360-degree view of mountains situated across Thailand and Myanmar.

Most of the region is covered with thick forest, except for grasslands on the outskirts of the mountainside. During the rainy season, the mountain is home to "jumping snails", a type of leech that might discourage casual hikers for those few months. Otherwise, the Khao-Ka Jome Mountain needs only access for transportation and tourist facilities to attract tourists. Transport to the mountain from the park center takes more than forty minutes each way, taking care to drive slowly to maintain safety on the sharper inclines.

2.2 Existing Problems at Suan Phung Nature Education Area

Though HRH Princess Maha Chakri Sirindhorn Project staff has been working over the past three years to balance economic development, environment, and community at Suan Phung Conservation Area, problems still exist. Sustainable tourism is not present at Khao Jone Waterfall, Boe Klueng Hot Spring, and Khao-Ka Jome Mountain. The ecological status of flora and fauna, and water quality are unknown. The community remains poor and illegal activities appear to be the easy way for local people to make quick money. If community members do not have enough money to tend to their immediate basic needs, they will continue to degrade the environment for money or work at low cost for the businessmen who exploit the land. Balancing tourism and conservation is difficult; the goal is to be aware of the existing problems in order to overcome them and be successful.

We describe the obstacles specific to each attraction. The Royal Project asked our team to provide recommendations for these existing problems. The objective is to increase the park's value as a tourist attraction while considering the environment and community. Suan Phung Nature Education Park will educate the people about conservation. Tourism will increase the entire community living standard. Conservation will become part of the lifestyle at Suan Phung.

2.2.1 Problems at Khao Jone Waterfall

Several challenges exist at the Khao Jone Waterfall. The current management does not involve the community in its efforts. There is no goal of ecotourism and no sustainable practices in place (Chakkrit). The management remains unorganized. There are no existing regulations for tourists and no standardized enforcement. Illegal activity takes place in the forest surrounding the waterfall. There is no regular communication with Ratchaburi province officials. An unfair distribution of profits supports the businessmen, but no fiscal benefit returns to the community. No one monitors the community water supply, so the impact of tourists on water quality is currently unknown.

2.2.1.1 Unfair distribution of profits

Currently, local vendors, shops, and restaurant stands allow inexpensive parking in the village right next to the waterfall's first level. Many tourists prefer to drive up to the waterfall rather than hiking a three-kilometer trail to get there. The opportunity to park so close is an advantage for tourists and an advantage for the business people in the area.

In the village parking lot, there is a sign that lists where the money collected by the businesses go: cleaning, electricity, a youth lunch program, local education programs, etc. However, no documents show that the money actually goes to the services listed. Some suggest that it goes directly into the pockets of the collectors (Chakkrit). There is no clean up crew visible, no neighborhood activities documented, and no list of the exact portion returned to the community.

One idea suggested by the Royal Project staff is to allow these vendors the first opportunity to relocate to the Princess's Project site. If the vendors recognize that tourists will enter the park from the new opening, they will want to maximize business and relocate (Sompop). According to the Royal Project staff, ideally the village entrance would close. The entrance fee at the Princess Project site returns to the local people so the entire community benefits (Chakkrit).

2.2.1.2 Lack of communication with Ratchaburi province officials

There is little communication between the provincial government and local district government (Chakkrit). A new, sling bridge will be built next to the waterfall to provide pedestrians an alternative to walking along the ground (Figure 2.7). The decision to build this bridge makes no sense, as it does not provide additional protection or safety to the tourists. The bridge does not coincide with the conservation efforts in the area and it further destroys the environment around the waterfall. The village people do not know who signed an agreement for a bridge construction project. However, they assume the decision to build the bridge was at a state regional or governmental level (Chakkrit).

Figure 2.7 - Sling bridge under construction

The Royal Project staff expressed concern for tourists at the waterfall, since the construction group clearly works through the weekend, which is the busiest time for tourism there. Building a bridge where tourists are present creates a safety hazard and unwelcome noise pollution. A committee already exists that focuses on this problem (Chakkrit). However, the problem is constant and since papers were signed the project will proceed. There appears to be no communication between the bridge construction project and the community; therefore, the Royal Project staff suggested forming a committee to approve operations decisions and all changes, such as new buildings in the community.

2.2.1.3 Lack of official staff, maintenance, and rules

One major problem at the waterfall is the lack of rules and regulations. Regulations need to be clearly stated and enforced. Impacts of tourism in parks can be reduced effectively through controls on access, equipment, activities, and group sizes (Buckley 222). No signs specify rules or appropriate behavior for tourists. Compliance with environmental regulations is low and so-called self-regulation is rather ineffective (Buckley 223).

The Royal Project staff addressed the problem of litter along the trail and concluded that trash bins would help. At the park, entrances there are no signs and no guards present. The village currently provides changing areas next to the first level of the waterfall; however, no sign specifies what they are. The village parking lot and Royal Project entrance provide toilets. No signs inform visitors of the toilets' locations. No trail or waterfall level has a toilet or waste receptacle. No organized crew cleans or picks up tourists' waste. After a busy tourist weekend, a maintenance crew should clean any remaining trash (Chakkrit). Employing a management team, maintenance crew, and rangers to enforce rules may fix some of these problems (Chakkrit).

2.2.1.4 Questionable water quality

The waterfall supplies the water for villages downstream, which could currently be polluted from a tin mine that closed thirty years ago. However, the water has not been tested. Doctor Friedhelm Göltenboth, an ecology expert, suspects there may be trace metals in the water's sediment. Another concern is that businesses and vendors may have disposed of metals in the watershed (Chakkrit).

Water degradation is a long-term risk. However, the Royal Project staff mentioned that there is no *documented* illness attributed to pollutants from the old tin mine. There is more concern about tourist impact on water quality and how to monitor water quality changes over time. People pollute the water by urinating and discarding garbage in it. Uneducated tourists often do not know what kind of long-term effects garbage has on water (Chakkrit).

The village people add supplementary irrigation piping to divert the water for their own use (Figure 2.8). The local people are unaware of principles of sustainable water quality management. Tourists can see the irrigation pipes from the waterfall trail. The Royal Project staff does not like the pipes' existing location. Having no standards for quality and control of the water could eventually cost the villagers their natural water supply (Chakkrit).

Figure 2.8 - Irrigation pipes over Khao Jone Waterfall

2.2.1.5 Poaching, illegal harvesting, and logging

Since commercialized trade places high value on rare natural resources, poaching is endemic in Thailand. The problem is worst in uneducated communities. Rare species become extinct and natural resources diminish. Although government and environmental organizations reforest the land, the number of trees illegally logged is high and reforesting does not restore the land.

One immediate problem is that some police have personal connections with loggers, which enables loggers to bribe the law enforcement officers. When the district ranger reacts to an illegal activity to local authority, the police take so long to arrive that the loggers escape (Chakkrit). The government does not adequately prosecute illegal loggers. Currently, people get away with illegal chopping and selling of Mymaka, a Thai tree located in the Suan Phung area, or illegal transporting of teak wood from the Myanmar border through the Suan Phung Park district.

2.2.2 Problems at Boe Klueng Hot Spring

At the Boe Klueng Hot Spring, the major problem concerns the ownership and usage of the water. Though present for many years, the problem over the land ownership remains unsettled. The concern of the Royal Project staff is that many community members cannot afford to bathe in the Hot Spring. The Royal Project staff also wishes that profits gained from the naturally flowing, forty to fifty degrees Celsius, water are returned to the community so everyone in the local area could benefit.

The debate over who owns the spring continues. However, government cases could lie undecided for several years without a conclusion. The debate goes back to the one miner who discovered the natural hot spring. After he uncovered the hot spring, he bought the land from the Anglo Eastern Mining team. Other families of miners in the area then moved to Suan Phung. The miner who owned the land of the hot spring became well known. The people of the province elected him mayor of Ratchaburi province twice. When this miner worked for King Rama V, the court certified the land ownership and titled the hot spring "Hot Spring of Klueng Land" (Sompop). Monyakula was the name of the landowner's family, as recognized by King Rama VI. Therefore, the Monyakula family owns paperwork that states the hot spring belonged to them. The problem with Monyakula owning the land is that in Thailand, after a mine closes, the land must be reforested for 20 years. The people must then return the land to the government.

The Royal Project staff stated that the ownership papers the Monyakula family has might be inaccurate. After the mine closes, the land returns to government ownership. The conflict began because the government did not insure reforestation of the land and therefore, the Monyakula family does not think the government should reclaim the land after 20 years. However, the families occupied the land and they never properly reforested the mine; under the topsoil is all sand. Some members of the community recognize that the land should belong to the government but they have no power to make a difference (Chakkrit). Local government did not stop the people from staying on the old mine's land; and the ownership remains uncertain (Chakkrit).

The Monyakula family continues exploiting the land to prosper from the hot spring land, resort, and decorated pool. As the community, rich with natural resources, gets poorer and poorer, families like the Monyakula, who occupy the land,

grow richer and richer (Sompop). The Royal Project staff suggested setting up funding to ensure environmental preservation around the hot spring land. A board could allocate money to the entire community to disperse the profits and determine appropriate use policies of the hot spring (Chakkrit).

The goal of the Royal Project in the hot spring area is to educate the community about the land usage situation. Currently the price for using the spring is too high for many community members to afford (Chakkrit). Until the court reaches a decision on the hot spring ownership, the Royal Project plans to pipe water across the street for another bath. This bath would give money back to the community and help the local people regain power of the spring.

2.2.3 Problems at Khao-Ka Jome Mountain

The Khao-Ka Jome Mountain is primarily untouched, therefore, it would make an excellent location for ecotourism. It features an untainted waterfall called Pha Dang, trails through the forests, and viewpoints. No scientific data exist about the mountain. Currently, the few hikers that venture to the land enjoy the mountain trails since it is rare to see other hikers on the paths. The Royal Project staff does not anticipate mass tourism on the mountain. Its goal is to provide more resources and a sustainable management structure while controlling the number of tourists who visit. The Royal Project staff does not want tourism to expand faster than the park can adapt.

2.2.3.1 Poaching, illegal harvesting, and logging

Illegal poaching, logging, and harvesting of natural resources are widespread on the mountain. The land is ten square kilometers and has only two border police stations. The current enforcement rarely notices missing items right away. They fail to notice the damage for long periods of time. There is no information about the species living on the mountain or the quantity of flora and fauna. No structured patrol oversees the area.

2.2.3.2 Lack of surveying, eco-research, and ecotourism plan

"Recommendations given regarding the Khao-Ka Jome Mountain are perhaps the most beneficial since the land is untouched" (Areerat). Scientists need to collect and document existing flora and fauna. The park management needs to determine the current status of the land (Sompop). Scientific data is important to show the community and tourists about the park. It also creates a record to show change over time.

The Royal Project staff suggested some areas of focus for us to work on. They would appreciate our assistance in planning natural attraction points, family lodging activities, environmental plan, and a start up plan for carrying capacity. Through sustainable activities, conservation practices will spread and build awareness in the community (Sompop).

2.3 Ecotourism Strategies

The Royal Project staff guided us toward the topic of ecotourism as a way to create the desired balance in Suan Phung. Honey defines modern ecotourism as "striving to respect and benefit protected areas as well as the people living around or on these lands" (3). Glen T. Hvenegaard says, "most experts suggest ecotourism should achieve specific conservation and development goals." He then defines ecotourism as "responsible travel to natural areas which conserve the environment and improve the welfare of the local people" (700). Ecotourism has fewer negative impacts on nature than normal recreational tourism. It also strives to improve the conservation of natural resources more than conventional methods of tourism (Longchit 12). There is a common theme in the definitions from these three authors. Ecotourism is a branch of tourism that strives towards goals of preservation or possibly improvement of natural resources, while taking into account social implications for the local people.

Longchit identifies a few significant characteristics of Ecotourism:

- Ecotourism is responsible travel to natural areas without the negative impact on them
- Ecotourism creates an understanding of the natural environment and of cultures
- Ecotourism provides local people with long-term economic opportunities and benefits (13-14)

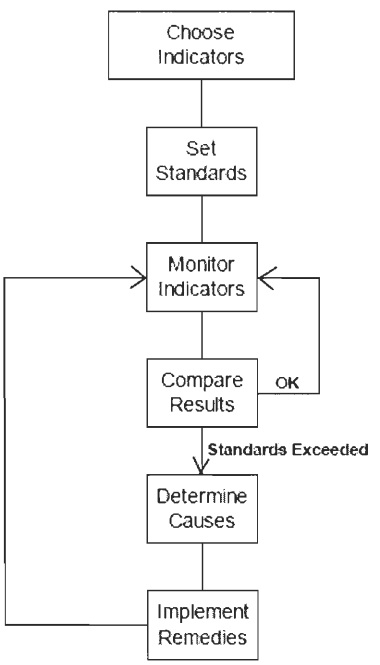
These three concepts are important and unique to this branch of tourism.

Ecotourism as a concept strives toward both economic prosperity and environmental and cultural preservation. The methods for achieving this balance include many different strategies and concepts. We implement these strategies in various ways to reach the main desirable idea of ecotourism. For example calculating a carrying capacity for a park is a tool used to limit the number of tourists, which can

help conserve the area. Depending on the place, national park, wildlife conserve, or conservation area, one can use specific strategies depending on the exact problems that place is facing. With proper use of the strategies and techniques, one can achieve a successful balance via ecotourism.

2.3.1 Limits of Acceptable Change

Limits of Acceptable Change (LAC) provides a means to monitor visitor impact and document changes in the land as they occur, to study the differences over time. The concept dates from the 1980s, and it is a way to help reduce impacts on the environment. LAC acknowledges that park visitors leave a mark on the land and is a means of calculating a carrying capacity in parks. We discuss the first three parts of the LAC flowchart (Figure 2.9): indicators, standards, and limits.



Source: Behn et al 27

Figure 2.9 - LAC flowchart

An indicator is a measurable for change that can be computed over time, for example: the number of defaced trees per area, trail width per area, pieces of trash per area, and number of forest fires. When choosing indicators, it is important to look at their ability to show change definitively. Researchers use initial indicator data as a baseline to determine the current status of the environment.

Standards act as the maximum measurable allowance for the indicator, for example: trail width can be no more than three meters, or there may be only two pieces of trash per square meter. The baseline indicators describe the current status. The standard is the maximum allowance of change compared to the baseline. Management then determines if the indicator has changed and if it remains within the acceptable allowance for change. It is important when choosing a standard to accurately predict the level at which change is too destructive on the environment. If one picks a level too high, then no action will be taken until the damage is already done. This is an example of both an indicator and its standard: indicator is the number of defaced trees per square kilometer, and a standard is the number ten. The number of defaced trees is measured and it must be no more than ten per kilometer squared. One should monitor an indicator on some regular basis to test for any change. If change occurs and this change brings the measurable up above the standard, then one must take compensatory action in order to curb this negative change.

In a recreational park, staff must make sure tourists do not destroy park surroundings by setting a limit on what kinds of damage, or change, are acceptable. They must balance the number of tourists allowed in the park with the severity of the damage they cause. If no tourists are allowed in, then the park environment will go unharmed, however the park will make no revenue. Inversely, if the incoming amount of tourists goes unchecked, then we could see vast destruction of the park environment. Staff must then find a satisfactory middle ground, where the park makes enough money to be sufficient and help the community, while the park itself is left as unspoiled as possible.

3 METHODOLOGY

Our goal was to assist the Royal Project team in successfully implementing ecotourism strategies and to propose plans for sustainable economic growth and environmental conservation. We accomplished this by recommending ecotourism strategies to the Royal Project staff. To provide accurate recommendations for the staff we completed several major tasks, including interviews, observations and case study evaluations.

We conducted interviews with staff at Suan Phung, Paa She Wildlife Sanctuary, Khao Yai National Park, and Chulalongkorn University, and with the president of EuroNatur. These interviews offered information regarding the current status of the Suan Phung Nature Education Park, and on several challenges and solutions used at other parks. Along with the interviews, we made many observations concerning the physical aspects of the Suan Phung Nature Education Park and other similar park areas.

Lastly, we examined several case studies of parks with similar challenges to the Suan Phung Park. We also investigated the solutions used to remedy these problems as well as the success of the solutions. The data collected from the case study research along with the interviews and observations provided support for our recommendations.

3.1 Observations and Interviews

In order to create relevant recommendations, our team first examined previous research on the balance between conservation and tourism. We consulted park managers, experts on environmental and park issues, academics, and tourists. From

this information, our team gained an understanding of both conservation goals and approaches to achieving them. To acquire further knowledge and advice, we conducted interviews with experts in related fields.

3.1.1 Suan Phung

In addition to observing the park and its attractions, it was also very important for our team to have a clear understanding of the desires of both the management and the tourists. In order to achieve this understanding, we conducted interviews with project staff and surveyed tourists visiting the area.

3.1.1.1 Conservation staff

We interviewed the Royal Project staff to establish uniform goals for park improvement. Clear communication of their knowledge of the park status and what the staff views as the most important obstacles facing the area were vital to deciding the scope of our project. In addition, background information not available in English was a valuable benefit from these interviews. The interviews ranged from formal meetings and presentations with the entire project staff to discussions along trails and visits to the three tourist attractions of our project with Director Chakkrit. The staff observed the main problems in the park to be in the areas of environment, management, and community (see Section 2.2).

3.1.1.2 Tourists

We conducted a brief survey to generate some factual background information about the tourist population in the area. We interviewed 28 tourists to determine their home location, length of stay, and their use of the facilities at Suan Phung, such as the parts of the park they were visiting (see Appendix D for survey information).

3.1.2 Paa She Wildlife Sanctuary

The Paa She Wildlife Sanctuary is also a royal conservation project. Some of the problems that it faced are similar to ones that Suan Phung is looking to overcome. Through our interview with the head director and assistant director of the sanctuary central office, we inquired about the background and objectives of the wildlife sanctuary, and in what ways they parallel those of the Suan Phung Nature Educational Park. We evaluated the operational methods at Paa She, and the feasibility of applying them at Suan Phung.

3.1.3 Khao Yai National Park

On a trip to Khao Yai we examined the park facilities and interviewed the Head of National Research and Development of Natural Resources, Khun Prawatsart Chanthep. We inquired about various park management issues such as carrying capacity and the zoning of the park area, as well as the services available to tourists. We inspected popular waterfall areas and experienced other tourist services such as a night safari and a guided trek through the forest. We compared our findings in Khao Yai to similar situations at Suan Phung and examined the possibility of offering similar services to tourists visiting Suan Phung.

3.1.4 Chulalongkorn University faculty and staff

For a better understanding of water quality and other environmental factors our team contacted Dr. Kumthorn Thirakhupt, Professor of Biology, and his graduate assistant who specializes in ecologically responsible tourism, Khun Tatsanawalai Utarasakul. They described clear indicators of water quality as well as standards and methods applicable to the conservation area.

3.1.5 EuroNatur

We interviewed Dr. Claus-Peter Hutter, president of EuroNatur, to discuss sustainable tourism and conservation methods that provide economic opportunities to the local community. EuroNatur initiated a successful project in the Philippines, based on a type of reforestation designed to produce a sustainable economic benefit (Appendix E). In addition, exposure to his organization's work, and that of other organizations he mentioned, prompted us to contact the Sierra Club in the United States for further information on sustainable tourism services.

3.2 Case Studies

Case study analysis helped us determine strategies for sustainable ecotourism that were appropriate for the central area of Suan Phung. We determined why some parks appear relatively unsuccessful and looked at alternative solutions to apply to Suan Phung.

We analyzed the ecotourism tools utilized in Kanchanaburi province because tourists frequent the province. We looked at operational and structural methods that

Kanchanaburi park staff tried. We learned what methods experts documented as successful or methods that were ineffective. One book, *Case Studies on Ecotourism* by Ralph Buckley, was particularly helpful. Using this book and other sources, we studied a variety of parks: Yellowstone National Park, United States; Khao Yai National Park, Thailand; and parks in Indonesia, Nepal, Belize, Brazil, and Australia. We analyzed operational and structural methods used by different parks to understand different parks challenges and successes.

Publications presenting ecotourism case studies are useful for examining such issues as the following:

- whether small ecotourism operations comply more closely with the defining criteria for ecotourism;
- whether ecotourism necessarily paves the way for large-scale mainstream tourism development, particularly in and around protected areas;
- whether ecotourism development patterns are influenced more by local politics and society or by global tourism trends;
- whether ecotourism does in fact contribute effectively to conservation of the natural environment and, if so, to what degree and under what circumstances;
- whether the educational component of ecotourism reduces the local environmental and social impacts of ecotourists and, if so to what degree;
- whether the educational component leads ecotourists to modify their lifestyles at all and, if so, what forms of education and interpretation are most effective;
- which factors are most significant in minimizing the environmental impacts of ecotourism: for example technology, education, location or client selection (Buckley 2).

4 RESULTS AND ANALYSIS

We offer four full recommendations for park staff at Suan Phung Nature Education Park, addressing: uncertain water quality, poaching and illegal harvesting, and negative impacts from tourism and insufficient revenue to the local community. In these four recommendations, we address many of the important steps that park staff could take to remedy the problems, including future steps to assure long-term effectiveness of the solution.

4.1 Recommendation for Assessing Water Quality

Water quality is an important issue at Suan Phung Nature Education Park. Changes to the water system influence the environment as well as the living conditions of people in the area. Assessing the water quality is a first step toward improving it. Since the condition of the water is unknown, and no one has observed any problems, there has been no effort to examine water quality. Dr. Friedhelm Göltenboth of EuroNatur remarked that sediment in one of the streams in the park might be from heavy metal deposits from a tin mine; he did not reach a firm conclusion since it was not essential to his project at the park. Similarly, agricultural chemicals such as pesticides and fertilizers from orange farms in the area might leak into ground and surface waters. The extent of any leakage is unknown.

Tourism in the area also can directly introduce pollutants into the water. Use by tourists can increase bacteria in the water to unsafe levels. Further study must determine whether these problems affect water quality in Suan Phung. After researchers establish the current condition, it is important to institute any methods needed to restore the water to appropriate levels.

4.1.1 Heavy metal pollution

Heavy metal pollution from tin mines can kill aquatic life and alter the chemical status of water. To examine this problem, it is important to monitor the water flowing near the mines for seepage as well as to test the soil around the mines. Results from testing the water will determine if pollutants from the mine are currently seeping into the water system. The soil test will indicate the possibility of any pollutants seeping out of the mine into the water in the future.

A chemist can conduct tests to gauge metal content in the water. By measuring specific conductance of the water, (how well it conducts electricity); it is possible to determine the concentration of dissolved ions in a sample. Another similar test is to measure the atomic absorption of a sample, which determines the amount and composition of dissolved elements. Methods such as precision chromatography show the types of materials dissolved in the water.

To test the mine area, a geologist or chemist can test the soil. One such test that has proven effective and efficient is the simple leech field test designed by Hageman and Briggs. A modified version of the United States Environmental Protection Agency (EPA) field test method 1312, the simple leech field test produces the same quality of results in a fraction of the time, and with minimal laboratory costs (Hageman 1).

If heavy metal pollution proves to be a problem, it is possible to take measures at both the water site and the site of the mine. Geologists should investigate sealing the mine from leaking further into the water supply, as well as the use reactive barriers designed to prevent trace metals from distributing through the water system. Both a water treatment facility and hyporheic zone cleansing would assist in removing

heavy metal from the water. Hyporheic zone cleansing is a process that occurs at mixing points of ground and surface water, and it is shown to decrease the amount of dissolved metals twelve to 70 percent ("Nature's Way...").

4.1.2 Agricultural chemical pollution

When excess agricultural chemicals enter the water supply, they can cause many problems. Deformities in animals, particularly water animals, are one indicator of a problem. More dangerous, however, is the long-term problem of bioaccumulation. Bioaccumulation occurs when many creatures in the lower parts of the food chain absorb a foreign element and pass on this element when creatures that would not normally be exposed to it eat them. Consuming agricultural chemicals, whether directly through shallow wells that are tainted or from food exposed through bioaccumulation, can make people very ill. Besides the environmental problems from pesticides and herbicides, fertilizer runoff can stimulate growth of aquatic plant life and create low oxygen levels for aquatic wildlife ("Water quality in nonpoint sources...").

Monitoring agricultural chemical levels before problems start to appear is important to prevent health risks. Scientists should test the water downstream from farmland, chemists should test the water for chemical content, and biologists should examine aquatic wildlife that is sensitive to such chemical changes.

Reactive barriers can effectively prevent fertilizers from entering the water supply ("Handbook on Permeable..."). However, it is more effective to decrease agricultural chemicals through better farm management. A sparing, more targeted use of pesticides, as well as safer chemical choices in fertilizers, can substantially decrease chemical pollution of the environment. In addition, practices such as not

applying pesticides directly before rainfall can help to limit chemical runoff as well as remove the need for reapplication ("Management Practices..."). An organized local management board to oversee pesticide and other agricultural issues can be helpful in legislative efforts to create and maintain chemical policies, as well as in bringing together representation for farmers with environmental representatives. Such educational techniques as a model farm that specifically displays better pesticide and other agricultural chemical use would encourage local farmers to follow such an example.

To continue decreasing agricultural chemical pollution, it is important to consult biologists to understand what chemical levels are acceptable. It is beneficial to examine further other agricultural groups for more management ideas on how to balance chemical use.

4.1.3 Bacterial pollution

Tourist use of the park as well as waste from tourist facilities can elevate the bacteria level in water. High levels of bacteria can make the water unfit for drinking and cause illness if used improperly for domestic purposes. Animals can also become ill from the bacteria, tainting the local food supply.

Testing the water seasonally and during periods of heavy use is important to prevent dangerous elevations in bacteria levels. Biologists can conduct biochemical oxygen demand tests, and look for fecal indicator bacteria and viruses to determine if bacterial pollution is present. Multiple antibiotic resistance tests, ribotyping tests on E. Coli, and stereotyping on F+RNA coli phages, are all effective tests for identifying the source of bacterial pollution (Stewart).

To combat high levels of bacteria, we recommend two approaches: an increase in regulations at tourist sites, and treatment of the water to decrease bacterial levels. To decrease bacteria levels with prevention of pollution entering the water, implement rules limiting swimming locations, and regulate substances brought directly into the water area, such as food. Have clearly marked signs for showers and changing areas, and a checkpoint to enforce regulations to further decrease noncompliance of these rules. To improve water quality directly, downstream from the attraction initiate water treatment. Techniques such as filtering or chemical use could lower bacterial levels safely. An additional option is to treat the water at the point of extraction before domestic use.

Biologists can conduct the above-mentioned tests, and consult on appropriate ways to treat the water downstream from the attraction. The staff should investigate other means of bacteria control, such as oxygenating the water or introducing natural predators of the bacteria into the water system. Finally, researchers should determine if non-bacterial tourism waste is also a problem.

4.1.4 Continuing water quality management

Continuing efforts in water quality management are as important as the initial determination of the water status. In order to maintain a high level of water quality and environmental conservation over time, it is necessary to do more than simply test and treat the water. Applying Limits of Acceptable Change (LAC; see section 2.3.1) and using the recommendations above is important in attaining future goals. Use the tests and indicators mentioned to set up a baseline for the employment of the recommendations to maintain and improve water quality. By using the

recommendations within a framework of LAC, these suggestions can become more than just a one-time solution and operate fully as a water quality management plan.

Applying Limits of Acceptable Change to this process, which creates a system of water quality management, will further improve and maintain water quality. However, both discovery of the water status and LAC application are steps for creating countermeasures to any water quality problems that may arise. To decrease future risk and further improve water quality, installing a preventive system is necessary.

To prevent water quality problems from arising, we recommend creating a development plan for the area that specifically considers water. There are two important parts to this plan: the water quality management plan from LAC, and a method of preventing situations that would pose risks to water quality. By properly identifying types of water use and the impact that these uses have on water quality, it is possible to minimize risks to the population, and ensure that sufficient water is available. A simplified example of zoning through water use levels with farmland use and domestic use as two levels of water usage is to zone all future farmland locations downstream from domestic use areas so that the farms do not pollute water consumed by people. The actual determination and structure of a water development plan would be much more complex; however, there are resources to assist in starting such a plan. The United States Geological Survey (USGS) distinguishes water use by ten levels: public water supply, domestic, commercial, industrial, mining, irrigation, livestock and animal specialties, thermoelectric power generation, hydroelectric power generation, and wastewater collection and return flow (National Handbook of Recommended Methods 1). The efficiency of use and quality of water in Suan Phung will improve by using levels of water usage to determine land zoning and the

treatment requirements of water. Implementation of a water use development plan is a complex part of water quality management, but is also an important next step. It may not be necessary for Suan Phung to develop such a plan immediately; however, park staff should consider such a system for the future. Instituting development control is always simpler when done early on rather than after an area is established without such zoning policies.

4.2 Recommendation for Combating Poaching and Illegal Harvesting

Suan Phung Nature Education Park suffers from poaching and illegal harvesting. Illegal activity causes the size of the forest to decrease and rare species to diminish. In this section, we recommend ways to combat illegal activity and promote conservation in the area. The recommendation is divided into two parts. We provide recommendations on how to minimize poaching and illegal harvesting through improving law enforcement and through utilizing community-based solutions.

One case study on the Philippines described how ecotourism minimized its illegal forest activities. The Philippine government declared the Olango Island Wildlife Sanctuary at risk from illegal harvesting. The government also stated that the island is internationally important to wetland migratory birds. Organizations worked together to form the Suba Olango Ecotourism Cooperative. Through ecotourism, the Philippines decreased poaching and improved conservation. The ecotourism project was community based and used minimal impact activity with education to be successful.

> "It appears that the project has successfully used ecotourism as a mechanism to involve a local community in protecting an internationally significant conservation area, rather than posing a continual threat to its ecological integrity. The Olango Bird and Seascape Tour incorporate a nature-based product, minimal- impact management, an environmental education component, a contribution to conservation, and community involvement: a text book example of ecotourism" (Buckley 79).

Through community involvement and a nationally funded initiative from the Philippine government, Olango Island saw benefit in ecotourism and combated illegal activities while conserving the wetland. In Khao Yai National Park, the Khao Yai Conservation Project formed as a way to take conservation seriously. The project, led by three professionally trained teams of rangers, informed visitors of the poaching problem. They have begun to see successful results and now more effectively monitor animal population.

4.2.1 Improvement of law enforcement

Illegal activities at Suan Phung Nature Education Park destroy the land. With the help of local law enforcement, poaching, illegal harvesting, and logging will decrease. "Strict enforcement of law including deterrent punishment in tandem with a program to address corruption within enforcement agencies is essential and urgent if illegal logging is to be controlled" (Chandrasekharan 1). This quotation reflects policies implemented in Indonesia to save its trees. In order to protect the land and prove successful, enforcement must be taken seriously at Suan Phung. The recommendations we provide in this subsection help improve the current law enforcement situation.

We recommend imposing visible and consistent enforcement. Paa She Wildlife Conservation and many other Thai national parks utilize military rangers for enforcement. The parks also outline distinct rules for visitors. The military act as a

visible deterrent in the park and enforce the rules without acting in a physical or violent manner. They ensure that people follow the rules and act as a reminder to respect the rules. It is important that tourists know the rules and abide by them. Signs should state fines that may affect tourists if they break the rules. Regulations must be displayed in various languages for both domestic and foreign tourists. Visual depictions of the rules may also be helpful, as seen in Khao Yai National Park. If park rangers uphold the rules consistently, the number of tourists who break them decreases.

We recommend training local people as park rangers, guards, and police. Training local people proved effective in Indonesia and the Philippines. Director Chakkrit also suggested training local people to promote community involvement. In developing nations, the government does not enforce environmental regulations as this quotation exemplifies.

> "The Royal Forest Department is under constant pressure to take immediate action in the areas where preservation laws have gone uninformed, especially coastal zones where illegal tourist accommodation has flourished. Their slowness to respond in the cases of Ko Phi-Phi and Koh Samet suggest corruption at the highest levels" (Cummings 24).

The benefit to utilizing community members as enforcement is that many members already know the land. Allowing these local people to contribute is a way to promote community pride. If people living in Suan Phung area share common views, training local people is a way to standardize enforcement. It is important that community members believe in conserving the environment. If the villagers believe in conservation and are familiar with the land, training local people will allow them to use what they know to benefit the park.

If local people become trained police, the current problem of illegal poachers and loggers bribing the police decreases (Chakkrit). People living in Suan Phung recognize sustainable practices to preserve the land. Most poachers come to the area from outside the district (Chakkrit). Local police could still receive bribes from poachers in the area; however training local people builds a community to act as a team of defense. Local police who accept bribes in exchange for freedom in Suan Phung Nature Education Park lack the awareness of the consequences and long term harmful effects of unsustainable harvesting. The Philippines Noslek Arbor Canopy Walk utilizes local people as guides and as enforcement rangers to spread the income of their park throughout the community. "Locals rely on this income when subsistence harvests are lean. Since these are the times at which they would otherwise cut trees to sell as lumber... the canopy walk makes a significant local contribution to forest conservation" (Buckley 80). The community will strengthen, the park will benefit, and ideally, illegal activity will diminish as it did in the Philippines.

We recommend watchtowers in Suan Phung to improve law enforcement. They provide a means of prevention and allow police to see more land than ground level patrol. At the Paa She Wildlife Sanctuary, the staff mentioned they use sub-headquarters with lookout towers to provide maximum coverage of the land. Though Paa She is 489 km^2 in area and Suan Phung Park is 210 km^2 in area, we feel that watchtowers would be helpful in prevention of illegal activities. "As in similar situations worldwide, most of this illegal harvesting within the protected area takes place in the more remote parts of the park, where it is less likely to be detected and where there are commonly more resources available for harvesting" (Buckley 93). This quotation pertains to Khao Yai National Park, and since the Khao-Ka Jome

Mountain remains untouched land, harvesting in remote areas may happen there as well. A tower would patrol illegal activity in an area, especially if people harvest in remote areas where rangers may not immediately notice the damage.

We recommend using a helicopter to patrol parts of Suan Phung Park. The presence of air enforcement provides an intimidation factor. Through helicopter patrol over the land, the police have better access and more mobility. The guards can fly over the untouched land on the Khao Ka-Jome Mountain and if there was an emergency, the police or rangers could reach the scene quicker. A helicopter would provide faster service to protect the Suan Phung Park or assist a traveler who needed help. At Khao Yai National Park helicopter patrol most often prevents forest fire. At Paa She Park, the management effectively protects the park through a combination of different patrol methods to ensure successful enforcement. When a park has means for patrolling the air and land, enforcement is more reliable. Parks with reliable enforcement have time to focus on their conservation objectives, and the park management does not waste time dealing with problems caused by insufficient staffing, authority, or inadequate facilities (Areerat).

If enforcement is consistent and visible in Suan Phung, the problem of poaching and illegal harvesting will diminish. To further enforcement, we recommend adapting Thailand's national constitution to affirm protection of flora and fauna. This step was taken in both the Philippines and Indonesia to protect natural resources (Tacconi 2). One program, called Sustainable Development Program, Royal Institute of International Affairs, formed in Japan to implement sustainable conservation. A document titled National and international policies to control illegal forest activities describe success in adapting national policy to favor conservation (Tacconi 1). Positive results are indirect and may not be as effective in Thailand. The Thai lifestyle

allows people to interpret the law loosely and the people embody a 'mai pen rai' (translated as "never, never mind") attitude. However, addressing illegal forest activities at the national level is a means of declaring government and royal support for preservation of rare species and conservation of environment

4.2.2 Community based solutions

Community based solutions mean incorporating the community in all aspects of the park from its ecological education to independent conservation roles local people can take. Getting the community to take an active part in sustainable tourism builds conservation into the local people's way of life, whether the local people rely on the income of protecting the land or selling the natural products they make in sustainable ways. "Ecotourism can make a particularly valuable contribution to conservation, either by providing funds for protected-area agencies or by providing economic and employment incentives for local communities and other landholders to conserve land, plants and wildlife as tourist attractions" (Buckley 223). The latter part of this quotation states that ecotourism provides economic and employment incentives. Local people play different roles in ecotourism from workers to landholders. Community members take part in different ways. Total local involvement minimizes illegal activity.

Without community participation, ecotourism struggles. The idea is to build conservation interest among the people. The local people can benefit from ecotourism just as the park can benefit from their assistance. It is important to include the community is all stages of planning.

> "Local communities can participate in ecotourism projects at the planning stage, during implementation and can share the benefits. Participation in the planning [Ecotourism] process includes such tasks as identifying problems, formulating alternatives, planning activities and allocating resources" (Whelan 133).

Without participation throughout the entire ecotourism process conservation of land remains difficult.

There are many opportunities throughout the ecotourism process to get the community involved. The earlier in the process local people participate, the more likely they will be to go along with any new changes in their community. Through the following recommendations, we provide ways to bring the community together and build environmental awareness among the local people. Without community involvement, it is more likely that an ecotourism project will be unsustainable. "The risk of creating an unsustainable ecotourism project- one not supported by the local people, and perhaps destroyed by them- is great if there is no local participation in the project" (Whelan 136).

An idea that worked well for Indonesia, Australia, and Tanzania is to compensate community members that report illegal behavior. All the local people need to support conservation. We recommend Suan Phung Nature Education Park compensate local people who report illegal activity. Rewarding local people who report illegal activity is a successful way for community members to get involved in conservation even if they are not initially interested in conserving the environment. Community members report a crime to the park center or wildlife department if they witness an illegal forest activity and see direct personal compensation for providing accurate substantial evidence.

In Tanzania, Robin Hurt Hunting Safaris provide substantial support for anti-poaching activities and community development projects. The Robin Hurt Hunting Safari staff established anti-poaching patrols, paying former poachers and other villagers to take part in anti-poaching activities and paying rewards for successful anti-poaching operations. The exact amounts do not necessarily apply to Suan Phung; however, the incentives Tanzania rewards for may be helpful. Tanzania incentives are as follows: for the discovery and destruction of a poachers' camp; for each rifle or shotgun handed over to the Tanzania Wildlife Department; for each arrest and successful conviction of a poacher; and for each arrest and successful conviction of an elephant or rhino poacher (Buckley 213). The staff at Robin Hurt Hunting Safaris admitted that their resources are too few to continue effective long-term anti-poaching goals; however, incentives work as a temporary solution. If Suan Phung identifies rare species and decides to implement a policy similar to this one, an expert can calculate specific incentives to Suan Phung Nature Education Park depending on the availability of funding and park objectives.

Community members who desire can establish enterprises that sustainably harvest natural resources. Local people gain personal direct economic benefit. Other projects sponsored by HRH the Princess and HRM the Queen currently teach sustainable harvesting practices, and how to make and sell natural products (Chakkrit). Many people illegally poach and log because they do not know how else to make money. Establishing businesses with sustainable practices minimize illegal behavior by bringing awareness of a more sustainable way to make and sell products. The Philippines and Indonesia were both successful in establishing sustainable enterprises. Projects exist to show the local people how to sell seeds of trees in the Philippines. Planting these seeds led to "rainforestation" and reforesting the land.

The sales deliver legitimate returns to the local community as opposed to the previous methods of making money through illegal logging (Hutter). Projects in Indonesia taught local people how to make sustainable natural products. Sustainable businesses supplement income, which local people would ordinarily make through illegal harvesting. Community people should learn environmentally sound harvesting procedures. Local people will learn to produce natural products in an environmentally sound way and improve economic development.

We recommend creating conservation enthusiasm around rare and endangered species. Sharing a common bond is an opportunity to develop community pride. Rare endangered species live in the Suan Phung community, and that is a common bond. Members of the Suan Phung community should learn about the rare species and be proud to live in a community with them. An example of a location, which built pride around local species, is an ecotourism venture in the Philippines called Suba Olango Ecotourism Cooperative. They created a means of involving the local community in the conservation of a wetland for the sake of important migratory birds (Buckley 78). Suan Phung park staff should focus on educating people about concepts the people can relate to and understand. We recommend developing enthusiasm on what makes Suan Phung unique. For example, the community shares an environment that houses endangered species. If people understand rare species become extinct, they will develop a responsibility to save the animals. We recommend creating enthusiasm to preserve the species at Suan Phung. It is important that local people realize how lucky the community is to house rare species in their environment. We recommend creating a concern about the endangered species among the local people. If someone illegally hunts barking deer in Suan Phung, then the Suan Phung district will have no more barking deer. On the larger

scale, the species of barking deer could become extinct entirely if Suan Phung does not take an active effort in conservation.

A strategy beneficial in Paa She Wildlife Sanctuary is to hold conferences to educate village people on the local environment. Building community awareness goes beyond exhibits and brochures. Active conferences, held by nature experts or the leading park staff, enable local people to ask questions and give a means for the staff to deliver new ideas and important park data. Local people are receptive when ecotourism managers take the time to listen. "When [ecotourism] managers take the time to listen, they can enlist confidence, trust, and support from the local population" (Whelan 134). Holding conferences is an opportunity for the community leaders and conservation managers to convene. Maintaining momentum of the balance of conservation and economic stability, the park managers can discuss environmental problems and concerns.

"The strictest control of wildlife trade by the staff of the Wildlife Conservation Division, Royal Forrest Department, had caused remarkable reduction in the trade levels of domestic protected species; however, more is still needed to enhance strict control of international wildlife trade" (Endangered Species and Habitats of Thailand). Thailand has shown improvement over the years. Strict international wildlife trade helped, but the problem still exists. Through improving law enforcement and implementing community-based intervention, improvements in Suan Phung Nature Education Park will continue. Through community involvement, more local people should feel the benefit of ecotourism and sustainable tourism should preserve cultural norms.

4.3 Recommendation for Minimizing Negative Impacts of Tourism

Tourists visit parks to see attractions and do not always know their responsibility to environment conservation. Currently in Suan Phung Park, a large number of paths and uncontrolled trails are present at the hot spring and waterfall areas (Hutter). Trash and pollution become a problem when park management can no longer control the number of tourists who enter. It is important to recognize that tourism without proper planning and control can lead to undesirable development. Currently undesirable development or excessive tourism is not a problem at Suan Phung. Tourists visit the first levels of Khao Jone Waterfall and Boe Klueng Hot Spring. Visitor control would help minimize negative impacts of tourism. Predominantly untouched areas such as the Khao-Ka Jome Mountain form the most promising opportunity to initiate visitor control strategies. For this reason, the Khao-Ka Jome Mountain may benefit from [the provided] ecotourism strategies more than Khao Jone Waterfall and Boe-Klueng Hot Spring.

Tourism causes environmental damage, cultural loss, and exploitation of an area. Officials must maintain control over the number of tourists in the park and the local vendors in the area in order to see both economic benefit and ecological conservation. Suan Phung needs sustainable tourism. In this recommendation, we provide ecotourism strategies that limit damage to environment and monitor change over time. We describe setting up a park management plan to uphold the ideals of preservation while limiting the undesired development. We recommend establishing a carrying capacity to limit number of visitors. We also recommend utilizing Limits of Acceptable Change to monitor effects of tourists on Khao-Ka Jome Mountain.

4.3.1 Park management plan

Developing a framework for planning and managing ecotourism is challenging; however, through the help of effective park management, ecotourism can be implemented successfully. The bulk of the information we provide in this section comes from a book for managing the environment; Nature Tourism, edited by Tensie Whelan. To initiate sustainable tourism, we recommend setting up an ecotourism board. This board would act as a governing committee that manages and oversees changes, keeping the best interest of Suan Phung Park in mind. Objectives may include goals under three categories: prevention, research, and education/ tourism services. For Suan Phung we recommend inviting members from the government, park managers, current private business owners, community representatives, and international development and conservation organizations. These organizations may provide technical and financial assistance.

All ecotourism locations require organization and a strategy. "It is essential that every natural area documents a strategy of how tourism will be promoted and controlled over time" (Whelan 190). We recommend utilizing a method Dr. Claus-Peter Hutter provided that would reforest Suan Phung and preserve the native species in the area. Dr. Hutter, President of EuroNatur, extended an offer to assist in setting up a park plan for Suan Phung (Hutter). He offered to assist with advisory services and training of local people. Dr. Hutter's focus lies in rebuilding natural forests through the "Rainforestation Method," a way to reforest the land by strategically planting rainforest saplings (Hutter).

We recommend that the park management hire the necessary experts to complete three major tasks. The first is to conduct a full survey of Suan Phung Nature Education Park. This survey should include biological information about natural

resources, fragility of the existing ecosystems, and ecological constraints to tourism development. This survey will document the condition of the park.

Second, ensure that park objectives comply with management plans, guidelines, and zoning. It is important that profits go to further conservation practices as well as community members. With the ecotourism board and other ministries, we recommend developing mechanisms for appropriate entrance fees and channeling money back to conservation as well as the local community (Whelan 193). (For specific recommendations regarding revenue to the local community, see section 4.4 of this chapter.) During initial planning stages, Suan Phung needs to create realistic management objectives. To prevent excessive tourism, Suan Phung must set up regulations and means of control. Thai people and foreign tourists should understand and comply with the rules.

In the development, stage of the park, support and help from park management is essential. The park staff must assist in developing a park infrastructure to ensure the structure and plans are environmentally sound and feasible. Since development also benefits from community involvement, we recommend always using local labor and products when possible (Whelan 195). To maintain visitor cooperation, we recommend creating interpretive programs and controlled effective trails during the development stage. To strengthen community togetherness, we recommend giving preference to local residents in hiring park personal and offering concessions within the park (Whelan 195). Existing vendors and local businessmen should have first priority to combine efforts for further economic development and conservation of the area. We recommend promoting the Suan Phung Nature Education Park through selected national and international tour companies. (To learn more about broadening ways to promote Suan Phung, see section 4.4) We recommend developing complete

guidelines for tourists to follow while in the park. Khao Yai National Park provides tourist guidelines in their brochure (see Appendix H). The Responsible Tourist Guide Book includes the following set of instructions for travelers. Suan Phung would benefit from a set of such instructions.

- Stick to the trail, even if it is wet or muddy
- Don't tread on vegetation, even lichens
- Don't pick up plants or collect souvenirs, and pack out all rubbish and pick up other rubbish along the trail
- Use toilet facilities provided, and otherwise dig a hole 15 cm deep at least 100 m from any watercourse, and pack out all sanitary items
- Bring only biodegradable and phosphorus-free soaps, shampoos etc...
- Wash dishes, hands etc...at least 50 m from any watercourse and scatter any waste water the same distance away (Buckley 53).

Once a new management plan at Suan Phung Nature Education Park goes into effect, monitoring is important. We recommend conducting economic and environmental impact studies and publicize information to increase awareness of the park's status. We recommend surveying tourists periodically about Suan Phung. A survey would help determine tourists' characteristics, motives, and activities, and be useful for developing future tourism policies and promotional plans (Whelan 198). We recommend offering continuing education for guides to diversify their expertise. We recommend ensuring that local groups get involved with tourism to the extent they want and that they receive proper training and compensation for their work (Whelan 198).

4.3.2 Carrying capacity

In the development plan, we recommend conducting environmental impact studies and establish "tolerable levels of visitation" (Whelan 195). Tolerable levels of

visitation are the same concept as a carrying capacity and determine the appropriate number of tourists in the park. Carrying capacity refers to the maximum number of individuals who can be supported by the resources in a given area without degrading the natural, ecological, social, or cultural surroundings. For Suan Phung Park, the number represents the maximum number of tourists who should be visiting the park at one time. Many parks fail without visitor control, because tourists overfill facilities and parks go understaffed. Determining an appropriate carrying capacity is necessary to keep Suan Phung Nature Education Park running smoothly. Some parks determine a carrying capacity through Limits of Acceptable Change, some through the assistance of conservation experts, and some by judgment on what the staff can handle.

We recommend nature experts and park management work together to determine the exact levels and policies of visitation at Suan Phung. We provide examples of successful carrying capacities at other parks. In Kenya, the carrying capacity of certain parks varies from season to season or year to year depending on the amount of rainfall and the migration habits of wildlife (Whelan 31). We recommend Suan Phung analyze carrying capacity based on different seasons as well to see if different times of the year require fewer visitors to maintain area conservation. Habitats of endangered species may vary over different seasons. Particular flora may have roots that stick out, creating a higher risk for preservation of species (Whelan 31).

Control through use of a carrying capacity is used in parks throughout Thailand. Khao Yai National Park requires that camping and trekking groups are of no more than ten people and are accompanied by a nature guide (Khao Yai National Park Brochure). Controlling visitors by requiring the company of a nature guide is a

way of control that works appropriately in large parks, where numerous trekking trails exist and hikers could get lost. However, Suan Phung may not need to start with a policy like this one; the information we provide in this section may be helpful in the future. Paa She Wildlife Sanctuary Park accepts no more than 300 tourists per month and no more than 20 people per group unless a specific academic program makes a reservation for a large group activity. For special large group activities, the limit is 200 students per time (Areerat). Paa She Park bases their carrying capacity on park staff. Many tourist sites in Kanchanaburi Province control the number of tourists; however, the outcomes of carrying capacity use in Kanchanaburi Province are not known (Buckley 80).

Carrying capacity identifies when park facilities do not meet the needs of tourists. Here are two examples of how monitoring visitor levels through carrying capacity helped establish the demand for more facilities. In Suba Marine Park, an excellent example of a mutually beneficial interaction of nature tourism and ecosystem protection, the management based the maximum carrying capacity on spatial considerations rather than environmental concerns, because the Suba Marine Park staff envisions crowding to become a problem before serious environmental impacts (Whelan 125). The Monteville Cloud Forest Reserve group, in Costa Rica, undertook a study of carrying capacity at their park. They discovered that while the reserve could handle more visitors, their facilities could not (Whelan 42). We recommend utilizing a carrying capacity at Suan Phung as a way to control the number of visitors. We recommend analyzing the total area of the park compared to visitors and the amount of facilities compared to visitors.

4.3.3 Limits of Acceptable Change

Through the Limits of Acceptable Change (LAC) tool, park staff can monitor visitor impact over time. Using this method, the ecotourism board and park staffs accept that tourism changes the environment. By using LAC, the management acknowledges change and monitors change as a way to maintain control. We recommend LAC as one method for Suan Phung Nature Education Park to observe and document change. We provide information about possible indicators for Suan Phung; however, we recommend consulting an expert to determine the best indicators for the area. The best indicators are ones easily measurable by any member of the park staff.

Indicators that involve visitors or measure frequency of visitor use work well. Measuring indicators provides beneficial data to use LAC to determine an appropriate carrying capacity. One example is to use number of visitor groups one tourist encounters in one day. In an example of LAC in Suan Phung, the standard set at the park could be each group sees no more than nine other groups in one day. Visitor control is also necessary to insure that an area preserves its uniqueness. Nature tourists appreciate the undeveloped natural beauty at Suan Phung. Therefore, seeing too many other visitor groups in one day of peaceful hiking and picnicking will detract from the experience at the park.

As more tourists walk along the hiking trail at Suan Phung, the ground next to the stone trail could flatten down and the trail could become wider. The park staff can conclude widening of a trail is a result of frequent use or misuse. The park staff can examine species along the trail. Overuse or misuse of the path can cause an increase in damaged species. When using the LAC tool, we recommend picking indicators that are visually obvious. Some examples that other parks use to determine visitor use

include the width of the trail, number of trails used, number of trashcans used, frequency of needed trash disposal, and number of trash pieces in sight. From the list of indicators selected, the park staff can deduce the level of negative tourist impact that occurs at the park. We recommend setting realistic standards, accurately monitoring results, and comparing the two. If the park staff observes a negative change over time, we recommend hiring nature experts or specialists of the particular problem to help determine the cause and implement solutions immediately.

4.4 Recommendation for Increasing Revenue to the Local Community

In order to increase the profitability of tourism at Suan Phung Nature Education Park, it is important to improve the structure of existing tourism services to include high-end tourists. High-end tourism attractions draw large sums of money from tourists looking for the best or the rarest experiences during their vacation. It is impractical to recommend that world class resort tourism facilities be built at the park as this would not preserve the environment. However, promoting the park as a rare untouched part of Thai wilderness and offering high-end tourists exposure to it through nature outings, can lead to increasing economic benefits while still preserving the park goals and the condition of the environment.

Nature outings are particularly effective as high-end tourism attractions for national parks. Not only do they emphasize conservation through entertainment, as the quality of the wilderness is the attraction, but the outings are an exotic experience to foreign tourists. Naturally, high-end tourism appeals to foreign tourists over native tourists as foreigners cannot walk into their back yard at home and enjoy a smaller version of the park; it is a unique event for them. By implementing high-end tourism,

the park can increase the number of foreign tourists, and collect additional revenues from these programs (Hutter).

To begin the high-end tourism nature outing programs, we recommend two types of nature outings: guided hikes, and camping hikes. Guided hikes can be either on-trail or off-trail. On-trail guided hikes take advantage of the stone paved trails already at the park. These hikes are easy to set up, and are a good initial stage for the high-end tourism program. Off-trail or wilderness hikes are more exciting for tourists looking for a unique experience, but are more difficult to set up and must have further limiting controls than on-trail hikes to minimize damage to the untouched portions of the environment.

Guided camping outings can be for both experienced tourists and those new to camping, and the only requirement is that the tourists are physically able to hike and carry a backpack containing supplies. Park management should limit these outings as well to prevent damage to the environment. An alternate option for camping outings rather than free-form in which only the general location of camp is known, are the "base camp" style hikes in which there are pre-determined camps along an established route. These can offer comfortable facilities, but are not as environmentally friendly.

4.4.1 Setting up nature outings

There are three important steps to setting up high-end tourism nature outings: training guides, determining exactly what outings to offer, and promoting the nature outings appropriately. These steps set up three critical parts of a successful nature outing. The amount of work in training guides is dependent upon what type of nature outing they are offering and what kind of skills are required. Guided hikes require guides that have substantial knowledge of the area, such as animal and plant life, and

that information is reasonably easy to train to new guides. In addition to this knowledge, camping guides must have experience in the wilderness and be competent in camping. The ability to speak English is essential, and the more fluent and experienced guides earn a higher wage. After finding guides for tours, choosing the routes for wilderness hikes and camping trips is necessary to begin planning the actual outing details. This allows for the specific needs and details of each trip to be planned out, and gives the guides opportunities to become completely familiar with the details along the trail, allowing them to do a better job. An important last step to high-end nature outings is proper promotion. This can come in many forms such as pamphlets available at the park, but is effective when available remotely to foreign tourists. Using the internet as a medium for advertising nature outings is highly successful and allows tourists seeking such an experience to become aware of the services at Suan Phung. It is important to illustrate the special qualities of the area as well as give specific details into the expectations of each hike. Proper promotion of high-end services ensures that a demand is present to fill the available tours at any stage in the high-end tourism program's growth.

4.4.2 Continuing work

By starting with hiking trips and continuing development to camping trips, a full high-end tourism program is an excellent method to increase revenue to the local community at Suan Phung Nature Education Park. After establishing high-end tourism in the park, we recommend two possible extensions. The first is starting "volunteer outings" similar to those offered by the Sierra Club in America ("Today on Get Outdoors!"). The club markets these trips as high-end nature tourism that also gives back to the environment. The outings can include a variety of activities such as

cleaning trash along trails or assisting in research at a national park. Volunteer outings serve the double purpose of tourism and recruiting assistance with a park project effort. These trips give the volunteers a sense of accomplishment in working for the benefit of the park that goes beyond a simple wilderness experience.

The second extension is to shift control of the outings to the local people once tourism has shown such trips to be profitable. This gives them a more direct source of profit, and furthers their support and protection of the environment. This is not to say that the park should relinquish all control; it is still important for the park staff to have oversight over the number and quality of tours ongoing. This control can be established through licensing the guides at the park. Rangers can check guides for licenses, and remove any unapproved tours. Any guides conducting excessive numbers of trips or found to be damaging the environment can have their license revoked. Licensed guides can assure tourists that their services will be of good quality, as they have passed whatever requirements the park deems necessary, such as training at the park or a short tenure as an official park guide. Licensing guides helps prevent problems that could arise from the hikes.

5 CONCLUSION AND CONTINUING WORK

Using the information we collected from Staff at Suan Phung Park, case studies, and similar parks across Thailand, we provided several full recommendations. Although these recommendations represent what our team believes to be the best ways to encourage ecotourism, we cannot guarantee their complete success. There are countless factors, which could determine the successfulness of these recommendations, some, which park staff can control, and some, which they cannot. With this noted, we must add that we are confident that the recommendations given in chapter four will be of help in successfully implementing ecotourism in Suan Phung Nature Education Park.

In this chapter, we provide a brief overview of the main concepts and points of our suggestions and we propose further extensions to this project. Exploration and completion of the new projects will further help Suan Phung Nature Education Park Staff in reaching their goals regarding sustainability and development.

5.1 Water Quality

One project involves determining water usage by the community in the area. A team could survey and observe local people to determine what water is used for in different parts of the community. The information gathered would help in constructing a better water quality management plan.

Another project concerns to determining water quality in the area through sampling. Keeping different sources of pollution in mind, a team would assess the best spots to conduct sampling. Main methods would include investigating effects of the three types of pollution along with mapping out the area with respect to pollution

sources. Once a team determines the best spots to sample, park staff can hire chemists to conduct the sampling and testing. The information gathered will help to determine water quality in order to keep domestic use water safe for the community.

The final project we propose concerning water quality is to establish indicators for LAC in surface and/or groundwater. A team would investigate possible indicators for change in water quality, including aquatic life health and chemical makeup, and use information from Suan Phung to assess the best possible implementation in the park. With LAC initiated, staff can bring in experts to test water and make proper limits to keep water quality acceptable.

5.2 Poaching and Illegal Harvesting

The first project we propose to combat poaching and illegal harvesting is identifying natural resource value and sensitivity in Suan Phung Park. There are many species of rare plant and animal within the park and each of these species holds a monetary value in the area. A project to determine these values would be beneficial for assessments of the economic feasibility of sustainable business alternatives. A team could accomplish this by observing local shops and interviewing community members to ascertain general prices and values. This project would be an aid to park staff when setting up new sustainable local businesses.

Another project involves determining indicators for LAC concerning rare and endangered species. Attaining an idea of rare animal population numbers is a good way to determine if there is significant poaching in the area. We propose a team set up indicators of the different types of rare animals such as number sighted per month, or number of droppings sighted in a week. Using these indicators, staff can determine an

acceptable population level and continue monitoring to make sure that poaching does not drive the species into regional or total extinction.

The next two projects are community based. One project is to develop methods for educating the local community about the local environment. This is necessary to instill pride and concern in locals for their environment, and environmental pride will lead to better local conservation practices. A team could set up educational courses to be taught to children or local farmers, as well as help promote the park attractions to locals. Another significant topic requiring community education is setting up businesses that use area resources sustainably. Using information about local resources, the team could propose sustainable business practices gathered from case studies. After educating the local community, residents will want to help in conserving their own environment.

5.3 Negative Impacts from Tourism

We suggest a project to determine indicators for LAC to curb excessive tourist numbers by implementing a carrying capacity. To use the LAC method successfully, a team must set up obvious indicators of change. The team could find applicable indicators also survey the park area initially to set up a baseline. Staff would be able to use the indicators and baseline to monitor visitor impacts in the future and set a reasonable limit for tourists entering the park.

The second project regards determining methods for proper human waste control. This project would help alleviate the problem of trash on the trails and bacterial pollution in the places where tourists swim. A team could examine case studies of similar parks to determine how those parks remedied such problems. Examples of solutions could include special trash receptacles and strategically placed

bathrooms around swimming attractions. This project would further conservation and alleviate problems associated with excessive tourism and the negative impacts it brings.

5.4 Revenue to the Local Community

An obvious project, to help provide greater revenue to the local community, concerns recommending ways to divide park income into the community. It is important to know what areas of the community are in need and should benefit first from park income. A team could survey locals and observe village conditions in order to determine recommendations as to which places are in most need of money: schools, orphanages, or poor families. Park staff, governmental agencies, and local people could review these recommendations to determine their feasibility and best use. The local community should benefit from park income, and a system of allocating park profits is very important.

Another project concerns setting up a promotional plan and literature for high-end tourism in Suan Phung. For high-end tourism to be successful in the area, significant promotion is necessary to tourist agencies and on the World Wide Web to attract foreigners. A team could devise a plan for promoting park attractions and tours, as well as contact several agencies and draft brochures. This project would be helpful to the staff at Suan Phung, as they are not all fluent in English and may not understand promoting in countries abroad. The work completed in this project would be helpful in implementing high-end tourism and increasing cash flow to the local community.

6 BIBLIOGRAPHY

Alvarado, Ernesto, and David Sandberg. "Logging in Tropical Forest: Literature Review on Ecological Impacts." Fire and Environmental Research Applications. 9 April 2001. http://www.fs.fed.us/puw/fera.

Buckley, Ralf. Case Studies in Ecotourism. CAB International Publishing. 2003.

Behn, Mark. et al. A Carrying Capacity and Attendance Management Strategy for Massachusetts State Parks, Beaches and Reservations. Massachusetts Institute of Technology. May 11, 1998

Callister, Debra. World Bank Group. "Corrupt and illegal activities in forest sector: Current understandings and implications for World Bank forest policy." May 1999.http://lnweb18.worldbank.org/ESSD/ardext.nsf/14ByDocName/ForestGovernanceProgramBackgroundDocumentsandResearch.

Chandrasekharan, Cherukat. "Mission on Forest Fire Prevention and Management." Indonesia News Letter. 2003.

Chanthep, Prawatsart. Personal Interview. Academy Forestry level Khao Yai National Park. Head of National Research and Development of Natural Resources. 24 February 2004.

Cummings, Joe. et al. Lonely Planet Thailand. Lonely Planet Publications. Melbourne, Oakland, London, Paris. August 2003.

Director Dr. Chakkrit. Personal Communication. Royal Project staff. 17-18 January 2004.

Endangered Species and Habitats of Thailand. Ecological Research Department Thailand. Institute of Scientific and Technological Research. 1991.

Hageman, Phillip L., and Paul H. Briggs. "A Simple Field Leach Test for Rapid Screening and Qualitative Characterization of Mine Waste Dump Material on Abandoned Mine Lands." U.S. Department of the Interior, U.S. Geological Survey. 14 January 2004.

Honey, Martha. Ecotourism and Sustainable Development: Who Owns Paradise? Washington D.C.: Island Press, 1999.

Hutter PhD, Claus-Peter. Personal Interview. EuroNatur. President. 22 January 2004.

Hvenegaard Glen T. and Phillip Darden. "Ecotourism Versus Tourism in a Thai National Park." Annals of Tourism Research. 25.3 (1998): 700-720.

Khao Yai National Park. National Park, Wildlife and Plant Conservation Department. Recreation and Interpretation Division. November 2003.

Khun Areerat. Personal Communication. Royal Project staff. 17-19 January 2004.

Khun Sompop. Personal Communication. Royal Project staff. 18-19 January 2004.

Longchit, Chootima. Community Leaders' Knowledge and Perceptions Toward Eco-Tourism and Community Involvement in Ban Kram Community, Rayang, Thailand: A Qualitative Study. The Graduate School, University of Wisconsin-Stout, October 1998.

Mbabali Aulo, Mary Grace. "Development of ecotourism in protected and other natural areas of Uganda: The case of the Budongo Forest Reserve." Regional Preparatory Meeting for International Year of Ecotourism 2002. 5-6 March 2001. http://www.world-tourism.org/sustainable/IYE/Regional_Activities/Mozambique

Melamari, Lota. "Experience of Tanzania national parks on planning, development and management of ecotourism." Regional Preparatory Meeting for International Year of Ecotourism 2002. 5-6 March 2001. http://www.world-tourism.org/sustainable/IYE/Regional_Activities/Mozambique

Pu. Personal Communication. Department of Biology, Graduate Assistant. Chulalongkorn University. 24-25 February 2004.

Stewart, Jill. et al. "Microbial Source Tracking in South Carolina Surface Waters." The Newsletter of the Center for Coastal Environmental Health and Biomolecular Research. 2 February 2004.

Tacconi, Luca. et al. Sustainable Development Program, Royal Institute of International Affairs. "National and international policies to control illegal forest activities." Government of Japan. July 2003.

Thirakhupt PhD, Kumthorn. Personal Interview. Department of Biology, Faculty of Science. Chulalongkorn University. 15 January 2004.

"Today on Get Outdoors!" Sierra Club. 1 March 2004. http://www.sierraclub.org/outings/national/service.asp

U.S. Department of the Interior, U.S. Geological Survey. Toxic Substances Hydrology Program. "Handbook on Permeable Reactive Barriers Published." 16 December 2003. http://toxics.usgs.gov/highlights/PRB_handbook.html

U.S. Department of the Interior, U.S. Geological Survey. Toxic Substances Hydrology Program. "Management Practices a Factor in Herbicide Declines." 14 February 2003. http://toxics.usgs.gov/highlights/herbicide_decline.html

U.S. Department of the Interior, U.S. Geological Survey. Toxic Substances Hydrology Program. "Nature's Way of Cleaning Up Mining-Contaminated Streams." 14 January 2004. http://toxics.usgs.gov/highlights/metals_streams.html

U.S. Department of the Interior, U.S. Geological Survey. National Handbook of Recommended Methods for Water Data Acquisition. (11). 2 February 2004. http://water.usgs.gov/pubs/chapter11/index.html

U.S. Department of the Interior, U.S. Geological Survey. National Water Quality Assessment Program. "Water quality and nonpoint sources in agricultural watersheds." 16 October 2002. http://water.usgs.gov/nawqa/informing/agriculture.html

Whelan, Tensie. Nature Tourism. Managing the Environment. Washington, DC. Island Press. 1991.

7 APPENDIX

A. Notes from Khao Yai Visit

Park: Khao Yai National Park

Dates Visited: Tuesday February 24- Wednesday February 25

Interviewed: Head of National Research and Development of Natural Resources

Sites Visited: Visitor Information Center; Haew Suwat Waterfall; Mo-Sing-To Animal Watching Tower; Haew Narok Waterfall

Data Collected:

- Park management divided into 8 parts
  - each governed by 10 guards
  - each site includes visiting facilities
  - each park has 3 managers; prevention, research, service/ resorts
- No carrying capacity per area, but limits to number of tents, trash bins, rest rooms
  - 6 National Parks will determine a carrying capacity in near future
  - An increase in facilities will compensate for tourists, all different areas of Khao Yai to be promoted to spread out tourists
  - Current challenge waste incineration; current solution transport to community resource; a more efficient way is needed
- Standard enforcement used
  - Reference Act of National Park 2533
  - List of Conservation Hints provided for tourists
  - Newest Rule: Do not bring foam into National Park
- Long-term increase in fees do not effect tourist population
  - Fees from tourism bring in 30 million baht per year
  - 10 thousand tourists per day on long weekends
  - 80% Thai tourists; 20% foreign tourists
- Current problems and solutions

    - Tourists bring pets
    - Tourists bring in alcohol though the park does not sell alcohol
    - Tourist vehicles drive too fast
    - Tourists bring music, guitar, and disrupt nature
- Maintain community involvement
    - Part of each area's management promotes community involvement and sustainable practices
    - Government Cooperation WILD Aid Smithsonian Organization promotes awareness
    - Local people take advantage of the opportunity to be a guide; led to a decrease in illegal harvesting
- Community members learn sustainable practices young
    - Programs train children in sustainable practices
    - Programs train youth guides
    - Local guides promote environmental awareness, protect the forest
- Every National Park contains zoning master plan
    - Each zone is determined by area not specific to area's activity
    - Each zone promotes tourism specific to that zone
- Professional guides train every year
    - Train new guides every year
    - All training supported by Khao Yai Conservation Foundation
    - All members who speak English are encouraged to volunteer to help teach English to local guides and officers
- Ecotourism practices not yet 100% successful but good first step
    - More tourist awareness for littering needed
    - More tourist education needed
    - Sustainable management long-term project
    - Park research long-term
- Cost of guide
    - 300 baht per day
    - More dangerous trails 500 baht per day

- Overnight trails/ camping require a hired guide for protection 500 baht per day
- Foreigners have the same prices and services as Thai people

- Water supply, electricity
  - Mo-Sing-To Reservoir created as a primary water supply
  - Electricity shuts off in camp sites at 10pm
- Season for trekking
  - Some trails close in the dry season if they require more than 2 days to hike because hikers may run out of their water supply
  - Trails close for safety reasons
- Future goals regarding the attitude of tourists
  - Promote trekking on nature trails
  - Try to change attitude of tourists to make them more interested in trekking
  - Promote environmental education
- Khao Yai Conservation Project
  - Led by 3 professional trained teams of rangers
    - Patrol Team- protects park from poachers
    - Scientific Team- conducts studies, counts animal populations
    - Community Outreach Team- works with local children and community leaders
  - Goal of project
    - To reduce poaching
    - To restore and maintain Khao Yai ecological balance
    - To share experiences and knowledge gained from Khao Yai Conservation Project with other parks across Asia and Thailand
  - Measuring success of Khao Yai Conservation Project
    - measures population trends to determine success; increase of animal population indicates decrease in poaching
    - monitors by intensive year round surveys

- secretly placed, infrared jungle "camera traps"
- transact counting methods

admits that challenges still exist, attributes existing challenges to local poverty and ill equipped rangers

B. Email of Suggestions From Dr. Claus-Peter Hutter

Delivered-To: jsiripas@pioneer.netserv.chula.ac.th
From: "Claus-Peter Hutter" <claus-peter.hutter@euronatur.org>
To: <siripastr.j@chula.ac.th>
Cc: Werner Mühlbauer <muehlbauer@ats.uni-hohenheim.de>,
"Friedhelm Goeltenboth" <friedgoelten@gmx.de>
Subject: Suggestions for Suan Phung Project
Date: Wed, 18 Feb 2004 14:37:41 +0100

Dear Mrs. Siripastr,

Many thanks for your message. Today, I would like to refer to our meeting and forward you the announced recommendations concerning the Suan Phung Project initiated by HRH Maha Chakri Sirindhorn. The suggestions mainly consider the subjects sustainable development, protection of biodiversity, broadly based environmental education as well as environmentally sound tourism.

1. For our opinion, the area has a lot of potential for renaturation measures and environmental education. However, these potentials can only be used and put in ecological and economic value if the visitors of the area - both excursionists as well as high price tourists - come across almost pristine nature. As a consequence, paths and trails as well as other development measures should only occur on a limited scale.

2. Already now, in the range of the hot springs as well as the water cascades, a huge number of paths and uncontrolled trails are in existence. In case of growing numbers of visitors, , which is to be expected those places, will inevitably lose their holy spirit and therefore their identity. It is absolutely necessary to take countermeasures: We suggest removing the kiosks in the range of the hot springs. Also, camping on and entering the water cascades should be prohibited. In case the negative development continues, these places of great natural individuality and beauty will lose their particularity, turn into an area of common amusement, and then be comparable to many other places in the world with undesirable development.

3. Visitor management is absolutely necessary; from our point of view, existing paths and trails are sufficient. Trespassing needs to be stopped.

4. By courtesy of the reforestation of damaged areas, we see good chances of subnatural rehabilitation. We have gained a lot of experience concerning this matter on more than 40 study sites on Leyte Island, Philippines. We already offered our support to the Vice Director of the Royal Projects of HRH Maha Chakri Sirindhorn, Mr. Kitti Kanthamit. Within the scope of the so-called "Rainforestation-Method" which is using autochthonal and endemic tree and

shrub species, it is possible to rebuild subnatural forests. Here, we could help with advisory service as well as with training. I suggested Mr. Kitti Kanthamit to visit our joint project on Leyte Island/Philippines (partners are the University of Hohenheim near Stuttgart/Germany, the Leyte State University and the European Nature Heritage Fund) together with his experts.

5. We can also support the training of disseminators who could pass on the Rainforestation method to subsistence farmers. In addition, we could help in finding possibilities for scholarship holders from Thailand for education and training as well as special qualification at the Center for Agriculture in the Tropics and Subtropics of Hohenheim University. I am - on honorary basis - acting as chairman of the scientific committee and also, I am holding lectures in the subject "Environmental Management" in the international study course "Environmental Management and Agricultural Food Production".

6. For my opinion, an environmentally sound and sustainable tourism is possible, if it is kept within a limit and professionally guided. This means that for our opinion the amount of tourists spending some days in special camps should be limited. Those tourists will mostly come from Europe and North America. In the end, an environmentally sound tourism could be established, also because adequate partners are available. Overall, we see great potential for ecology and economy in Thailand by valorization and amplification of national parks and their advertisement. As far as we are informed, by now, only around 5 % of all visitors of national parks are foreigners. This reflects the great-unused potentials existing. On the other hand, more visitors also call for visitor management as well as professional supervision. Here, places of employment for locals could be created, expanded and safeguarded.

7. In the meantime, we have made good experiences in different parts of Germany and Europe to protect ecosystems and to aim at a protection of processes (process protection) instead of regarding a single flora or fauna species. Former follows the complicated structures of natural balance and its respective biotopes best. Efforts in the protection of habitats by process protection automatically lead to the becoming of the ecological structure needed for the conservation of the different flora and fauna species.

We could also engross the thoughts and exchange of information about this subject and provide experts for a visit in Thailand or in Germany.

We are happy to bring in our international experience from numerous model projects in the Suan Phung Project and are looking forward to a cooperation and exchange of knowledge.

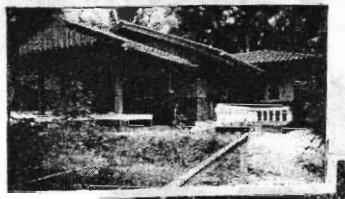
Sincerely yours

Claus-Peter Hutter

Dr.h.c. Claus-Peter Hutter
Präsident

EURONATUR
Bahnhofstrasse 35
D - 71638 Ludwigsburg
Tel.: ++49 (0)7141 92 03 21
Fax: ++49 (0)7141 90 11 83
claus-peter.hutter@euronatur.org
www.euronatur.org

Boe Klueng Hot Spring
Suan Peung District
Ratchaburi Province



Resort

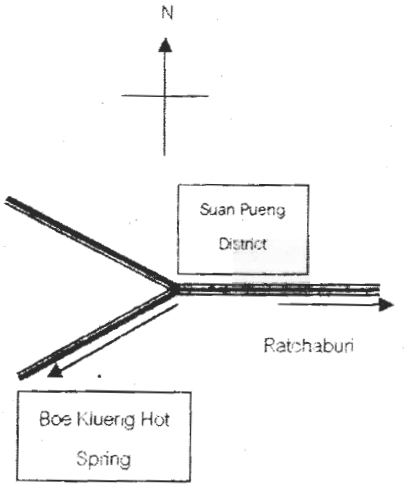
Hot Spring

Feeling nature, fresh air with mountains, forest, and waterfalls of Thailand which is situated on the border next to Myanmar. It is attractive and challenging.

Hot Spring is as a natural present to make people warm and freshy.

Its temperature is always about 40 - 50 celcius

Route	Distance
Bangkok – Ratchaburi	100 kilometers
Ratchaburi – Suan Pueng District	53 kilometers
Suan Pueng District – Hot Spring	14.5 kilometers



Reservation

Mr. Tertsak Monyakula

27 Moo 7 Boe Klueng,Suan Pueng ratchaburi

OR

Ms.Saipin 032-364188 ,01-9867510

Mrs. Sriporn 032-711086, 09-9182114

Taking a bath

Type	Adult (bath)	Child (bath)
Decorated pool	50	30
Natural pool	30	20

Touring Places

Dumneon Saduak District

- Floating Market in Dumnern Saduak District
- Family life in Dumnern Saduak canal

Potaram

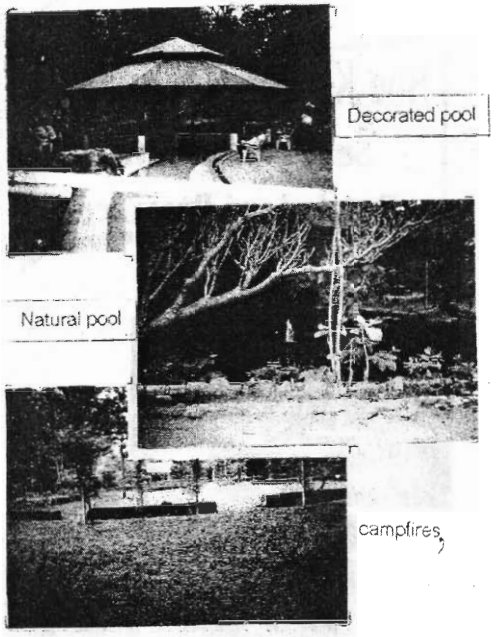
- Tam Kangkao Chongpram
- Nang Yai Wat Kanon
- The Mural at Wat Kongkaram
- The King Rama VI monument

Jom bueng District

- Tam Chompon
- Tam Chao bin
- Khao Pratup Chang open Zoo
- Suan Prenksasrt Wannakadee Pak Klang

Suan Pueng District

- Boe Klueng Hot Spring
- Klao Jone Waterfall
- Pong Yup
- Usawadee rose garden
- Pawotai museum
- Handicraft center and Sirikit Forest
- Kang Som Maew



Water in this stream had been analyzed by the science Department and was found to be safe for skin treatment. It is believed that a bath in this stream can help you remain young, active and relaxed. It also help to lose weight.

There is a pool about 320 square meters. It contains 50 people. It is clean and good for your family and friends.

Accommodation

Resort

For	20	people /night	4000	bath
For	15	people/night	3000	bath
For	10	people/night	2000	bath

Tent

A Big tent for	10	people/night	1500	bath
A Small tent for	2	people/night	300	bath

Tent brought 80 bath a person

There are campfires, drums, speakers and microphones for **free.**

- Free taking a bath in Hot Spring for staying at night customers.
- If you would like to cook,please bring your instruments yourselves.

Souvenirs

- Natural honey From Tanaosri Mountain
- Pomelo
- Lots of fruit

Boe Klueng Hot Spring Restaurant

Saturday - Sunday	8:00 a.m. - 6:00 p.m.
Monday –Friday	8:00 a.m. - 5:00 p.m.

Menu

Sticky rice with Papaya Salad (Somtum)	10 - 20 bath
Fried rice	20 bath
Fried pork, Larp, Numtok	40 bath
Fried boar or fried domestic folw with chili	50 bath

A domestic fowl soup (Tom Yum Kai Ban)

50-100 bath

The snakehead soup (Tom Yum Pla Chon)

50-100 bath

Many kinds of meat soup (Tom Yum Ruam Mit)

50-100 bath

Boiled rice mixed with chicken, prawns, pork, squid

20-50 bath

Soup	40 – 80 bath

Or any kinds you would like

D. Tourist Survey Results

Tourist Survey

Survey Completed: 18 January 2004
Location Surveyed: Khao Jone Waterfall

How did you enter the area?	How long will you stay in the park?	If spending the night, where do you stay?	Other than visiting the waterfall, will you visit the hot spring as well?	Where are you from?
village	half day	resort	yes	Bangkok
project	1 day	resort	yes	Ratchaburi
village	1 day	project cottage	no	Bangkok
project	half day	other	yes	Ratchaburi
village	half day	resort	yes	Bangkok
village	2 days	resort	yes	Nontaburi
village	half day	other	yes	other
village	half day	resort	yes	Bangkok
project	half day	never spend the night	yes	Supanburi
village	half day	project cottage	yes	Bangkok
project	half day	resort	yes	Samutprakarn
village	half day	never spend the night	yes	Nonthaburi
village	1day	friend's house	no	Ratchaburi
village	half day	other	yes	Phetchaboon
village	half day	never spend the night	yes	Samutprakarn
village	2 days	resort	yes	Bangkok
project	half day	resort	no	Samutprakarn
project	1 day	resort	yes	Bangkok
village	half day	resort	yes	Bangkok

project	half day	[left blank]	yes	Phetchaburi
village	half day	other	yes	Phetchaburi
village	half day	resort	yes	Supanburi
village	half day	resort	yes	Bangkok
village	1 day	resort	yes	Bangkok
village	1 day	resort	yes	Bangkok
project	half day	resort	yes	Nakornphatom
village	half day	never spend the night	yes	Nonthaburi

E. EuroNatur Rainforestation Information

How to repair a rainforest?

- Rainforestation Farming Concept -

Philippine Rainforest

About 100 years ago, 60% of the surface area of the Philippines was covered with rainforest. Today, only 6% remain.

Consequences:

- shortage of timber
- soil erosion and landslides
- floods

Forest was replaced by coconuts and fields

After clearing the rainforest, coconut plantations and shifting cultivation were installed.

Consequences:

- only short term agricultural use was possible
- severe soil erosion and sedimentation in near-shore coral reefs occurred
- degraded soils and low economic revenues for coconut products threatened the subsistence of the farmers
- reduction of the rainforest areas resulted in the destruction of habitats for animal and plants
- primary rainforest was lost forever

Scientists from the **Leyte State University** (Philippines) and the **University of Hohenheim** (Germany), supported by the **European Nature Heritage Fund EURONATUR**, developed a reforestation concept to re-establish a near-to-nature forest area of use for man and animal.

The "Rainforestation Farming" concept

→ Cultivation of native rainforest tree species in combination with coconuts, timber and fruit trees offers new habitats for animals and plants

→ Different cash crops are integrated into the system at the same time:

- fruit-bearing trees like Mangoes und Durian
- shade loving plants like coffee and ginger
- spices like cardamom and vanilla

www.troz.de

Success story

→ One of the smallest and highly endangered monkey species of the world, the tarsier, found a new home in "rainforestation" areas

→ Arable soils and income for poor subsistence farmers are sustainably secured

University of Hohenheim
Centre for Agriculture in the Tropics
Contact: Prof. Dr. Friedhelm Göltenboth
(goltenfr@uni-hohenheim.de)

Leyte State University (LSU)
Leyte, Philippines
Contact: Dr. Paciencia P. Milan
(opvisca@mozcom.com)

European Nature Heritage Fund
Euronatur, Radolfzell
Contact: Claus-Peter Hutter
(info@euronatur.org)

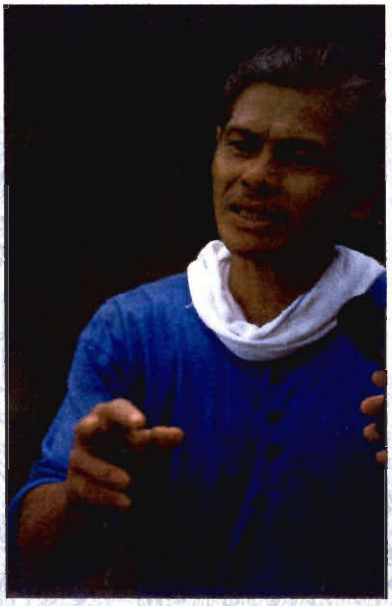
The future of my grandchildren

- Reforestation sustainably secures income -

Portrait: **Romano Macario**

married, 3 children

subsistence farmer on Leyte, The Philippines



Coconuts and further agricultural activities yield less and less income to secure a decent living for the family of Romano Macario.

Copra, the dried pulp of the coconut, the main product of Romano Macario's farm, is a raw material for cosmetics and lubricants. The value of copra on the world market declines constantly.

Since 1991, Romano Macario has planted more than 4000 seedlings of native rainforest tree species underneath his old stand of coconuts, because his steep sloping farmland threatened to slide down-hill:

- broad rooting tree species such as *Casuarina sp.* to stabilise the slopes
- quality timber trees and fruit trees as new, alternative source of income

Plantation, two years old

A high quality timber tree is worth thousands of EURO

„With the "Rainforestation Farming" concept I do not only protect my farmland against further erosion, but I also secure my income and that of my children and grandchildren. These timber trees are our savings account!"

www.troz.de

University of Hohenheim
Centre for Agriculture in the Tropics
Contact: Prof. Dr. Friedhelm Goltenboth
(goltenfr@uni-hohenheim.de)

Leyte State University (LSU)
Leyte, Philippines
Contact: Dr. Paciencia P. Milan
(epvisca@mozcom.com)

European Nature Heritage Fund
Euronatur, Radolfzell
Contact: Claus-Peter Hutter
(info@euronatur.org)

Car parts from banana fibres?

- career opportunities for the Abaca fibre -

Abaca or Manila-hemp

The banana species *Musa textilis* is one of the most interesting plants in the "Rainforestation Farming" concept. It produces the worlds longest and strongest natural fibre of up to 3 m length.

About two years after planting the first fibres can be harvested. Three harvests per year are possible

The fibres are extracted, mostly by hand, from the pseudostems of the banana plant

Drying of the fibres

This shade loving banana species offers a rapid and sustainable income for the farmers

www.troz.de

Areas of use for the fibres

Today:

- Ropes and bags
- Textiles and souvenirs
- Enhancing the durability of banknotes

Future:

in combination with two-component-plastics and epoxy resins as replacement for glass fibres in composite materials:

- Manufacturing of car parts
- Furniture

University of Hohenheim
Centre for Agriculture in the Tropics
Contact: Prof. Dr. Friedhelm Göltenboth
(goltenfr@uni-hohenheim.de)

Leyte State University (LSU)
Leyte, Philippines
Contact: Dr. Paciencia P. Milan
(opvisca@mozcom.com)

European Nature Heritage Fund
Euronatur, Radolfzell
Contact: Claus-Peter Hutter
(info@euronatur.org)

From burning trees to growing trees

- the conversion of grassland into forest -

With the development of the different tree species, the tree canopy closes more and more and a forest appears :

Planted tree-seedlings on grass covered slopes

1 year later

2 years later

4 years later

The Vision

www.troz.de

University of Hohenheim
Centre for Agriculture in the Tropics
Contact: Prof. Dr. Friedhelm Göltenboth
(goltenfr@uni-hohenheim.de)

Leyte State University (LSU)
Leyte, Philippines
Contact: Dr. Paciencia P. Milan
(opvisca@mozcom.com)

European Nature Heritage Fund
Euronatur, Radolfzell
Contact: Claus-Peter Hutter
(info@euronatur.org)

F. Interim Report Submitted to HRH Princess Maha Chakri Sirindhorn

Ecotourism in Suan Phung Nature Education Park:
Balancing Conservation with Economic Development

An Interim Report

Submitted by:

David Bresnick
Pamela Giasson
Theodore Phillips

Project Advisors:

Professor Joel J. Brattin
Professor Stephen J. Weininger

Sponsored by:

The Office of HRH Princess Maha Chakri Sirindhorn's Projects,
Bureau of the Royal Household

Project Liaisons:

Ajarn M.L. Siripastr Jayanta
Ajarn Luxsana Limsavarn

11 February 2547

Introduction

Your Highness, we are a team of students from Worcester Polytechnic Institute, a U.S. university in the state of Massachusetts about 65 km west of Boston. WPI's curriculum centers upon the study of science and technology, along with the impact these have on society. We are currently completing a project here in Thailand based on integrating science, technology, and society. We are examining societal issues and working to provide solutions to improve the lives of Thai people directly. For this project, we are to complete a full professional report including goals, methods, and results. With your permission, we will present this report to you upon its completion at the end of our stay in Thailand (the first week of March). In the interim, we would like to inform you of our goals, methods, and future work, and provide a preview of our expected results.

For this project, The Office of HRH Maha Chakri Sirindhorn's Projects, Bureau of the Royal Household, asked our team to help maintain balance in the Suan Phung Nature Education Park. The current park staff has informed our team of a conflict between conservation of the park area and tourism. The staff is concerned that tourists may damage the environment and local community, and has chosen ecotourism as a method of balancing environmental conservation with economic development in the Suan Phung area. This balance will aid the local people economically while conserving the area in which they live.

Goals

The goal of our project is to assist the Royal Project staff in successfully implementing ecotourism strategies for three key park areas: Khao Jone Waterfall, Boe Klueng Hot Spring, and Khao-Ka Jome Mountain. Park staff chose these areas because they have the most potential for attracting tourists, thus bringing in economic benefits, but also causing environmental damage. We will propose plans for both sustainable economic development and environmental conservation at these three park attractions. We will recommend strategies and tools, which park staff can use to implement successful ecotourism in Suan Phung Nature Education Park.

Methods

To attain these goals and provide useful recommendations, we will interview staff and observe conditions at Suan Phung Nature Education Park and similar parks, as well as analyze relevant case studies. We have interviewed many of the important staff members at Suan Phung in order to gain a firmer grasp of the park, its challenges, and the opportunities it presents. We also observed the current park environmental status along with the condition of the hot spring, waterfall, and mountain. As of now, we have visited two other parks facing similar issues: Paa She Wildlife Conservation, directly to the south of the Suan Phung Park, and Erawan National Park in Kanachaburi province. At these parks, we interviewed staff members in order to determine how they coped with challenges and implemented ecotourism. We also observed park conditions and operations in these two locations and analyzed possible applications in Suan Phung. In the near future, we plan to visit Khao Yai National Park to find further information regarding ecotourism.

We have also investigated case studies of parks facing similar challenges. We

found studies based in the U.S., Thailand, Indonesia, and the Philippines along with other countries. These studies will help us determine ecotourism strategies for the challenges in Suan Phung, and assess the effectiveness of various solutions.

Currently we are able to provide two firm recommendations for the park staff, and in our final report (to be completed in early March), we plan to present several more. Our current recommendations regard challenges concerning park water quality and illegal poaching and harvesting on park grounds.

Recommendation One

Water quality is important in the Suan Phung Park, as many communities use the water for drinking and washing without any filtering beforehand. Through the analysis of manuals, cases, and standards of mainly governmental organizations, we produced a list of recommendations for testing, monitoring, and, in some cases, treatment of water. This recommendation will help the communities within the Suan Phung Nature Education Park have access to clean water.

Suan Phung staff informed us of three concerns about water quality. The first regards several tin mines in the park, most of which are abandoned. Staff suspects that these mines leak traces of heavy metal into the ground water and nearby streams, potentially causing sickness in nearby communities. We recommend first that a chemist conduct tests to determine the current quality of stream and ground water. He may use methods such as high precision chromatography and specific conductance to determine levels of heavy metal in the water. In addition, a geologist should test the mine area using a simple leech field test to examine the ground for contaminants. When monitoring the water, some indicators of problems include dead aquatic life and changes in pH or ion levels. Some solutions to these problems include sealing

mine areas, installing a water treatment facility, and providing reactive barriers for trace metals. To implement these solutions park staff should look toward engineers, geologists, and chemists, along with water organizations such as USGS Water.

The second concern regards orange farms in the area that use heavy pesticides. Scientists suspect that these chemicals infiltrate ground water and may cause health problems for nearby villagers. The final concern is the possibility of tourists contaminating village water supplies by swimming in Khao Jone Waterfall and Boe Klueng Hot Spring. It is likely that the tourists will introduce unsafe levels of bacteria into the water at these locations. We have a similar list of recommendations regarding these two types of pollutants as well; we will detail them in our final report.

Recommendation Two

Our second recommendation is in response to the challenge of local Thais poaching, logging, and illegally harvesting indigenous flora and fauna. The Suan Phung Park area is government owned conservation land and therefore it is unlawful to harvest plants, log, or hunt animals in the area. Unfortunately, there currently is no enforcement of these laws, as there are no park rangers and the community has limited concern for the environment. For example, many locals will cut down trees or hunt under cover of darkness without repercussions. Such illegal activities badly damage the environment, as species of orchids and rare hardwoods are disappearing from the area. The goal of our recommendation is to help prevent or minimize illegal harvesting, logging, and poaching in the area by providing techniques used in other similar parks. This recommendation contains two main suggestions.

Our first suggestion regards an improvement of law enforcement in the park area. To achieve consistent enforcement, several possible approaches are feasible. The

park could draft a constitution that assures the protection of flora and fauna. It is important for locals to know the exact laws governing the environment. If necessary, building watchtowers could help secure the area. Imposing visible and consistent enforcement may deter criminal behavior. These actions could easily tie into community involvement as well, since park staff can train local people as police or guards and pay them to protect their homeland.

The most successful proven way to reduce illegal harvesting and poaching is through community-based intervention. By giving the local community a stake in the welfare of their environment, the people will develop a sense of pride and a desire to protect their own area as an asset. One way to accomplish this end is to reward or compensate community members who report illegal activity. Although this approach has variable results, in some cases it can be effective. Possibly the best way to ensure a reduction in illegal harvesting is to establish enterprises that sustainably harvest natural resources and have direct economic benefit for locals. With a direct economic benefit, community members will see to it that they take care of the forest in order to keep their business profitable. The final and possibly most important measure to take against illegal harvesting is community education. If park staff is able to successfully educate the community about the economic and physical disasters that can occur from environmental abuse, this strategy could prove most effective in environmental conservation.

Continuing Investigations

Besides these two recommendations, we will deliver several more in our final report. These recommendations will focus upon other important challenges facing the successful implementation of ecotourism in Suan Phung Nature Education Park. We

will provide recommendations regarding a carrying capacity for tourists at the park, in order to limit environmental damage. We will assess the effects of implementing high-end tourism as a way of economically benefiting the community while attracting foreign tourists. Finally, our report will address issues regarding the distribution of wealth from tourists, and community access to the local resources in the park.

We hope that our recommendations will be of help to the Suan Phung Nature Education Park Project and that they will aid the park staff in successfully implementing sustainable ecotourism. Upon completion of our report, we shall submit it to park staff and project directors for their review.

We are grateful for the opportunity to work with The Office of HRH Maha Chakri Sirindhorn's Projects, Bureau of the Royal Household, and hope to keep our relationship strong into the future.

Selected Relevant Sources

Buckley, Ralf. International Centre for Ecotourism Research, Australia. Case Studies in Ecotourism. CAB International Publishing. Massachusetts. 2003.

Endangered Species and Habitats of Thailand. Ecological Research Department Thailand. Institute of Scientific and Technological Research. 1991.

Key, Pete. Fipronil - New Insecticide to be Studied. Center for Coastal Environmental Health and Bimolecular Research, CCEHBR News. October 2000.

National Field Manual for the Collection of Water-Quality Data. U.S. Department of the Interior, U.S. Geological Survey. March 2003.

Tacconi, Luca. Center for International Forrest Research. Boscolo, Marco. Center for International Development. Brack, Duncan. Sustainable Development Program, Royal Institute of International Affairs. National and international policies to control illegal forest activities. Government of Japan. July 2003.

G. Suan Phung Opening Presentation Poster

Ecotourism in Suan Phung Nature Education Park

Goal

To assist the Royal Project staff in implementing ecotourism by creating a series of recommendations

Methods

- Conduct interviews and observe conditions at similar parks
- Examine case studies for related problems and effective solutions

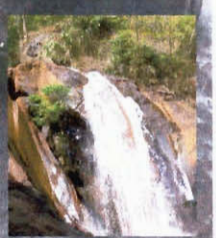
Recommendation 1 - Water Quality

Water sources at Suan Phung Park may have contamination from three different sources: tin mines, agriculture, and tourists.

Tin mines may introduce heavy metals
- Test specific conductance of water
- If contaminated: seal mine or use reactive barriers

Agriculture may introduce chemical pesticides
- Test chemical content of water
- If contaminated: implement pesticide regulations; use timed application of pesticides

Tourists may introduce bacteria
- Test for oxygen demand or use MAR Test on water
- If contaminated: regulate tourist area; implement water treatment



Recommendation 2 - Illegal Harvesting and Poaching

Local people are illegally harvesting and logging in the park area for economic benefit.

There are two approaches to remedy this.

Community Based Solutions
- Hold conferences to educate and communicate with locals
- Establish businesses that harvest resources in a sustainable and profitable manner
- Reward community members for reporting illegal activity
- Create enthusiasm and pride in the community for its local environment

Improvement of law enforcement
- Train locals as rangers and police to patrol the area
- Adopt a set of laws governing park resources
- Impose visible and consistent enforcement

Continuing Efforts

We plan to provide futher recommendations regarding key issues

These recommendations will include:
- determining a carrying capacity to limit tourist levels
- investigating possible benefits of high-end tourism in the park
- identifying methods for increasing returns to the local community

H. Khao Yai Park Brochure

KHAO YAI

Khao Yai National Park
National Park Office
National Park, Wildlife and
Plant Conservation Department
http://www.dnp.go.th

Khao Yai is Thailand's oldest National Park, declared in September 1962. In 1982 it was enlisted as an ASEAN heritage site due to its variety of flora and fauna, and is now world-famous. Khao Yai has also been nominated as a World Heritage Site. It is Thailand's third largest National Park, covering an area of 2,165.55 km and its highest peak, Khao Rom, reaches an elevation of 1,351 m above sea level. Khao Yai is part of the Phanom Dongrak Range, which forms a mountainous wall fencing the northeast plateau from the central plain of Thailand. Park Headquarters are situated roughly 200 km northeast of Bangkok. The Park extends across four provinces: Saraburi, Nakhon Nayok, Nakhon Ratchasima and Prachin Buri. Khao Yai has many attractions, including waterfalls, a rich diversity of plants (approx. 2,000 species), plentiful wildlife and an interesting cultural history. It is easy to understand why Khao Yai is Thailand's most popular National Park.

Khao Yai National Park is one of six related areas under the management of National Parks, Wildlife and Plant Conservation, which together constitute Queen Sirikit's Dong Phayayen-Khao Yai Forest Complex, in recognition of Her Majesty the Queen's 72nd birthday anniversary. The other five areas are Pangsida National Park; Ta Phraya National Park; Thap Lan National Park; Phraputtachai National Park; and Dongyai Wildlife Sanctuary. See the relevant brochures for more information on each area.

General information

How to get there:

By car: From Bangkok, Khao Yai is less than 3 hours by car. From Phahonyothin Road the quickest way (160 km) is to turn right at Rangsit Junction into Highway 305 (Rangsit to Nakhon Nayok). Before arriving at Pranchinburi, switch left to Highway 33 at Naresuan Junction. Turn left on Highway 3077 which leads northwards another 41km to the park headquarters.

By bus from Bangkok: Buses leave the Northern Bus Terminal (Mo Chit) for Pak Chong and Nakhon Ratchasima about every half-hour. From Pak Chong take a songtaeo to the park headquarters. It is also possible to take a bus from Mo Chit to Naresuan Junction, and then take a songtaeo from there to the park headquarters.

The park's visitor centre, located at park headquarters, provides a useful starting point for visitors. It contains information and interpretive facilities to entrance visitor's appreciation of the park. The visitor centre also includes exhibits on the natural environment and wildlife of Khao Yai and has information about day-hiking trails. The visitor centre closes at 6 pm.

The Park has a range of accommodation facilities, including: Camping: Visitors are able to bring their own tents or rent them at the Park for a small fee. Bungalow: Fourty bungalow are available for rent. Dormitory : The Park also has seven domitories available. Outside the Northern entrance of the Park, there are private resorts and campsites available for rent.Restaurants are located in five areas of the park; at park headquarters, Heo Suwat waterfall, Pha Kluai Mai campsite, Lam Ta Khlong campsite, and Heo Narok waterfall.

Conservational Hints

To maintain natural integrities of the park, in an appropriate manner that can eternally serve public educational and recreational needs, you as a park visitor can assist the park authority by following these :

- Do not harm or remove flora or fauna though they are in forms of leaves, flowers, fruits or any forms of forest products.
- Do not commercially operate human activities within the park area.
- Do not bring along weapons or hunting gears into the park area.
- Do not place or establish unauthorized signs or posters in the park and do not generate loud noises which may disturb other visitors or other park's natural organisms.
- Do not leave garbage wastes, or fuel matters, which may cause fire, outside the provided containers.
- Do not drive air-pollution generating vehicles within the park area.
- Drive your vehicles carefully and obey park's traffic regulations or signs and also park your vehicles properly only on provided parking grounds.
- Keep your visit in a manner which conforms with good Thai tradition and culture.
- Strictly follow park regulations and orders made by park law enforcement personnel.
- Do not bring foam ware into the National park.

For Reservation and Information contact:

- **Khao Yai National Park**
  PO Box 9, Pak Chong, Nakhon Ratchasima
  Thailand 30130 Tel. 66 3731 9002
- **National Park office**
  National Park, Wildlife and Plant Conservation Department
  61 Phahonyothin Rd., Chatuchak, Bangkok 10900
  Tel. 66 2579 7223, 66 2561 2919 and
  66 2561 4292-3 Ext. 724, 725
  Room reservation can be made through internet
  at www.dnp.go.th