ASSESSMENT OF TOURIST SITE POTENTIAL AND APPLICATION OF ENVIRONMENTAL MANAGEMENT SYSTEM FOR ECOTOURISM DEVELOPMENT IN SRI NAN NATIONAL PARK, NAN PROVINCE

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การประเมินศักยภาพของแหล่งท่องเที่ยวและการประยุกต์ระบบการจัดการสิ่งแวดล้อม เพื่อการพัฒนาการท่องเที่ยวเชิงนิเวศในอุทยานแห่งชาติศรีน่าน จังหวัดน่าน

นางสาวทัศนาวลัย อุฑารสกุล

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต
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Thesis Title	ASSESSMENT OF TOURIST SITE POTENTIAL AND APPLICATION OF ENVIRONMENTAL MANAGEMENT SYSTEM FOR ECOTOURISM DEVELOPMENT IN SRI NAN NATIONAL PARK, NAN PROVINCE
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ทัศนาวลัย อุฑารสกุล: การประเมินศักยภาพของแหล่งท่องเที่ยวและการประยุกต์ระบบการจัดการสิ่งแวดล้อมเพื่อการพัฒนาการท่องเที่ยวเชิงนิเวศในอุทยานแห่งชาติศรีน่าน จังหวัดน่าน (ASSESSMENT OF TOURIST SITE POTENTIAL AND APPLICATION OF ENVIRONMENTAL MANAGEMENT SYSTEM FOR ECOTOURISM DEVELOPMENT IN SRI NAN NATIONAL PARK, NAN PROVINCE) อ. ที่ปรึกษา: รองศาสตราจารย์ ดร. กำธร ธีรคุปต์, อ. ที่ปรึกษาร่วม: ผู้ช่วยศาสตราจารย์. ดร. อาจอง ประทัตสุนทรสาร, 151 หน้า.

การศึกษาการประเมินศักยภาพของแหล่งท่องเที่ยวและการประยุกต์ระบบการจัดการสิ่งแวดล้อมเพื่อพัฒนาการท่องเที่ยวเชิงนิเวศในอุทยานแห่งชาติศรีน่าน จังหวัดน่าน ได้ดำเนินการศึกษาตั้งแต่เดือนธันวาคม 2548 – ธันวาคม 2550 ผลการศึกษาสามารถคัดเลือกตัวชี้วัดแยกตามประเภทของแหล่งท่องเที่ยวธรรมชาติ 5 ประเภท ได้แก่ ภูเขา ธรณีสัณฐาน แก่ง แหล่งน้ำขนาดใหญ่และถ้ำ ได้ทั้งหมด 20 ตัวชี้วัด โดยพิจารณาตามองค์ประกอบหลักของการท่องเที่ยวเชิงนิเวศทั้ง 4 ด้านคือ ศักยภาพในด้านความเป็นธรรมชาติของแหล่งท่องเที่ยวประกอบด้วย 6 ตัวชี้วัด ศักยภาพในด้านการจัดการที่ยั่งยืนประกอบด้วย 8 ตัวชี้วัด ศักยภาพในด้านการให้ความรู้ด้านสิ่งแวดล้อมประกอบด้วย 4 ตัวชี้วัด และศักยภาพในด้านความมีส่วนร่วมของชุมชนประกอบด้วย 2 ตัวชี้วัด จากผลการประเมินศักยภาพพบว่าผาชู้และเสาดินมีศักยภาพในการท่องเที่ยวเชิงนิเวศในระดับสูงมาก ดอยเสมอดาวมีศักยภาพอยู่ในระดับที่สูง ในขณะที่แก่งหลวงและหมู่บ้านประมงปากนายมีศักยภาพในระดับปานกลางทั้งในและนอกเทศกาลท่องเที่ยว

ในการประยุกต์ระบบการจัดการสิ่งแวดล้อมเพื่อพัฒนาการท่องเที่ยว ได้ศึกษาถึงการใช้ทรัพยากรของนักท่องเที่ยวพบว่านักท่องเที่ยวต้องการใช้พื้นที่ในการพักแรมอย่างน้อย 2 ตารางเมตร/คน ใช้น้ำประมาณ 10.8 ลิตร/คน/วัน และสร้างขยะประมาณ 600 กรัม/คน/วัน ภายหลังจากการศึกษาได้จัดทำคู่มือพักแรมเชิงนิเวศ และลดผลกระทบจากการท่องเที่ยวด้วยการเพิ่มถังขยะและประชาสัมพันธ์ให้นักท่องเที่ยวร่วมกันแยกขยะและใช้ผลิตภัณฑ์ทำความสะอาดที่เป็นมิตรต่อสิ่งแวดล้อม รวมทั้งเพิ่มกิจกรรมการเรียนรู้ด้านดาราศาสตร์ให้กับนักท่องเที่ยว ซึ่งกิจกรรมดังกล่าวได้รับความสนใจและร่วมมืออย่างดียิ่งจากนักท่องเที่ยว อันเป็นสิ่งบ่งชี้ถึงความสำเร็จในการพัฒนาการท่องเที่ยวเชิงนิเวศในอุทยานแห่งชาติศรีน่านได้เป็นอย่างดีหากมีการจัดการที่เหมาะสม

ทั้งนี้ นักท่องเที่ยวร้อยละ 85.8 เดินทางมายังอุทยานแห่งชาติศรีน่านเพื่อต้องการพักผ่อน ตลอดจนเพื่อชมทะเลหมอก ชมทัศนียภาพและถ่ายรูป ร้อยละ 59.1, 58.6 และ 47.3 ตามลำดับ ในจำนวนนี้นักท่องเที่ยวร้อยละ 49.2 พักค้างแรมโดยเฉลี่ย 1 คืน ข้อเสนอแนะหลักจากนักท่องเที่ยวเพื่อการพัฒนาอุทยานแห่งชาติศรีน่าน คือ ต้องการให้อุทยานแห่งชาติศรีน่านคงความเป็นธรรมชาติไว้ให้มากที่สุด พัฒนาหาพื้นที่กางเต็นท์สำรองรวมทั้งที่จอดรถ และเพิ่มความสวยงามด้านภูมิทัศน์ด้วยการปลูกต้นไม้และไม้ดอก เพิ่มการประชาสัมพันธ์ เพิ่มจำนวนเต็นท์และถุงนอนให้เช่า และมีมาตรการจำกัดจำนวนนักท่องเที่ยว

สาขาวิชา วิทยาศาสตร์สิ่งแวดล้อม ลายมือชื่อนิสิต ทัศนาวลัย อุฑารสกุล

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TATSANAWALAI UTARASAKUL: ASSESSMENT OF TOURIST SITE POTENTIAL AND APPLICATION OF ENVIRONMENTAL MANAGEMENT SYSTEM FOR ECOTOURISM DEVELOPMENT IN SRI NAN NATIONAL PARK, NAN PROVINCE. THESIS ADVISOR: ASSOC. PROF. KUMTHORN THIRAKHUPT, PH.D., THESIS CO-ADVISOR: ASST. PROF. ART-ONG PRADATSUNDARASAR, PH.D., 151 pp.

The assessment of tourist site potential and the application of environmental management system for ecotourism development in Sri Nan National Park (SNNP) was investigated from December 2005 to December 2007. Twenty indicators of tourist site potential assessment for 5 types of tourist sites which are mountain, landform, rapid, reservoir, and cave are proposed and categorized based on 4 components of ecotourism. Of all the identified 20 indicators that indicate tourist site potential, 6 indicators represent nature-based tourism, 8 indicators represent sustainable management tourism, 4 indicators represent environmentally educative tourism, and 2 indicators represent people participation. The results showed that 2 nature sites of SNNP, "Pha Chu Clift" and "Sao Din Landform", were ranked as very high potential for ecotourism. Doi Sa Mer Dao Mountain was ranked as good potential, whereas Pak Nai and Kang Luang were ranked as moderate potential site for ecotourism.

The integration of environmental management system for ecotourism development was applied and investigated in SNNP. Tourists needed the space for at least 2 square meters/ person for camping, consumed water about 10.8 liters/ person/ day, and generated waste for 0.6kg/ person/ day. In order to minimize environmental impact, eco-camping guidebook, garbage bins, waste separation program and environmental friendly cleanser were arranged to the park. Tourists were highly interested and collaborated in provided materials and this circumstance can indicate that the successful of ecotourism development in SNNP is due to suitable environmental management system for tourists.

Results showed that 85.8% of tourists visited SNNP for relaxing followed by admiring sea of mist, scenery, and photography which were 59.1, 58.6, and 47.3%, respectively. 49.15% of tourists stayed overnight camping for 1 night. The major appreciation that the tourists visited SNNP included sea of mist, beautiful landscape and the staff's friendliness. The recommendations for ecotourism development in SNNP such as keeping the park as it is being in natural way, providing more area of camping site and car park, improving landscape scenery by planting more trees and flowers, increasing camping and accessories for renting, and limiting number of tourists are proposed.

Field of study ...Environmental Science... Student's signature.....Tatsanawalai.....

Academic year .....2007..... Advisor's signature.....K. Thirakhupt.....

Co-advisor's signature.....Art-ong Pradat.....

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LIST OF ABBREVIATIONS

DNP	Department of National Park
EMS	Environmental Management System
ERIC	Environmental Research Institute of Chulalongkorn University
EU	European Union
g	gram
GDRC	Global Development Research Center
L	Liter
SNNP	Sri Nan National Park
TAT	Tourism Authority of Thailand
UNEP	United Nations Environment Programme

Currency Exchange Rate 1 USD = 31.76 Baht (Bank of Thailand, April 10, 2008)

CHAPTER I

INTRODUCTION

1.1 Theoretical Background

Nan Province was established around 800 years ago at the same time as Sukothai Province. The fascinating history of Nan involves with many intertwining stories of Nan people presented in unique Lanna culture, memorable history, archeology, and various ecosystems that brought Nan become treasured hidden destination for tourists.

Nan is located in the northern part of Thailand (Figure 1-1). Nan currently has seven national parks, covering approximately 4,863 square kilometers. Most areas of Nan are predominantly mountainous and covered by forests. About 44% of the areas are classified as 1A-watershed zones, which are headwaters for many important rivers such as Nan, Wa, Sa, Haeng and Pad rivers.

Even mountains and forests at the Phi Pan Nam Range and the Luang Prabang Range serve as natural fortress hiding Nan from outsiders. The appreciation of beauty and fascination of its natural environment is currently the prime interest among tourists. As with this aspect of interest, increasing numbers of tourists seem to realize the importance of nature conservation, and ecotourism has become more popular recently (Department of National Park [DNP], 2004).

In 2004, 445,988 tourists visited Nan and 94.53% were Thai (Tourism Authority of Thailand [TAT], 2005). Among all tourists who visited Nan, 61,308 or 13.75% visited Sri Nan National Park (SNNP) which was the highest number of tourists compared to other national parks (DNP, 2005). The area of Sri Nan, covering 1024 square kilometers, made up with massive mountains and hill ranges

with several spectacular natural environments. Many types of forests and tremendous species of flora and faunas exist within the park. In addition, the Sao Din, a natural earth pillars formed by erosion located at the south of the park, creates an amazing appearance destination.

One of the ideas for ecotourism is causing minimal environmental damage to the tourist sites (Ceballos - Lascurain, 1996; Page and Dowling, 2002; Green Globe 21 International Ecotourism Standard, 2004). Especially in mountain tourism, tourists are attracted to the mountainous destination for many reasons, including cool climate, clean air, unique landscapes and wildlife, scenic beauty, local culture, history and heritage, and nature-related activities and sports. Consequently, tourism may have a wide impact on mountain ecosystems, communities and economics (United Nations Environment Programme [UNEP], 2007).

To date, the tourist's number in SNNP has been increasing and some negative impacts on its natural environment have appeared but the study on the potential of tourist sites and the management plan for ecotourism has never been conducted. Therefore, this research aims to identify and assess appropriate parameters that can indicate the potential of each tourist site and to apply environmental management system (EMS) for ecotourism management in SNNP.

In this study, some appropriate parameters were identified and assessed in each tourist site. Moreover, EMS was applied as a method that integrate functional elements to achieve the principles of Ecotourism which further evaluate, manage, and reduce the negative environmental impacts in the tourist area.

1.2 Objectives

1.2.1 To determine parameters that indicates the potential of each tourist site.

1.2.2 To assess the potential of each tourist site in Sri Nan National Park.

1.2.3 To develop the management plan for ecotourism in Sri Nan National Park.

1.3 Anticipated benefits

1.3.1 This research will provide the appropriate parameters that can indicate potential of tourist sites for Sri Nan National Park.

1.3.2 The result of tourist site potential will be a useful standard for the monitoring program of Sri Nan National Park in the future.

1.3.3 This research will provide ecotourism management plan for Sri Nan National Park and may be useful to the ecotourism development of other national parks in Nan Province.

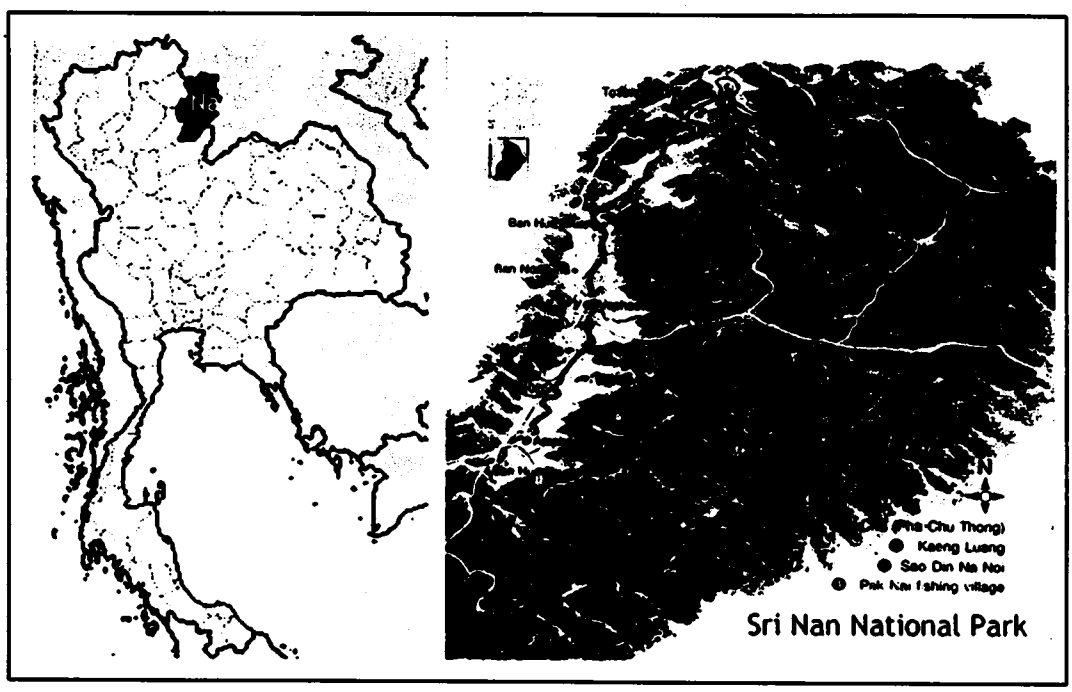


Figure 1-1 Location of Nan Province and Sri Nan National Park, Thailand

CHAPTER II

LITERATURE REVIEWS

2.1 Sustainable Development and Ecotourism

Sustainable development is a concept that has been at the forefront of international development. In the early 1970s, the Club of Rome had presented for the first time how limited resources could set limits to growth in "our common future". The underlying principles that make up sustainable development have been around for centuries but it was not until 1987 that official use of the term "sustainable development" received international recognition in the Bruntland Commission. Basic definition of sustainable development was "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development [WCED], 1987).

Since the first definition of sustainable development by the Bruntland Commission, the concept has continued to gain popularity and has evolved to represent much more than it's original definition (Buchsbaum, 2004). Environmental protection topic became a major issue in the 1990s after the concept of sustainable development has been introduced. The 2002 World Summit on Sustainable Development expanded this definition identifying the three over arching objectives of sustainable development to be eradicating poverty, protecting natural resources, and changing unsustainable production and consumption patterns.

A number of such sustainability concepts have been developed for different purposes, targeted at different stakeholders but each eventually leading to a sustainable future. Such concept is often associated with the sustainable agriculture, sustainable forestry, sustainable community developments, and sustainable tourism (Tsaur *et al.*, 2006). Sustainable development is vial for continued survival and viability of the tourism industry and for protection and nurturing of the natural and cultural environment on which tourism depends. A more appropriate and conscientious approach would be to use tourism as a means to protect the environment and turn sustain biodiversity (Page and Dowling, 2002).

Nature-based tourism (which include sustainable and ecotourism), is rapidly growing sector of the tourism industry. So it has often proved to be powerful incentive for conservation in many parts of the world. But in the same time, uncontrolled mass tourism has and continues to contribute to the degradation of many areas of natural and cultural significance, entailing the loss of biological and cultural diversity, as well as of important sources of income. Clearly, what is needed is an environmental responsible approach to tourism, or "sustainable tourism" (Ceballos-Lascurain, 1996).

In 1995, the World Trade Organization (WTO) stated the meaning of sustainable tourism in Agenda 21 for the Travel and Tourism industry "Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems".

Many groups have proposed sets of guidelines or principles for sustainable tourism and ecotourism. Tourism Concern and the World Wildlife Fund for Nature developed a well known list of principles and guidelines in 1991 which are presented in Table 2-1.

In the 4th International Borneo Tourism Conference 2007, Hector Ceballos-Lascurain (2007) noted that sustainable tourism is an umbrella concept embracing all types of tourism which maintain the environmental, social and economical integrity and well being of natural and cultural resources in perpetuity. Quite often, ecotourism is also confused with sustainable tourism. In comparison to ecotourism, sustainable tourism is much more comprehensive and covers all forms of tourism. Ecotourism is a sub-component of sustainable tourism as shown in Figure 2-1.

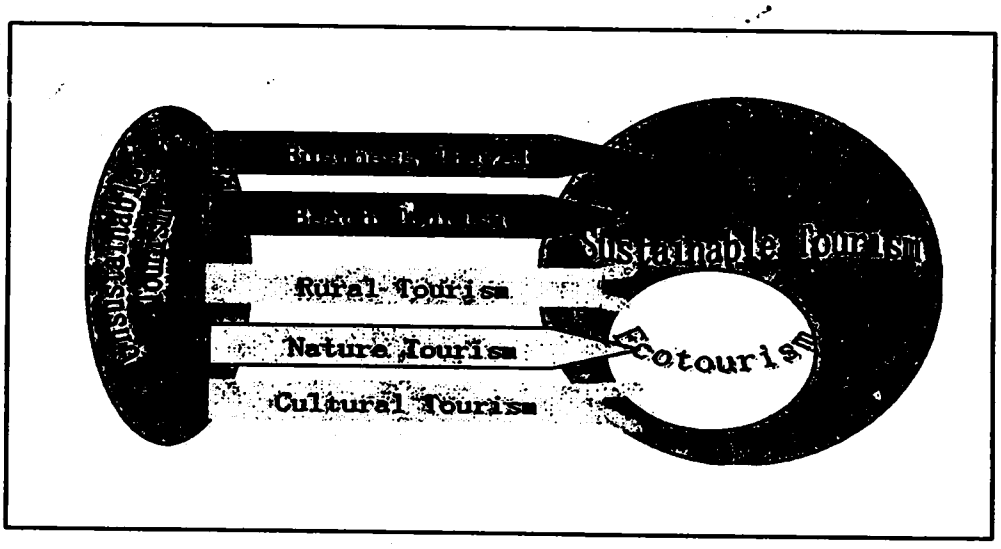


Figure 2-1 Sustainable tourism and ecotourism (UNEP, 2002)

Table 2-1 Principles for Sustainable Tourism (Blamey, 2001)

Principles	Components
1.Using resources with sustainable ways	The conservation and sustainable use of resources (natural, social, cultural) is crucial and makes long-term business sense
2. Reducing over consumption and waste	Reduction of over-consumption and waste. Avoid the costs of restoring long-term environmental damage and contribute to the quality of tourism
3. Maintaining Biodiversity	Maintaining and promoting natural, social, and cultural diversity is essential for long-term sustainable tourism, and creates a resilient base for the industry
4. Integrating tourism into planning	Tourism development is integrated into a national and local strategic plan which undertakes environmental impact assessments and increase the long-term viability of tourism
5. Supporting local economies	Tourism that supports a wide range of local economic activities avoids environmental damage
6. Involving local communities	The full involvement of local communities in the tourism sector not only benefits them and the environment but also improves the quality of the tourism project

Table 2-1(Cont.)

Principles	Components
7. Consulting stakeholders and the public	Consultation between the tourism industry and local communities organizations and institutions is essential if they are to work alongside each other and resolve potential conflicts of interest
8. Training Staff	Staff training which integrates sustainable tourism into work practices, along with recruitment of personnel at all level and improves the quality of the tourism product
9. Marketing tourism responsibly	Marketing that provides tourists with full and responsible information, increases respect for the natural, social and cultural environments of destination areas and enhances customer satisfaction
10. Undertaking research	Ongoing research and monitoring using effective data collection and analysis is essential to help solve problems and bring benefits to destinations, the industry and consumers

Ecotourism has been growing rapidly over the last decades and defined as a form of sustainable tourism which was expected to serve as a tool for both conservation and development (Ceballos-Lascurain, 1998). Ecotourism has also often perceived as an excellent tool for promoting sustainable development in developing countries. While ecotourism has the potential to create positive environmental and social impacts, it can unfortunately be as damaging as mass tourism if it is not done properly (UNEP, 2002). United Nation designated the year 2002 as the International Year of Ecotourism. Commission on Sustainable Development has requested

international agencies, government and the private sector to undertake supportive activities.

Many definitions of "Ecotourism" have emerged since the originally term was coined in 1983 by Hector Ceballos-Lascurain who is a Mexican architect and environmentalist. Ceballos-Lascurain noted that there was the presence of an every-growing number of tourists, especially North Americans who were interested mainly in bird watching. He believed such people could play an important role in boosting the local rural economy, creating new jobs and preserving the ecology of the area, and began using the word "ecotourism" to describe this phenomenon (Ceballos-Lascurain, 1996; Page and Dowling, 2002).

Therefore, Ceballos-Lascurain started that "ecotourism is the tourism that involves traveling to relatively undisturbed natural areas with the specific objective of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas." He added that the term also implies a scientific, aesthetic or philosophical approach although the ecotourist is not required to be a professional scientist, artist or philosopher.

In 1993, the earlier ecotourism definition was revised and modified to "Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features-both past and present) that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations". This definition was officially adopted by IUCN during its First World Conservation Congress held in Montreal, 1996 (Page and Dowling, 2002).

Since then, the concept of ecotourism has taken on a more scientific character, focusing on environmental management concerns and development of sustainable tourism methods. Currently, there is no specific consensus on the definition of ecotourism. There are many well recognized definitions that have formed a clear picture of its core principles, which are shown in Table 2-2.

Ecotourism is usually considered to be not only nature-based tourism, but also responsible travel to natural areas that conserves the environment and improves the well-being of local people. Scace *et. al* (1991, cited in Ceballos-Lascurain, 1996) have identified 35 terms that may link to ecotourism. Among the best known of these are: nature tourism, nature-based or nature-oriented tourism, wilderness tourism, adventure tourism, green tourism, alternative tourism, sustainable tourism, appropriate tourism, nature vacations, study tourism,. scientific tourism, cultural tourism, low-impact tourism, agro tourism, rural tourism ,and soft tourism. In addition, ecotourism appears to have much in common with the concept of "alternative tourism" or "appropriate tourism" which has been discussed within the tourism industry for over a decade. For example, it provides its greatest benefits through pursuit of a widespread but controlled "small is beautiful" philosophy.

Table 2-2 Definitions of Ecotourism

Sources	Definitions
Hector Ceballoss-Lascurain (1996)	Ecotourism is tourism that involved traveling to relatively undisturbed natural areas with the specific object of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) founded in this area.
Conservation International (Ziffer, 1989)	Ecotourism is a form of tourism inspired primarily by the natural history of an area, including its indigenous cultures. The ecotourist visits relatively undeveloped areas in the spirit of appreciation, participation and sensitivity. The ecotourist practices a non-consumptive use of wildlife and natural resources and contributes to the visited areas through labor or financial means aimed at directly benefiting the conservation of the site and the economic well-being of the local residents.
World Conservation Union [IUCN] (Ceballos-Lascurain, 1996)	Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations.

Table 2-2 (Cont.)

Sources	Definitions
Martha Honey (Honey, 1999)	Ecotourism is a travel to fragile, pristine, and usually protected areas that strive to be low impact and (usually) small scale. It helps educate the traveler; provides funds for conservation; directly benefits the economic development and political empowerment of local communities; and fosters respect for different cultures and for human rights.
International Ecotourism Society	Ecotourism is a responsible travel to natural areas that conserves the environment and sustains the well-being of local people
Tourism Authority of Thailand (TAT, 1997)	Ecotourism is responsible travel in identified natural areas, including any cultural and historical component related to the ecosystem, which is intended to raise ecological and environmental awareness by means of a learning process and community participation in ways that are sustainable and involve environmental management

Honey (1999) identified the true form of ecotourism characteristics that should involves travel to natural destinations, minimize impact, build environmental awareness, provide direct financial benefits for conservation, provide financial benefits and empowerment for local people, respect local culture, and support human rights and democratic movements.

UNEP (2002) defined the principles of ecotourism in Ecotourism principles, practices, and policy for sustainability. Principles of ecotourism compose of mainly components as follow;

1. Minimize the negative impacts on nature and culture that can damage a destination.

2. Educate the traveler on the importance of conservation.

3. Stress the importance of responsible business which works cooperatively with local authorities and people to meet local needs and deliver conservation benefits.

4. Direct revenues to conservation and management of natural and protected areas.

5. Emphasize the need for regional tourism zoning and for visitor management plan designed for either regions or natural areas that are slated to become eco-destinations.

6. Emphasize use of environmental and social-base line studies, as well as long term monitoring program, to assess and minimize impacts.

7. Strive to maximize economic benefit for the host country, local business and communities, particularly people living in and adjacent to natural and protected areas.

8. Seek to ensure that tourism development does not exceed the social and environmental limits of acceptable change as determined by researchers in cooperation with local residents.

9. Rely on infrastructure that has been developed in harmony with the environment, minimizing the use of fossil fuel, conserving local plants and wildlife, and blending with the natural and cultural environment.

Furthermore, the International Ecotourism Society (2007) determined an outline for the principles of ecotourism in Oslo Statement of Ecotourism 2007. The principles of ecotourism includes minimizing environmental impact, building an environmental and cultural awareness and respect, providing positive experiences for both visitors and hosts, providing direct benefits for conservation, providing financial benefits and empowerment for local people, and raising sensitivity to host countries political, environmental, and social climate.

It was found that the idea and the theme of ecotourism has spread rapidly worldwide because of the impact of tourism occurred in many countries on many aspects such as social, economic, and environment (Nelson, 1994). The definition of ecotourism has been developed to satisfy some practitioners, depending on nature sites, geography of the sites and management objectives.

Based on variety of ideas of ecotourism from different people and organizations, Thailand Institute of Scientific and Technological Research [TISTR] and Tourism Authority of Thailand [TAT], 1997 have determined the definition and key elements of ecotourism. The following ideas are:

"Ecotourism is responsible travel in identified natural areas, including any cultural and historical component related to the ecosystem, which is intended to raise ecological and environmental awareness by means of a learning process and community participation in ways that are sustainable and involve environmental management"

There are 4 basic key elements that can be considered in terms of ecotourism area, tourism activities and processes, management system, and participation as follows:

Tourism area: Ecotourism takes place in natural tourism areas, which have endemic characteristics, including cultural and historical resources that are closely connected to the ecosystem of an area. This component can be called "nature-based tourism".

Activities and Processes: Ecotourism provides and opportunity for learning about the conditions of the environment and the function of the ecosystem in a tourism resources area. The result will increase knowledge, experience, appreciation and deeper awareness on the part of tourists, local people and entrepreneurs about the need to promote conservation values. This can be considered as "environmentally education-based tourism".

Management System: Ecotourism involves responsible travel that has no or low impact on the environment and society. The management system is comprehensive and addresses issues of resource conservation, environmental management, pollution control, pollution disposal and the control of tourism development. This can be referred to as "sustainable tourism management".

Participation: Ecotourism emphasizes the involvement of local communities and local government in organizing and managing tourism programs to give direct benefits. Benefits include income generation, enhancing people's quality of life and providing economic returns that can be used to maintain and manage tourism resources. The local community would participate by supervising tourism development

to ensure that it is appropriate. This can be referred to as "community participation-based tourism".

These four elements play an important role together to create the unique character of ecotourism (Figure 2-2). This form will be incomplete and cannot be called ecotourism, if any element is missing.

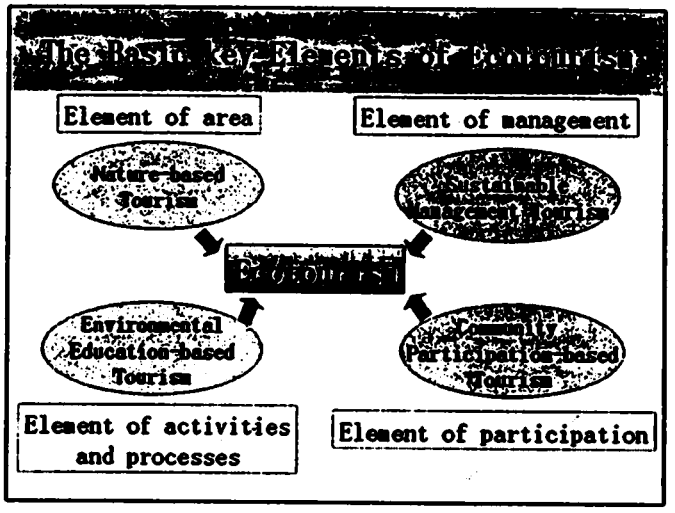


Figure 2-2 Basic key elements of ecotourism (TISTR and TAT, 1997)

Ecotourism becomes an alternative approach to the traditional tourism under the assumption that it minimizes negative impacts but maximizes benefits for the local people and their environment. As a result, many researches and sustainable techniques have been conducted on tourism topic in order to reduce its negative impacts and promote sustainable tourism development

Therefore, ecotourism is expected to provide incentives for conservation of natural areas. It will also provide resources, both financial and physical, for natural conservation, maintenance against environmental degradation, improvement in

biodiversity through breeding programs or gene bank, etc. Ecotourism will help to promote environmental awareness and ethics to the visitors.

However, ecotourism may cause the negative impact on the environment such as plant damage, forest clearance, disturbing animal habitats, creating soil compaction, and marine resource destruction. Overcrowding or unmanaged ecotourism can also increase pollution in the form of garbage, air pollution, and water pollution. It is also possible that ecotourism can introduce new species to an ecosystem; and it can increase the frequency of fire. Briefly, it is necessary to recognize that the negative impacts can be the result from inadequate planning and mismanagement of ecotourism. These impacts can be reduced with well-designed ecotourism activities, a control of the volume or frequency of visits, proper pricing techniques and careful environmental assessments by using indicators. These management strategies will be discussed in the next topic.

2.2 Tourist Site Assessment

Rapid growth and development in gateway communities for protected areas, such as national park and wilderness areas, threaten the sustainability of protected area ecosystem. (Howe *et al.*, 1997; Baron *et al.*, 2000; Parks and Harcourt, 2002 cited in Prato, 2007).

One way to determine the extent to which growth and development adversely affect protected area ecosystems is to assess their sustainability. If the assessment indicates the ecosystem is sustainable, then there is no need to change management practices and policies. On the other hand, if the assessment indicates the ecosystem is not sustainable, then we can rank management alternatives and select a preferred

management plan for achieving sustainability (Prato, 2007). An evaluation and rating system may help tourist to select sites, enhance their satisfaction, and encourage them to act responsibly (Deng, King, and Bauer, 2002). Therefore, the need for evaluating the sustainability of ecotourism is important not only to measure its effectiveness as a development strategy but also as a way to identify and reward companies which practice responsible ecotourism rather than those that are merely green washing (Macaulay Institute, 2007).

A number of tourism attraction rating systems or models used elsewhere were examined, including those used or proposed by academics, practitioners, and state tourism authorities in Australia, Canada and the USA. Tarmen *et al.* (2007) provided a basis for assessment and comparison tourism attractions in Kuching, Sarawak based on 10 categories. These include uniqueness, access, quality, parking/staging area, public supporting infrastructure, commercial supporting facilities, seasonality, information and interpretation, on-site activities, and accommodation.

Teh and Cabanban (2007) presented an *a priori* evaluation of the potential for developing sustainable within the biophysical context of Pulau Banggi, and undeveloped island off the northern Sabah, Malaysia. A set of biophysical criteria which conclude marine biodiversity, seasonality and oceanographic conditions, water resources and distribution, and waste management was applied as the criteria for assessment. The biggest constraint in this island is the lack of inadequate water and sanitation infrastructure. Blast fishing, although occurring less than once per hour, can potentially destroy the major attraction for tourist.

Ecotourism is usually considered to be more than just nature-based tourism and seen as a tool for conservation and sustainable development. So, how to maintain

sustainable development for an ecotourism site has become a critical issue. The use of indicators and standards is increasingly common among managers who monitor social and biophysical changed in natural resources setting. This may be the first time such an approach has been used to evaluate ecotourism operation. It should be noted that indicators are intended to be site specific and, in an ideal evaluation or monitoring procedure, should be selected and Delphi tested by people who know the area and setting being evaluated, and who understand the principles (Wallace and Pierce, 1996; Lin *et al.*, 2006). Moreover, it should be remembered that indicators are not comprehensive but can yield an evaluation that is indicative of overall conditions, if carefully selected. It is possible to develop standards for each indicator that enable a much higher degree of precision in measuring the indicators that are associated with ecotourism principles.

Farrell and Marion (2001) identified and assessed ecotourism visitor impacts at eight protected areas in Costa Rica and Belize. The impact assessment procedures included qualitative condition class systems, rating system, and measurement-based system applied to trails and recreation sites. Standardized assessment procures were developed and applied to record trail recreation site impacts. Impacts affecting the study areas included trail proliferation, erosion and widening, muddiness on trails, vegetation cover loss, soil and root exposure, and tree damage on recreation sites.

Emphadhu and Ruschano (2007) studied the assessment of nature-based tourism site potential at Chiang Mai province. Indicators and evaluative standards for site potential assessment were determined. The indicators divided into 4 groups which are tourism resources, facilities and service, environmental and social impact management and local community participation in tourism and also identified into

twenty-two parameters. The results revealed that 121 nature tourism site in Chiang Mai are currently managed for nature appreciation tourism, 56 sites for adventure tourism and only 6 for ecotourism.

Bhattacharya and Kumari (2004) determined the criteria and indicator for sustainable ecotourism in Sikkim, India. Several criteria were proposed with the group of indicators which are composed of maintenance of healthy ecosystem, conservation of cultural heritage, enabling environment for ecotourism promotion, livelihood generation and poverty alleviation, tourist satisfaction, carrying capacity and people participation and awareness generation.

2.3 Sustainable Tourism Indicators

Sustainable development has become the most popular catchwords on the world's policy agenda. Nearly all governments have committed themselves to sustainable development by integrating economic welfare, environmental quality and social coherence. Monitoring progress towards sustainable development requires in first place the identification of operational indicators that provide manageable units of information on economic, environmental, and social conditions (Bohringer and Joechem, 2007) and how these relationships change over time.

The Global Development Research Center (GDRC) defined the term of indicator as "An indicator is defined as parameter, or a value derived from parameters, which points to provide information about the state of a phenomenon/environment/ area. It is a means to reduce large quantity of data down to the simplest form" (GDRC, 2007). Indicators of sustainability for ecotourism are different than traditional development indicators because they take into consideration the web of complex interrelationships

and interdependencies of resources and stakeholders involved (Sirakaya *et al.*, 2001). Indicators have been proposed to date to meet the criteria of policy relevance, analytical soundness and measurability (Briassoulis, 2001).

In the mid 1980s, ecological indicators were proposed, which were quantitative, descriptive measures of either human pressures on the environment or of environmental conditions (Briassoulis, 2001). An environmental indicator can be broadly defined as a parameter, or value derived from parameter, which provides information about a phenomenon (OECD, 1993 cited in ADB, 2002). McCool (1996) noted that indicators should be easy to measure quantitatively. Lacking warning indicators, retrieval attempts are made mostly after the environment has been seriously impacted upon and fragile ecosystems are lost (Li, 2004)

Broadly, park agencies use environmental indicators in order to determine what impact tourists and other visitors are having on the park's natural environments; compare them with impacts from other sources; and undertake and evaluate management responses. To Monitoring visitor impacts needs ecological baseline data that incorporate seasonal cycles, long-term trends, extreme events, and internal patterns, it needs indicators that reflect the priority conservation values of the protected areas concerned, and the types of use not merely management process. It also needs specific indicators that are discriminating, quantifiable, actionable, sensitive, ecologically significant, integrated, and feasible in practice. And it needs experimental design that distinguishes tourist impacts from other sources of variation (Buckley, 2003).

Since the early 1990s, more environmental indicators have been developed (Briassoulis, 2001 and WTO, 2004). The compendium of sustainable development

indicator initiatives mentions more than 500 sustainable indicator efforts (Parris and Kates, 2003 cited in Bohringer and Joechem, 2007). The World Tourism Organization (WTO) has pioneered the development and application of sustainability indicators to tourism and to destinations. Since the Rio conference, planners and academics in many nations and specific destinations have been working to develop indicators suitable for their management needs. These indicators have focused both oh issues of impact and sustainability for tourism, and more traditional management indicators that respond to particular needs at many scales (WTO, 2004).

The many generic guidelines, checklists, indicators and accreditation schemes for sustainability in tourism overall, therefore are of little use of tourism and recreation in the park. A very different set of indicators is needed, focusing on local scale green rather than global scale brown impacts. Many potential indicators have been identified but rarely have they been implemented in practice (Buckley, 2003); but rarely have they been implement in practices.

Besides, Manoliadis (2002) noted that there is no universal set of indicators that is equally applicable in all cases. However, the following criteria are appropriate to most indicator selections. The indicator selection must be closely linked to project objectives and the environmental problems being addressed; part of a small set aiming to an effective approach; defined clearly in order to avoid confusion in their development or interpretation; practical and realistic, and their cost of collection and development therefore needs to be considered; high quality and reliability; appropriate spatial and temporal scale.

There are various international initiatives that provide the rationale for indicators of sustainable development and also suggest particular measure which may be of use at many scales. These include:

- The Agenda 21, defined at the Rio Earth Summit, in chapter 40 defines the need for appropriate information that supports decision-making, and suggests the elaboration of indicators of sustainable development;

- The agenda 21 for Tourism (WTO, WTTC, EC, 1995), presents indicators as one of the priority action areas, and a principal tool for monitoring;

- The UN Commission on Sustainable Development has developed a Theme Indicator Framework, which address overall sustainability issues, with specific subsets that may be directly applicable to tourism destination or to key assets. It also defined guidelines for developing a national indicator programs;

- The Global Reporting Initiative (GRI) attempts to set world standards on environmental reporting for public and private organization;

- Base on GRI, the Tour Operation Initiative has elaborated guidelines for sustainability reporting through performance indicators for tour operators.

There are different types of indicators, each with different utility to decision-makers. While the most directly useful maybe those that help to predict problems, several other genres exist (WTO, 2004):

- early warning indicators

- indicators of stresses on the system

- measures of the current state of industry
- measures of the impact of tourism development on the biophysical and socio-economic environment
- measures of management effort
- measures of management effect, results or performance

While all categories of indicators can be valuable in supporting sustainable tourism, the early warning indicators are frequently most useful to tourism managers and may provide the ability to anticipate serious negative effects on the destinations, or on the overall tourist experience.

Ideally, indicators can enable actions to be taken well before serious threats to sustainability occur. It should also be noted that the same indicator can frequently serve different purposes and its use can change over the time. Sirikaya *et al.* (2001) also renowned that "to evaluate the past, guide the action of the present, and plan for the future, we need to know what to monitor, what data to collect and what to measure. In other words, to track changes in social, natural, cultural, economic, and political arenas of ecotourism destinations, we need several sets of sustainability-centered ecotourism indicators based on their policy relevance, analytical soundness and measurability".

Good indicators provide decision makers with information that enables them to identify, evaluate and make timely decisions on critical changes being caused by ecotourism to the natural environment, communities and other resources. In theory, all forms of ecotourism can be differentiated as either sustainable or unsustainable but there is still a great deal of uncertainty regarding indicators for measuring and

monitoring sustainability. Furthermore, ecotourism, which appears to be sustainable in the short-term, may prove otherwise in the long run (Weaver, 1999).

WTO (2004) recommended that too many indicators can overwhelm users with too much information and can also overextend resources to support them. Most practitioners agree that it is essential to prioritize issues and the indicators that correspond to them to help create as shorter list without important gaps. The number of indicators will depend on the size of the destination, the number of critical issues, the interests of the user group, the information and the resources available to track and report on the indicators. The number of indicators for different projects is showing the Table 2-3.

Table 2-3 Numbers of Indicators

Organization	Purpose	Number of Indicator
Department of Culture, Media sport, UK	Measure the smallest set of sustainable tourism	21
The British Resorts Association	Measure tourism's impacts and good management practice amongst local authorities	12
Samoa	Monitor destination	20
Kangaroo Island, Australia	Monitor and manage tourism	17

In short, most practitioners agree 12-14 indicators are optimal and a central challenge in the indicators development process is to end up with consensus on a short list without important gaps. However, number of indicators are required "enough" to respond to the established priority issues. WTO (2004) also purposed baseline indicators for sustainable tourism in Table 2-4.

Among the different resolution indicators, many organizations and researchers have been determined various kinds of sustainable indicators. Green Globe 21 International Ecotourism Standard (2004) provided information to the operators to understand ecological sustainability by categorizing the principles of ecotourism into 11 topics as follows: ecotourism policy, performance and framework, natural area focus, interpretation and education, ecologically compatible infrastructure, ecological sustainable practice, contribution to conservation, benefiting local community, cultural respect and sensitivity, customer satisfaction, responsible marketing, and minimal impact codes of conduct.

Abidin (1999) identified sustainability criteria and indicators for evaluating sustainable ecotourism development in Taman Negara National Park, Malaysia. He used Delphi method and public survey to solicit opinions from interdisciplinary panel. The methodology involved the identification selection, evaluation of measurable criteria and indicators for ecotourism sustainability.

Table 2-4 Baseline indicators of sustainable tourism

Baseline Issue	Baseline Indicators
Local satisfaction with tourism	Local satisfaction level with tourism (Questionnaire)
Effects of tourism on communities	Ratio of tourist to local (average and peak period/days) % who believes that tourism has helped bring new services or infrastructure (questionnaire-based) Number and capacity of social services available to the community (% which are attributable to tourism)
Sustainable tourist satisfaction	Level of satisfaction by visitor (questionnaire-based) Perception of value for money (questionnaire-based) Percentage of return visitors
Tourism seasonality	Tourist arrivals by month (distribution throughout the year) Occupancy rates for licensed accommodation by month % of business establishment open all year Number and % of tourist industry jobs which are permanent
Economic benefits of tourism	Number of local people employed in tourism Revenues generated by tourism as %of total revenues generated in the community
Energy management	Per capita consumption of energy from all resources Percentage of businesses participating in energy conservation programs or applying energy saving policy and techniques % of energy consumption from renewable resources
Water availability and conservation	Water used (total volume consumed and liters per tourist per day) Water saving (% reduced, recaptured or recycled)

Table 2-4 (cont.)

Baseline Issue	Baseline Indicators
Drinking water quality	Percentage of tourism establishments with water treated to international potable standards
	Frequency of water-borne diseases: number/percentage of visitors reporting water-borne illness during their stay
Sewage treatment	Percentage of sewage from site receiving treatment (to primary, secondary, tertiary levels)
	Percentage of tourism establishments (or accommodation) on treatment system (s)
Solid waste management	Waste volume produced by the destination (tones/month)
	Volume of waste recycled (m^3)/ total volume of waste (m^3)(specify by different types)
	Quantity of waste strewn in public areas (garbage counts)
Development control	Existence of land use or development planning process, including tourism
	% of area subject to control (density, design, etc.)
Controlling use intensity	Total number of tourist arrivals (mean, monthly, peak periods)
	Number of tourist per square meter of the site (e.g., at beaches, attractions), per square kilometer of the destination, mean number/peak period average

Source: WTO (2004)

The office of national tourism Australia (2005) also described that environmental indicators are physical, chemical, biological or socio-economic measures that can be used to assess natural resources and environmental quality. They defined the core indicators of sustainable tourism and specific measure as follows:

- Site protection: category of site protection according to IUCN index
- Stress: tourist numbers per visiting site (per annum/peak month)
- Use intensity: intensity of use in peak period (persons/hectare)
- Social impact: ratio of tourists to locals (peak period and over time)
- Development control: existence of environmental review procedure or formal controls over development of site and use
- Waste management: percentage of sewage from site receiving treatment
- Planning process: existence of organized regional plan for tourist destination region
- Critical ecosystems: number of rare/ endangered species
- Consumer satisfaction: level of satisfaction by consumers (questionnaire based)
- Local satisfaction: level of satisfaction by locals (questionnaire based)
- Tourism contribution to local economy: proportion of total economic activity generated by tourism only

Lim and McAleer (2004) studied ecologically sustainable tourism management and proposed five types of environmental indicators for the detailed checklist; including of indicators for fragility of ecosystem and biodiversity, waste disposal, water consumption, intensity of land use and physical impact, and protection of the atmosphere. Li (2004) also proposed environmental management indicators for ecotourism in China's nature reserves. For ecotourism management, a set of warning indicators is important to indicate environmental change at tourism sites.

Georgesce and Nilson (2004) identified key issues and indicators for North Cape Breton in 4 groups including:

- a control of environmental impact (perception of level of cleanliness of areas frequented by tourist, clean image of the region, water quality in beach/rivers/stream areas, environmental practices and attitudes of tourists);
- economic benefits to the region (employment statistics, amount spent per day per tourist);
- marketing the region (opinion for quality/value, price of accommodation, repeat visit to same accommodation);
- community impacts (local attitudes and perception on tourism benefits or non-benefits);
- infrastructure (road condition, percentage of pull-offs per km of highway, Length of maintained trail system)

Ecotourism maybe more environmentally benign option than other extractive resource uses. However, without sufficient planning and management, ecotourism may also result in significant environmental impacts (Leung and Farrell, 2002). Therefore, an environmental management system will be considered in next topic as the sustainable management tool to integrate environmental, management, and ecotourism together.

2.4 Environmental Management System

An Environmental Management System (EMS) is a voluntary management tool that provides a framework for an organization to pro-actively manage its potential and actual environmental risks and opportunities (Global Development Research Center [GDRC], 2007). Whilst content and coverage of an EMS varies depending on scope and organization type, each EMS does have common elements. The Urban Environmental Management EMS Training Resource Kit notes that each EMS should:

Both the International Standards Organisation (ISO 14000) and the European Union (EU) Eco-Management and Audit Scheme (EMAS) have developed standards for the production of an EMS. Certification to either scheme is voluntary and is dependent upon assessment of an accredited third party body.

The benefits of an EMS include: reduced environmental impacts and risks; reduced operating costs; market advantages; enhanced reputation; increased efficiency of operations; improved relationships with regulators (improved compliance) and other stakeholders; cheaper insurance; the creation of an environmental early warning system; and the tracking of trends and the ability to make predications.

Obstacles to implementing and EMS include lack of time, human or financial resources; lack of senior management support; and lack of understanding of the EMS process.

The key stakeholders of an EMS are employees and persons/organizations directly affected by the EMS such as suppliers, temporary staff, contractors and distributors. Other stakeholders include government; environmental groups; the local community; regulators; non-government organizations; and industry groups. EMS can be applied to any government or non-government organization, site or activity.

In addition, the concept of environmental management system (EMS) was applied to encourage environmental friendly activities not only in industrial sector but also in natural resource management and tourism. The EMS method has been widely used, particularly in large hotels or hotel chains, to help conduct baseline studies, train staffs, and set up an achievement and monitoring system for the selected environmental targets such as reduction of pollution, and usage of water and electricity (Honey, 2004). Consequently, EMS concept, when integrated with various environmental aspects, is absolutely applicable for developing ecotourism in the national parks. There're various types of research and projects relevant with EMS.

For example, Commonwealth Department of Tourism, Australia (1995) developed best practice of ecotourism related energy and waste minimization initiatives in Australia and overseas. The twenty five activities were identified including land transport, water transport, energy supply, energy-efficient buildings, heating and cooling buildings, heating water, recovering heat, lighting, toilets, cooking, clothes washing and drying, dishwashing, hand washing, showering and bathing, refrigeration, office equipment, office paper, solid materials, building materials, newspaper and cardboard, glass, plastics, metal containers, food and garden materials, pumping water, and marketing energy and waste minimization.

Wood and Halpenny (2001 cited in UNEP, 2002), explained the key to achieve ecotourism management. They suggested that the significant sustainable index should come from researches, which have been developed from the best practices. Al-Sayed and Al-langawi (2003) studied biological resources conservation through ecotourism development in Kuwait. This research noted that ecotourism is one way to ensure the process of conservation and suggested the successful techniques to conserve the biological resources and biodiversity in the arid environment. These techniques include ecosystem identification, wildlife resource

identification, geological aspects of land use, and environmental feasibility of conservation and rehabilitation.

In Thailand, Environmental Research Institute of Chulalongkorn University (ERIC) and Bumi Kita Foundation (2007) conducted the research throughout Thailand in order to publish the natural guide of Thailand. The study was integrated principles based on the general framework of sustainable development.

For each principle detail criteria were further elaborated based on existing certification system and international guideline for sustainable tourism (for example the UNWTO, WWF, UNEP, Green Globe 21, IHEI, the European Eco-lables for tourism). The eco-rating principles used in this guidebook, which are:

- Traveler-friendly: is the criteria based on the perception of tourists, the hotel or activity provides and enjoyable experience for travelers who appreciate nature and local cultures. Important criteria are pristine and aesthetic environment; safe, clean and comfortable surroundings and facilities; friendly and efficient staff; and discovery of local nature and culture.

- Nature-friendly: the operation is designed and managed in a way that reduces negative environmental impact and enhances environmental conservation. Environmental management for small-scale tourism enterprises can be divided into four aspects: environmental planning; water and energy conservation, reduction of chemicals use; solid waste and waste water treatment; environmental education and conservation.

- Community-friendly: the operation contributes to the welfare of local people and enhances the local culture and focus on relationships with employees; relationships with communities; participation and economic opportunities for communities; and support of local culture.

2.5 Nan Province and Sri Nan National Park

2.5.1 Nan History

Nan, the land of eastern Lanna Kingdom has become city state more than 7 centuries (Charoensiri, 2007), is as old as the Sukhothai Kingdom and had 64 kings in total. Formerly, known as "Nantaburi" or "Woranakhon". The city was built by King Phu kha around the 12th century A.D. on the plains know today as Pua District.

In 1359, King Kanmueang obtained the Buddha relic from Sukhothai Kingdom and had it enshrined on a hill called "Doi Phu Phiang Chae Haeng". The city was tthen moved to the foot of this hill. Later in 1368, then Nan River changed direction, urging King Phakong, the son of King Kanmueang, to relocated the city to Ban Huai Khai on the west of Nan River, where the city has remained till today (TAT, 2005).

2.5.2 Geography

Nan Province is located in northern Thailand, covering an area of approximately 11,427 square kilometers (N 18° 00'45" - 19°37'53" and E 100°20'34" - 100°06'29"). The province is presently divided into 14 districts of which the northern and eastern parts are next to Laos's border whereas the southern and the western parts connect to Uttaradit, Phrae, and Payao Provinces, respectively. Most areas of Nan Province are predominantly mountainous with the slope of more than 30 degrees, covered by forests. About 44% of the areas are classified as 1A-watershed zones, which are headwaters for many important rivers such as Nan River, Sa River, Pua River, and Long River, etc.

Nan's geographical position has resulted in many terrestrial and aquatic ecosystems. Most of these varying ecosystems or natural resources are in pristine condition and result in the province being one of potential tourist sites. National parks in Nan Province have several spectacular natural environments, covering of

many types of tropical forests, streams, waterfalls, hot springs, caves, fossil of 200 hundred year-old marine mollusks, living fossil of a palm species, and varieties of wild flora and fauna. A rare species of plant which has a very beautiful flower, "Chompoo Phuka" *Bretschneidera sinensis* Hemsl., discovered only at Doi Phu Ka National Park and some rare species of wild animals such as the Serow *Naemorhedus sumatraensis*, the Banteng *Bos javanicus*, the Gaur *B. gaurus* and the Big-headed Turtle *Platysternon megacephalum* are attractive for tourists. The advantage of having these natural resources has brought more than 37 major tourism destinations in 7 national parks. In addition, Nan also has more than 27 major cultural tourist sites. Both natural and cultural sites have caused the increasing number of tourists annually (DNP, 2004).

The appreciation of beauty and fascination of its natural environment is currently the prime interest among tourists. As with this aspect of interest, increasing numbers of tourists seem to realize the importance of nature conservation, and ecotourism has become more and more popular recently.

GISTHAI of Chulalongkorn University (2006) was developed the 3D map showing geography of Nan (Fig 2-3) and Land Use in Nan (Fig 2-4).

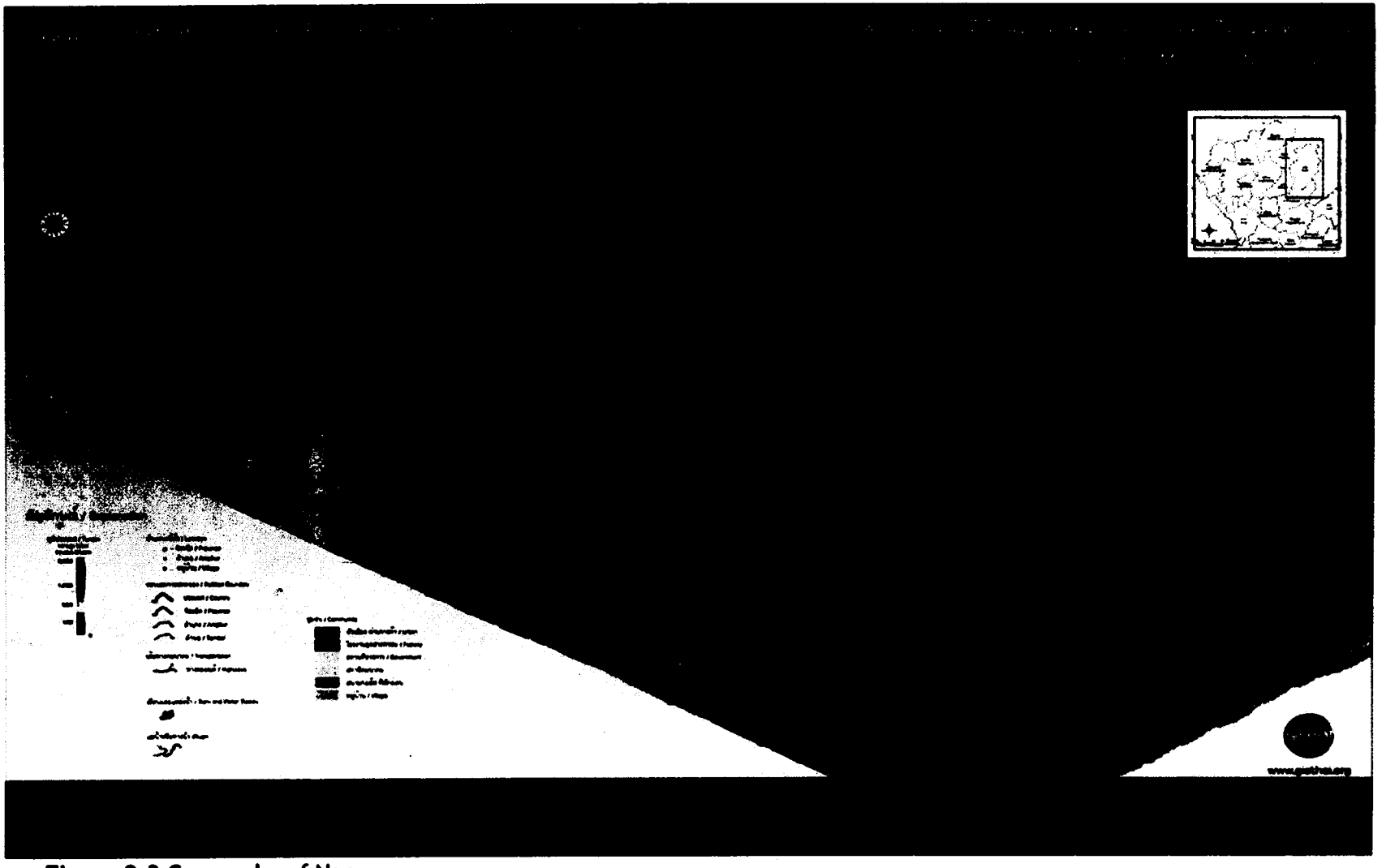


Figure 2-3 Geography of Nan

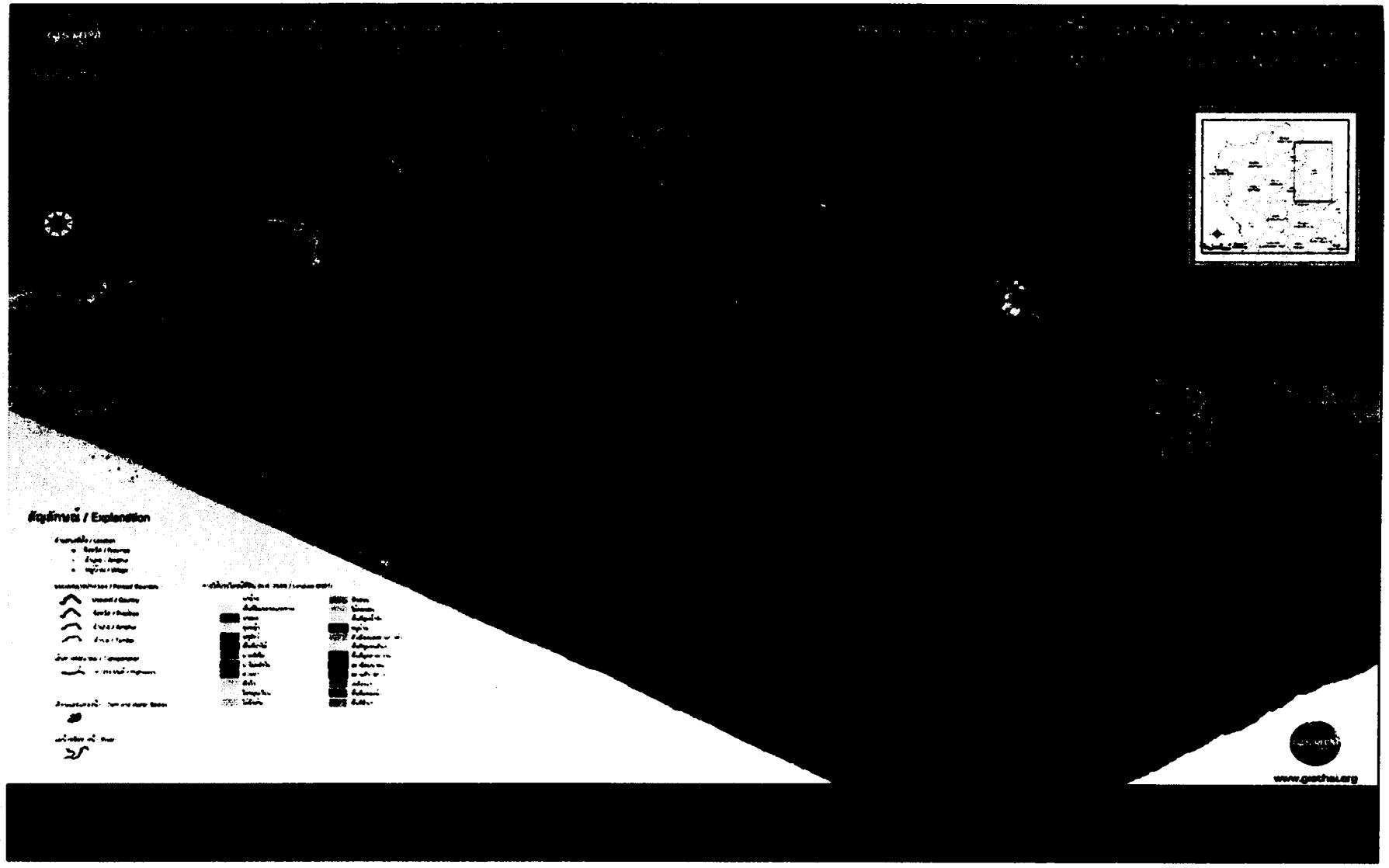


Figure 2-4 Land Use in Nan Province

2.5.3 Climate

Figure 2-5 shows the average temperature in Nan during year 2000-2006. During November - February, the average temperature was lower than 25 degree celcious.

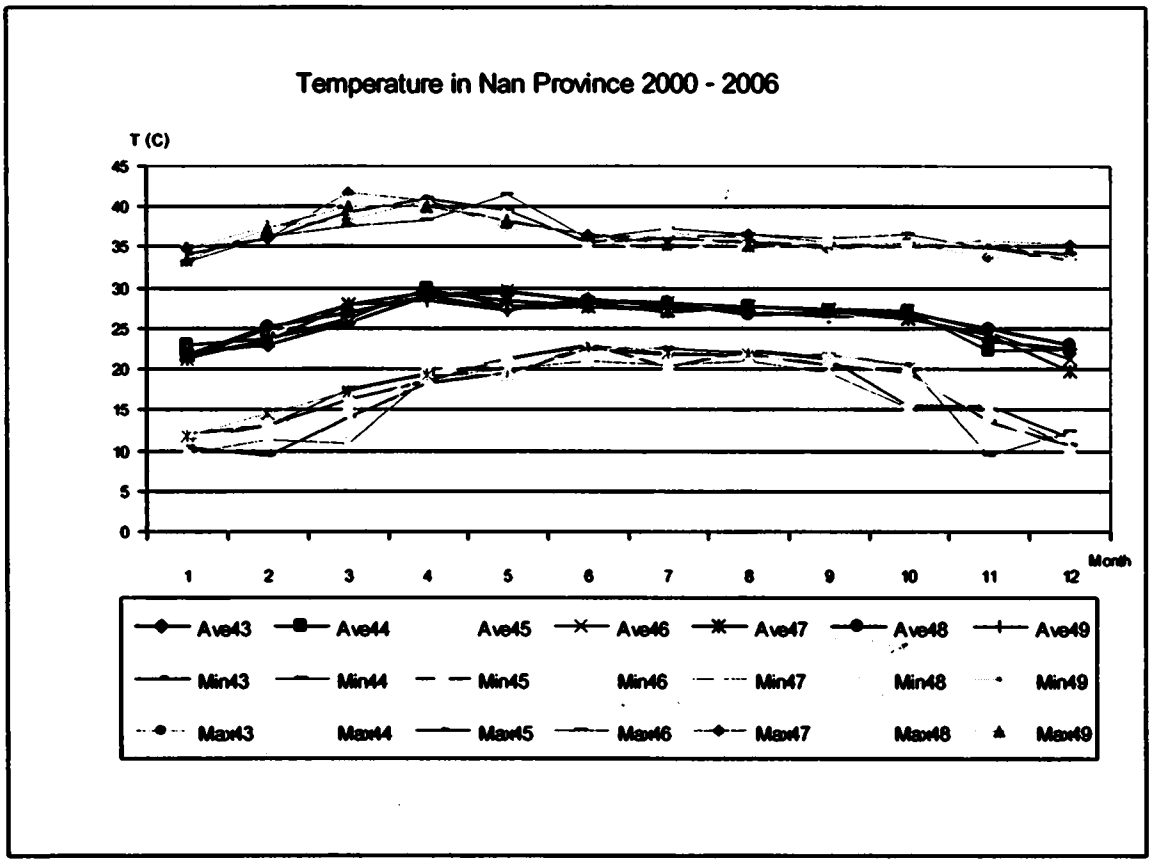


Figure 2-5 Average temperature in Nan Province

Source: The Meteorology Nan, Northern Meteorology Station (2007)

2.5.4 Tourist Statistic in Nan

Department of National Park Wildlife and Plant (2006) recorded the tourist statistics visiting national parks in Nan during 2005-2006 as shown in Table 2-5. Sri Nan National Park has maximum number of tourists, follow by Mae Cha Rim, Doi Phu Ka, Nantaburi, Khun Sa Than, Tam Sa Koen, and Khun Nan National Park, respectively.

Table 2-5 Numbers of tourists visiting national parks in Nan during October 2005 - September 2006.

National Park	Numbers of tourists												
	Oct 05	Nov 05	Dec 05	Jan 06	Feb 06	Mar 06	Apr 06	May 06	Jun 06	Jul 06	Aug 06	Sep 06	Total
Doi Phuka	968	682	6,052	4,073	2,000	639	1,837	472	254	446	574	325	18,322
Mae Charim	2,939	3,952	6,944	4,377	4,380	3,560	5,679	2,738	2,289	2,143	1,288	2,529	42,818
Sri Nan	2,310	2,042	13,348	9,782	2,637	1,386	2,434	595	541	1,313	1,173	8,376	45,937
Nantaburi	255	430	2,012	2,019	2,021	629	543	540	542	350	353	354	10,048
Tam Sa Koen	171	156	180	220	129	92	125	195	165	110	90	85	1,718
Khun Nan	56	94	217	287	153	58	67	542	43	46	50		1,613
Khun Sa Tan	380	1,171	2,406	1,099	946	324	600	347	323	456	588	664	9,304

2.5.5 Sri Nan National Park

In 2004, 445,988 tourists visited Nan and 94.53% were Thai (TAT, 2005). Among all tourists who visited Nan, 61,308 or 13.75% visited SNNP which was the highest number of tourists compared to other national parks (DNP, 2005). The area of Sri Nan, covering 1024 square kilometers, made up with massive mountains and hill ranges with several spectacular natural environments. Many types of forests and tremendous species of flora and faunas exist within the park. The popular destinations in Sri Nan are Doi Sa Mer Dao Montain, Pha Chu Cliff, Sao Din and Kok Sua Landform, Kang Luang Rapid, and Pak Nai Fishery Village Reservoir.

At Sao Din, Bunma (2004) studied diversity and utilization of plants and found 134 plant species were identified into 113 general and 57 families. The interesting plant was *Gardenia Turgida* Roxb. There were 17 useful plant species, among this 9 species used as food, 5 species for medicine, and 3 species used in another purposed.

Graduate students from Chiang Mai University conducted research related with tourism in Nan Province as follows:

Waritt (2001) investigated the community potentials in ecotourism promotion of Lam Nam Wa community. The results show that physical and environmental resources in this study had high level of potential, whereas the community potential for natural resource conservation was at a middle level, as same as the community potential for community participation-based tourism, the community potential for tourism service, and the community potential for income generation from tourism. The recommendation from this study is to establish a community committee to dialogue together with outsiders that arrange the tourist activities, the government and NGOs to find the way for community's potential income from ecotourism.

Jittrawongnun (2002) studied tourism changes in the Folk Ways along the Numwa River Bank, Nan Province. The key finding of the study noted that community had tourist site with diversity of natural resources such as forest, cataracts, and fish nurturing area. The folkways involved with these natural resources, in return, they have been preserved with trees, plants, wild animals and aquatic animals. The important pull factors were such as nature and soft adventure tourism sources, which caused tourism into the community.

Chankham (2003) conducted research in the potential of Tai Lue community in resource management for ecotourism at Don Mun village, Tha Wang Pha District. The results of this research showed that Tai Lue Community of Don Mun Village had long historical backgrounds. Many tourists always visited, the community ecosystem, and studied the culture, creating the community's pride and awareness of the village's resource conservation along with their tradition, culture and life style.

From the literature reviews, only a few of ecotourism researches have been conducted in Nan, especially in national park. Nevertheless, currently, Nan is still being one of the virgin popular destinations for tourists to admiring natural, cultural, and historical which are very sensitive areas. The mass tourism or even ecotourism may disturbed the pristine environment if lack of suitable management plan. Ecotourist impacts could have more serious ecological consequences as most visitor activities occur in environmentally sensitive or ecologically significant communities (Leung and Farrell, 2002). Consequently, this research is aimed to investigate tourist site potential and applied environmental management system for ecotourism development in Sri Nan National Park.

CHAPTER III

METHODOLOGY

3.1 Determination of indicators to indicate the potentiality of tourist site

3.1.1 The data of physical and natural resources, environmental conditions, and tourism of Sri Nan National Park was collected from secondary sources;

3.1.2 The present tourism situations were collected by interviewing officers, tourists, tour company operators, and local people with specific designed questionnaires;

3.1.3 Indicators that indicated potential of each tourist site were determined by;

3.1.3.1 Tourist sites of Sri Nan National Park were classified based on the definition of the Office of the National Environment Board, Thailand and the present tourism activities of each tourist site were surveyed.

3.1.3.2 Nature site potential for ecotourism of Sri Nan National Park was assessed and compared to the other national parks in Nan Province.

Potential of national park for ecotourism was evaluated by the following formula of the weighted score method (Forest Research, 1995):

$$EP = \frac{W_1r_1 + W_2r_2 + W_3r_3 + ...W_nr_n}{W_1 + W_2 + W_3 + ...W_n}$$

Where: EP = potential level of ecotourism

$r_{1...n}$ = scores of variables, from 1 to n

$W_{1...n}$ = weight scores of variables, from 1 to n

Some parameters for evaluating the potential are presented as following,

The attractiveness of each site for tourists is one of the most significant parameters. There are many factors dealing with the potential of attractiveness for tourists such as the chance for wildlife sights. These factors depend on species diversity, population abundance, rare species, endangered species, plant community diversity, plant community status, ecosystem uniqueness, physical uniqueness/characteristics, cultural uniqueness, landscape characteristics, outstanding antique, ancient remains and natural art object.

The values from the calculation range from the 0 to 3 (from non - potential to high potential)

3.1.3.3 Tourism impact assessment was analyzed in all national parks of Nan Province. In this study, risk assessment analysis was conducted in order to determine the impact level that may be occurred in the nature site by weight score method.

$$IP = \frac{W_1R_1 + W_2R_2 + W_3R_3 + ...WnRn}{W_1 + W_2 + W_3 + ...Wn}$$

Where: IP = the level of environmental impacts

$R_{1...n}$ = the potential score of variables, form 1 to n

$W_{1...n}$ = the weight of variable, from 1 to n

Some parameters for evaluating environmental impacts are presented as following,

The possible impacts on ecosystem are considered as the first parameter. This impact include possible effects to wildlife diversity, the species abundance, the ecological diversity and size of habitat, and also the possible impact on plants or other environmental factors. The second parameter is the impact on culture and way of life of native people in those areas, and the last parameter is the impact on art objects, ancient remains and antique in those areas.

The values from the calculation range from 0 to 3 (no impact to high impact).

3.1.3.4 Indicators that involved with the potentiality of each tourist site were identified based on 4 components of ecotourism which include:

- Indicators of nature based tourism
- Indicators of sustainable management
- Indicators of environmentally educative tourism
- Indicators of people participation

3.1.4 The criteria to assess each indicator were adapted from Handbook of Ecotourism Site Standard Assessment (ERIC, 2005). The tourist site potential assessment was developed for staff and local people to evaluate by themselves using simplified methodology.

3.1.5 Systematic evaluation form was designed to assess indicators that indicate potential of tourist sites in Sri Nan National Park. The schematic diagram for ecotourism site assessment framework was presented in Figure 3-1.

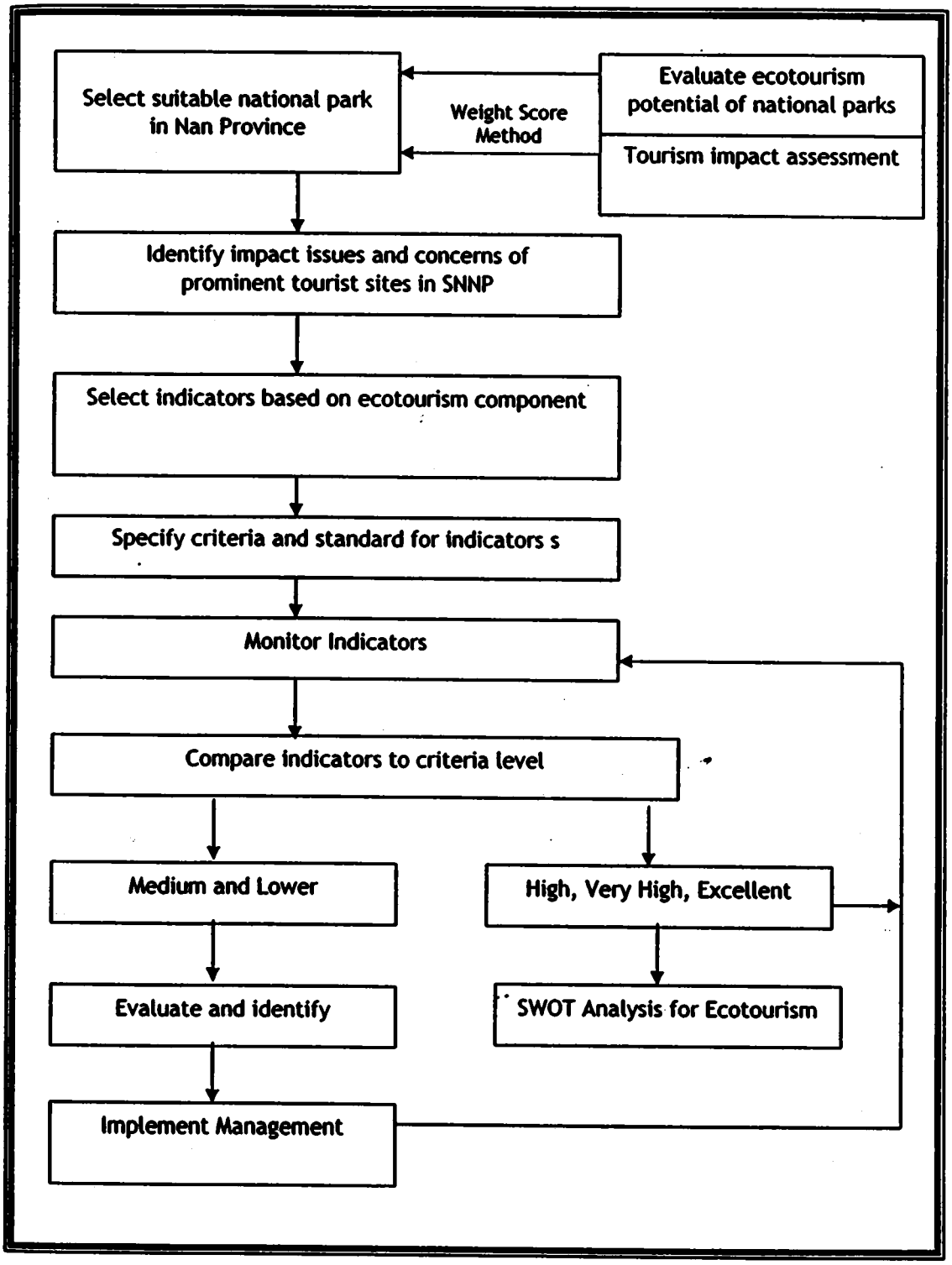


Figure 3-1 Schematic diagram for ecotourism site assessment framework (Adapted from Farrell, 2002)

3.2. Assessment of tourist site indicators in Sri Nan National Park

3.2.1 The indicators including nature-based tourism, sustainable management, environmentally educative tourism and people participation were assessed in each tourist site.

3.2.2 The data was collected in high tourist season (December) compared with low tourist season (April) for 4 days also covering the weekend period.

3.2.3 Standard of each tourist site was determined and the results were classified into 5 levels (excellent, very high, high, medium, and low potential for ecotourism).

3.3 The development of management plan for ecotourism in Sri Nan National Park based on environmental management system

3.3.1 Prominent environmental aspects were identified in Sri Nan National Park based on the concept and methodology of the environmental management system (Chankaew, 2002).

3.3.2 Ecotourism management plan for Sri Nan National Park was developed based on the information obtained and the 4 components of ecotourism.

3.3.2.1 Nature-based Tourism

3.3.2.1.1 The data of attractive flora, faunas, and landforms at tourist sites, such as Sao Din Na Noi landform, Pha Chu cliff, and Doi Sa Mer Dao Mountain, was collected.

3.3.2.1.2 Tourist's nature appreciation was surveyed using a specifically designed questionnaire.

3.3.2.2 Sustainable Management

3.3.2.2.1 Information of tourist activities, tourist statistics and tourist behaviors in Sri Nan National Park was collected using a specifically designed questionnaire.

3.3.2.2.2 Water consumption and water quality at the selected tourist sites were evaluated.

3.3.2.2.3 The quantities and quantities of solid wastes generated at each tourist site were investigated.

3.3.2.2.4 Specifically critical parameters for evaluation of the carrying capacity of the tourist sites in Sri Nan National Park were determined.

3.3.2.2.5 The carrying capacity at each camping site was determined. The information of camping site area, tourist statistics, and tourist satisfaction was collected.

Physical Carrying Capacity (PCC) can be expressed according to the following formula (Ceballos-Lascurain, 1996):

$$PCC = A \times V/a \times Rf$$

Where A = available area for public use

V/a = one visitor per m^2

Rf = rotation factor

Rotation factor is the number of permissible daily visits to a site, and is determined as

Rf = Opening period/ average time of one visit

3.3.2.3 Environmentally Educative Tourism

3.3.2.3.1 The data of flora, fauna and landform of Sri Nan National Park was collected.

3.3.2.3.2 A media coverage program of Sri Nan National Park was developed.

3.3.2.3.3 Ecotourism activities in Sri Nan National Park were studied and developed.

3.3.2.3.4 Nature trail at Sao Din Na Noi Landform was proposed.

3.3.2.3.5 Eco-camping sites at Doi Sa Mer Dao and Pha Chu were developed by providing eco-camping guide book and eco-friendly activities.

3.3.2.4 People Participation

3.3.2.4.1 Participatory Action Research (PAR) technique was applied in order to support people participation in Sri Nan National Park. The process begins with selected 2 target stakeholder groups including:

A: local people: tourists and park officers

B: policy makers: government, sub-district administration organization, tourist agency, NGOs, and local academic institute.

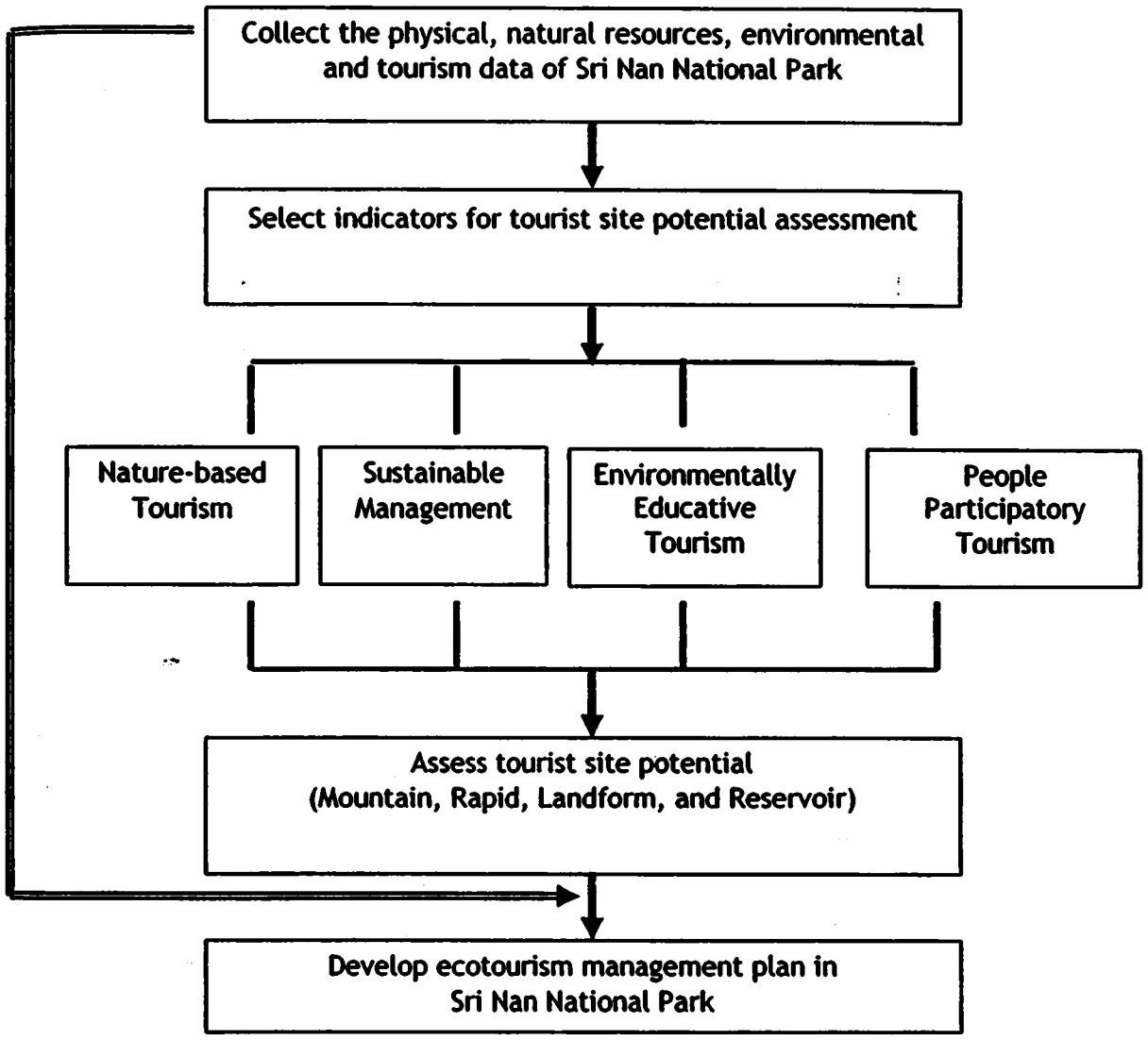
3.3.2.4.2 Relevant stakeholders were interviewed with ecotourism aspects and their needs.

3.3.2.4.3 The meeting with local people was arranged and discussed about the outcomes of the research and ecotourism management plans in Sri Nan National Park.

3.3.2.4.4 Ecotourism monitoring program for local people in Sri Nan National Park was developed.

3.3.4 Provision of appropriate environmental management plan for ecotourism in prominent tourist sites of Sri Nan National Park by SWOT Analysis.

Conceptual Framework



CHAPTER IV

RESULTS AND DISCUSSIONS

4.1 Determination of parameters to indicate the potential of tourist site

4.1.1 Current Situation of Prominent Sites in Sri Nan National Park

The general information of tourism in Sri Nan national parks was collected by reviewing all kinds of published materials. The questionnaire was designed for park authorities in order to compile the data of the current situation of tourism and facilities in national park. Several aspects of information gathered were grouped into physical, natural resource, environmental and tourism data as follows (Appendix A);

Physical data: geography, location, distance from Nan Province, contact address and telephone, head officer, suitable duration for traveling, weather condition, road condition, and electricity

Natural resource data: nature trails, prominent species and prominent tourist sites

Environmental data: water supply, waste separation, solid waste and wastewater management

Tourism data: tourism activities, number of tourists, accommodation, car park (location and capacity), public relation, restaurant, restroom, security for tourists, staff, research and current problem.

Sri Nan National Park is located 60 kilometers from Nan Province, has Nan River flows in north-south direction through the valley surrounded by intricate mountain range. Mixed deciduous and dry dipterocarp forests are commonly found along both banks of the river while hill evergreen, dry evergreen, and pine forests are dominantly on the mountain. The information of popular tourist sites in SNNP was thoroughly reviewed and investigated as followed;

Pha Chu Cliff covers 2,775 square meters of camping site and provides good viewpoint overlooking at the sea of mist and Nan River below. The flagpole on the cliff is the highest pole in Thailand. More than 500 tourists stay overnight camping during long weekend particularly in winter season. Due to the massive tourists visiting Pha Chu for camping without limit regulation, some problems such as the lack of camp site and car park, and water shortage occurred in the area.

Doi Sa Mer Dao camping site covers area approximately 1,520 square meters. Doi Sa Mer Dao is presently a popular tourist destination, especially during new year festival 2006, more than 700 tourists stayed overnight camping in order to admiring sea of mist, sunrise and beautiful sunset.

Sao Din Na Noi Landform is the natural wonder, resembling a small version of the Grand Canyon, covers 32,000 square meters. Sediments from the streams flew past the basin, created by the drift and collapse of the earth crust or the erosion by the rain, accumulated and formed into pinnacle shapes. Geological evidences showed these pinnacles dated back to the late Tertiary period, about 30,000-10,000 years ago. This site was presumably seabed at the time. The discovery of stone bracelets and ancient axes, now kept at Nan National Museum, implied that the Old Stone Age people had lived there. Moreover, Sao Din was recorded in the Unseen in Thailand due to the remarkable species, *Gardenia Turgida* Roxb. (in Thai "Dig Diam"), which always shake itself when touched at any

branches. Consequently, during high season, more than 1,500 tourists visit Sao Din daily.

Kaeng Luang Rapid contains natural islets carved by the Nan River. Rock knoll and long white beach reveal themselves in summer. At Kaeng Luang many fishes species have been found such as *Hemibagrus filamentus, Puntilus brevis, Morulius chrysophykadian, Hemibagrus filamentus, Pangasianodon hypophthalmus, Hinicorhynchus lobatus,Hinicorhynchus siamensis, Micronema apagon, Channa micropeltes,* and *Oxyeleotris marmoratus.*

Pak Nai Fishery Village was once a small village by the Nan River, located 60 kilometers from the park Headquarters. Construction of Sirikit Dam has changed Pak Nai into a fishery village by creating the inland lake encircled with green mountain ranges. Restaurants on the rafts serve freshwater fish from the reservoir. Many fish's species have been recorded in Pak Nai, such as *Rasbola* sp., *Ompok krattensis, Pangasianodon gigas, Mastacembelus armatus, Syncrossus helodes, Yasuhikotakia Nigrolineatus* (Vidthayanon, 2005) and some of these are rare species.

The information on biodiversity, attractive flora, faunas and tourist sites, tourist site classification and tourism activities in SNNP were classified based on the definition of the Office of the National Environment Board as shown in Table 4-1. The locations of each tourist site located in SNNP are shown in figure 4-1.

Table 4-1Tourist site classification and tourism activities in SNNP

Type	Tourist sites	Site characteristics	Major Tourists activities
Landform	Sao Din Na Noi Kok Sua		Admiring scenery, and flora watching
Rapid	Kang Luang		Admiring scenery and picnic
Cave	Tam Luang		Cave exploring
Mountain	Doi Sa Mer Dao Pha Chu Cliff		Camping, Admiring sea of mist, sunset, and sunrise scenery
Reservoir	Pak Nai Fishery Village		Admiring scenery and relaxing

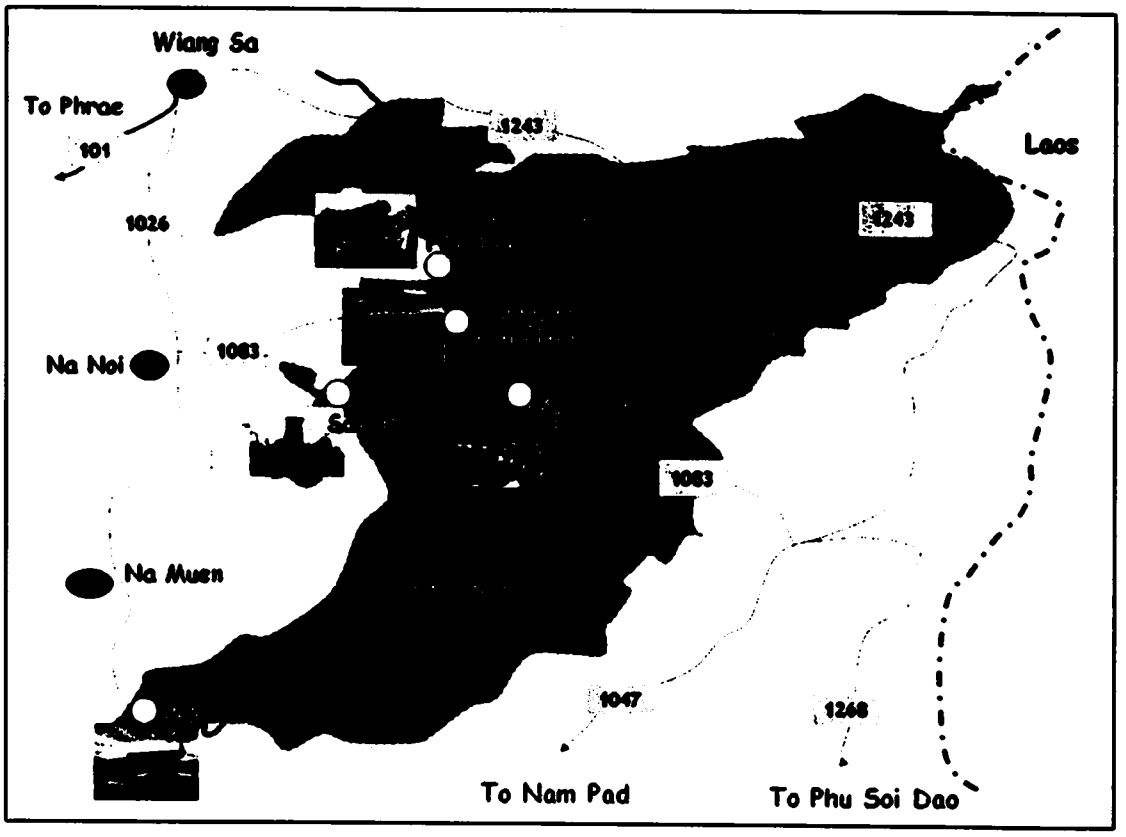


Figure 4-1 Prominent tourist sites located in Sri Nan National Park.

4.1.2 Indicators of Tourist Site Potential and Parameters

In order to identify specific indicators, the review literature of site assessment and ecological indicators including researches conducted in specific tourist site were thoroughly concerned and evaluated. The assessment of nature sites potential for ecotourism in 7 National Parks of Nan were investigated as presented in Table 4-2. Moreover, tourism impact assessment was conducted to determine the impact level that occurred in the national park by weight score method (Table 4-3).

Table 4-2 Assessment of nature sites potential for ecotourism in Nan National Park

National Parks	Σw_i	$\Sigma r_i w_i$	1.Resource attractiveness	2.Environmental awareness	3. Ecotourism activities	4. Accessibility	5. Safety	6. Conventional recreation	Σw	$\Sigma r_i w_i$	EP	Class
Rated score (1-3)			$\frac{\Sigma r_i w_i}{w_i}$	r11	r12	r13	r14	r15			$\frac{\Sigma r_i w_i}{w_i}$	
Weighted score	Σw_i=47			W11/5	W12/4	W13/1	W14/4	W15/5	Σw_i=66			
Doi Phu Ka		107	2.28	3	2	2	2	2		150	2.27	H
Sri Nan		101	2.15	3	1	3	3	2		145	2.20	H
Mae Cha Rim		89	1.89	3	2	3	3	2		137	2.08	H
Tam Sa Koen		94	2.00	3	2	1	2	2		136	2.06	H
Khun Nan		64	1.36	2	2	1	2	2		101	1.53	M
Nantaburi		84	1.79	2	2	1	2	2		121	1.83	M
Khun Sa Tan		74	1.57	2	2	1	2	2		111	1.68	M

H = High potential for ecotourism M = Moderate potential for ecotourism

Table 4-3 Risk assessment analysis in national parks of Nan

National parks	Impact on wildlife	Impact on flora	Impact on environment	ΣW_i	$\Sigma R_i W_i$	1. Impact on ecosystem	2. Impact on culture and community	3. Impact on ancient remain	ΣW_i	$\Sigma R_i W_i$	Impact of tourism	Class
Rated score (1-3)	R16	R17	R18			$\frac{\Sigma R_i W_i}{W_i}$	R19	R20			$\frac{\Sigma R_i W_i}{W_i}$	
Weighted score	W16/5	W17/4	W18/5	$\Sigma W_i = 14$			W19/5	W20/5	$\Sigma W_i = 24$		IP	
Doi Phu Ka	1	3	2		27	1.92	2	-		37	1.54	M
Sri Nan	2	2	3		33	2.36	2	-		43	1.79	M
Mae Cha Rim	2	1	3		29	2.07	-	2		39	1.63	M
Tam Sa Koen	2	1	2		24	1.71	2	-		34	1.42	M
Khun Nan	2	2	2		28	2.00	1	-		33	1.38	M
Nantaburi	2	1	2		24	1.71	2	-		34	1.42	M
Khun Sa Tan	2	2	2		28	2.00	1	-		33	1.38	M

M = Moderate Impact from Tourism

The results showed that, Sri Nan Nationak Park was rated in high level for ecotourism as same as Doi Phu Ka, Mae Cha Rim and Tam Sa Koen National Park where as Khun Nan, Nan Ta Bu Ri, and Khun SaThan National Park were rated in moderate level. Sri Nan was rated as high potential level due to the efficiency of environmental awareness, accessibility, and safety indicators. Moreover, from tourist statistics, Sri Nan had the highest number of tourists visited compared with other national parks because of the variety of natural tourist sites and beautiful natural scenery. This attractiveness may cause unexpected effects to the natural environment if proper management plan lackey.

Therefore, risk assessment analysis was also conducted in order to determine the impact level that occurred in each national park by focusing on 3 mainly impacts including of impact on ecosystem, culture and community, and ancient remain. The result showed that, all national parks were rated as having moderate risk from tourism activities. Among this, Sri Nan National Park had the highest impact compared to others. The serious impact was the impact on environment which occurred in major tourist sites in high tourist season.

Consequently, Sri Nan was selected to study particularly in assessment of tourist site potential and application of environmental management system for ecotourism development. In addition, the significant indicators from previous data was applied and investigated in the prominent tourist site of Sri Nan.

Recently, Sri Nan National Park has 5 types of tourist sites classified based on the definition of Office of National Environment Board, Thailand. The indicators that indicate the potential of tourist site for ecotourism in Sri Nan National Park have been categorized based on 4 components of ecotourism. The result of this study established 20 indicators which can indicate tourist site potential for ecotourism as shown in Table 4-4. Six indicators of nature based tourism,

8 indicators of sustainable management tourism, 4 indicators of environmentally educative tourism, and 2 indicators of people participation were identified. The selected indicators were separated in two groups which are common indicators for every types of tourist site and specify indicators for each tourist site.

Benchmark for identifying the levels of indicator's significant and criteria was followed by Thailand Ecotourism Site Standard (ERIC, 2006), Nature Site Evaluation Techniques (ERIC, 2003), WTO indicators of Sustainable Development for Tourism Destinations (WTO, 2004), related researches and literature reviews. The evaluation form for common indicators was developed and shown in Appendix B-1.

The evaluation form to determine indicators of mountain, landform, reservoir, and rapid was developed as presented in Appendix B-2 - B-5, respectively.

Table 4-4 Indicators of tourist sites, Sri Nan National Park

Tourist sites / Indicators	Landform	Rapid	Cave	Mountain	Reservoir
Nature-based tourism					
Uniqueness of the site	S	S	S	S	S
Occasion for visit	C	C	C	C	C
Aesthetic value	S	S	S	S	S
Diversity of flora and fauna	S	S	S	S	S
Popularity of the site	C	C	C	C	C
Route scenery	C	C	C	C	C
Sustainable management					
Road condition	C	C	C	C	C
Distance from the main road or Headquarters	C	C	C	C	C
Safety	S	S	S	S	S
Environmentally negative impact	S	S	S	S	S
Waste management	C	C	C	C	C
Water quality		S			S
Parking area	C	C		C	C
Infrastructure and accommodation				C	C
Environmental Education					
Environmentally educative activities	S	S	S	S	S
Environmentally educative media	C	C	C	C	C
Knowledge in environment and ecology of staffs and tour guides	S		S	S	
Research and database	C	C	C	C	C
People Participation					
Income from tourism to local people	C	C	C	C	C
Local people involved with planning and tourism management	C	C		C	

Note: C = Common indicators, S = Specific indicators

4.2 Tourist Site Assessment in Sri Nan National Park

4.2.1 The designed of form and methodology for tourist site assessment in this study

The ranking criteria for tourist site potential were identified as shown in Table 4-5. For evaluation or to assess tourist site potential, the evaluation form and scores were established for each indicator as show in Table 4-6 and divided into 4 major groups. When the evaluation process is complete, total scores will be compared with the standard level.

Table 4-5 Criteria and potential level of tourist site

Scores	Level	Symbol
80 - 100	Excellent	☺☺☺☺☺
71 - 80	Very high	☺☺☺☺
61 - 70	High	☺☺☺
51 - 60	Medium	☺☺
≤ 51	Low	☺

Table 4-6 Indicator assessment form

TYPE	INDICATORS	SCORES	TOTAL
Nature - based Tourism			
Common	Occasion for visit	5	
Common	Popularity of the site	5	
Common	Route scenery	5	
Specific	Uniqueness of the site	5	
Specific	Aesthetic value	5	
Specific	Diversity of flora and fauna	5	
Total		30	
Sustainable management			
Common	Road condition	5	
Common	Distance from the main road or Headquarters	5	
Common	Waste management	5	
Common	Parking area	5	
Specific	Environmentally negative impact	5	
Specific	Infrastructure and accommodation	5	
Specific	Safety	5	
Specific	Water quality	5	
Total		40	
Environmental Education			
Common	Environmentally educative media	5	
Common	Research and database	5	
Specific	Environmentally educative activities	5	
Specific	Knowledge in environment and ecology of staffs and tour guides	5	
Total		20	
People Participation			
Common	Income from tourism to local people	5	
Common	Local people involved with planning and tourism management	5	
Total		10	
Total score of indicators		100	

4.2.2 Tourist Site Assessment in Sri Nan National Park

The evaluation forms for tourist site assessment in SNNP have been designed and were evaluated in prominent tourist site. Table 4-7 shows result of evaluation scores at Doi Sa Mer Dao, Pha Chu, Sao Din, Kang Luang, and Pak Nai Fishery Village which have been evaluated during low tourist season in summer and high tourist season in winter.

The results from tourist site assessment were evaluated and identified the potential level for ecotourism as presented in Figure 4-2.

Table 4-7 Tourist site assessment in Sri Nan National Park

TYPE	INDICATORS	SCORES	TOURIST SITES									
			Sa Mer Dao		Pha Chu		Sao Din		Pak Nai		Kang Luang	
			Low	High	Low	High	Low	High	Low	High	Low	High
Nature - based Tourism												
Common	Occasion for visit	5	3	3	4	4	3	3	3	3	3	3
Common	Popularity of the site	5	4	4	4	4	4	4	3	3	3	3
Common	Route scenery	5	4	4	4	4	4	4	3	3	3	3
Specific	Uniqueness of the site	5	3	3	4	4	5	5	4	4	4	4
Specific	Aesthetic value	5	4	4	4	4	4	4	4	4	5	5
Specific	Diversity of flora and fauna	5	3	3	3	3	4	4	3	3	5	5
Total		30	21	21	23	23	24	24	20	20	23	23
Sustainable management												
Common	Road condition	5	2	2	4	4	3	3	4	4	5	5
Common	Distance from the main road or Headquarters	5	4	4	5	5	4	4	0	0	2	2
Common	Waste management	5	3	3	3	3	3	3	2	2	2	2
Common	Parking area	5	3	3	4	4	4	4	4	4	5	5
Common	Infrastructure and accommodation	5	3	3	4	4	4	4	2	2	3	3
Specific	Safety	5	4	4	5	5	5	5	4	4	2	2
Specific	Environmentally negative impact	5	4	4	4	4	3	2	3	3	3	3
Specific	Water quality	5	3	3	3	3	-	-	5	5	5	5
Total		40	27	27	32	32	30	29	22	22	24	24
Environmental Education												
Common	Environmentally educative media	5	3	3	4	4	5	5	2	2	1	1
Common	Research and database	5	3	3	3	3	4	4	2	2	3	3
Specific	Environmentally educative activities	5	1	1	5	5	5	5	1	1	0	0
Specific	Knowledge in environment and ecology of staffs	5	4	4	4	4	5	5	3	3	2	2
Total		20	11	11	16	16	19	19	8	8	6	6
People Participation												
Common	Income from tourism to local people	5	1	2	1	2	2	2	2	3	1	0
Common	Local people involved with planning and tourism	5	2	2	3	3	3	3	2	2	3	3
Total		10	3	4	4	5	5	5	4	5	4	3
Total score of indicators		100	62	62	75	76	78	77	54	54	57	56

Note: The detail of evaluation forms presented in Appendix B

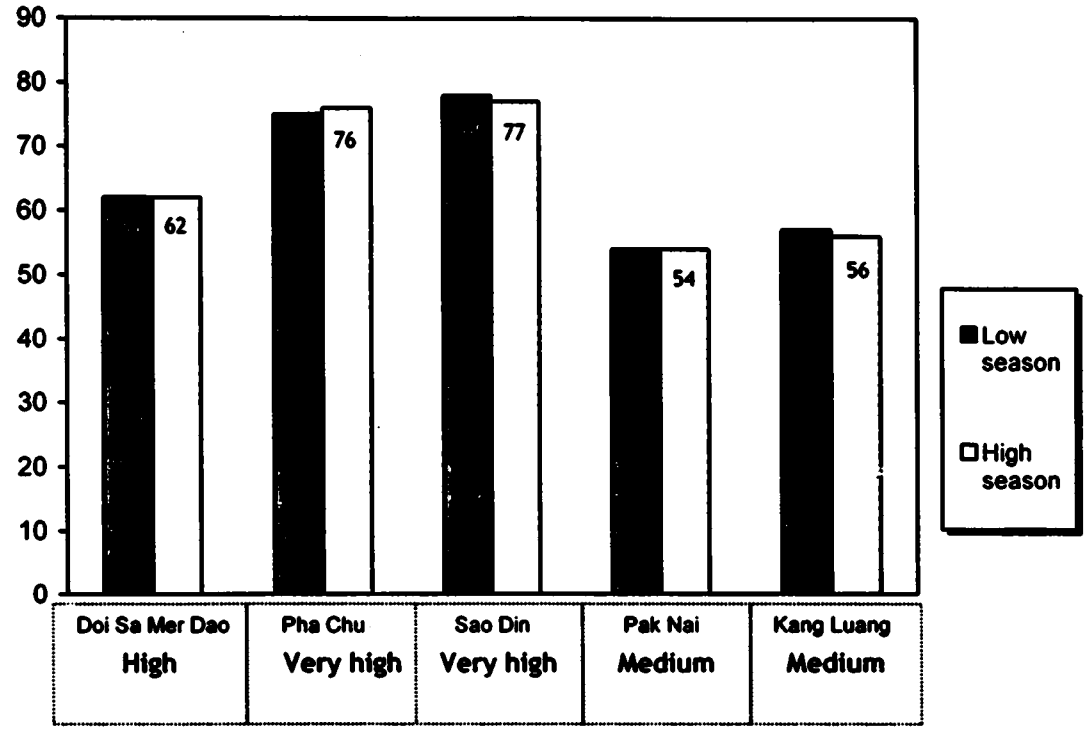


Figure 4-2 Potential of tourist sites in SNNP

Pha Chu Clift and Sao Din Landform were rated as having very high potential for ecotourism, while Doi Sa Mer Dao was in good potential and Pak Nai and Kang Luang were in medium potential.

The tourist season has little effect for ecotourism potential in tourist site; most are equal except Pha Chu, Sao Din and Kang Luang. The significant indicators varied by tourist seasonal are environmental impact and income from tourism to local people. In tourist season, especially long weekend in December, some local people bring their food, crafts, local fruits and souvenirs for selling to tourists. At the same time, negative environmental impact such as garbage appearance at Sao Din during high tourist season was occurred.

When looking in detail for each group of indicators, Doi Sa Mer Dao was rated only 21 from 30 in nature-based tourism indicators due to occasion for visit, uniqueness of the site and diversity of flora and fauna indicators. In the past, Doi

Sa Mer Dao was corn field and the owner donated this mountain to the park as a consequence of the beautiful scenery for camping, and admiring beautiful sea of mist, sunrise and sun set. For other indicators of sustainable management, environmental education, and people participation, Doi Sa Mer Dao is possible to have more potential if the road condition, car park and more environmental activities are improved.

At Pha Chu Clift, it was rated as very high potential for ecotourism because this area has been developed for more than 10 years to promote tourism. Therefore, accommodation, road condition, infrastructure, information center including media have been provided for tourists. To develop Pha Chu for better potential, it has to improve waste management system, establish more activities for tourists and searching alternative ways to enhance the collaboration of local people and national park.

Sao Din Landform was also rated in very high potential level. Sao Din is very unique by itself. In addition, with the interesting plant species "Dig Diam" and "Yah Khem Na Ri Ka", it can be a magnet for tourists to visit and add the higher scores for nature-based indicators. Environmental education indicators of Sao Din were rated in very high scores of 19 from 20, because of appropriate management. Nature trail with the interesting spot, map and information of plant species, archeology, especially staff who's very familiar in history of Sao Din made this place worthy to visit. Another alternative to develop Sao Din more attractive and has more potential for ecotourism is to establish the linkage activities between local people and tourists.

Pak Nai Fishery Village was rated as medium potential due to many reasons. The significant indicators are distance because Pak Nai is located 60 kilometers far from headquarters. Moreover, Pak Nai is still lacking of environmental friendly

activities and media. So, feasibility to improve Pak Nai's potential is to develop some tourism activities for tourists, providing map and information of species by enhancing research conducted in biodiversity of the reservoir.

Kang Luang was also rated in medium potential. The prominent reasons are because of inappropriate waste management, few information and caution about safety for tourists, none of environmental educative activities and media. However, most tourists only need to relax and admiring the scenery, therefore the park officer is encouraged to take care of this area in natural way with more concerning on safety and waste management.

4.3 Environmental Management System for Ecotourism Development

An environmental management system was applied for ecotourism development in SNNP. In this study, EMS was applied as a method that integrate functional elements to achieve the principles of ecotourism which further evaluate, manage, and reduce the negative environmental impacts in the tourist area. EMS was applied to SNNP from December 2005 to December 2007. Environmental aspects in SNNP were identified and ecotourism management plan was developed based on the four components of ecotourism as following;

4.3.1 Nature-based Tourism

The data of attractive flora and fauna found at the tourist sites were collected and the tourists' appreciation in nature was surveyed using specifically designed questionnaire (Appendix C). Environmental aspects in SNNP were identified in this study (Table 4-8). One of the attractiveness in SNNP for tourists is to admiring sea of mist, sunrise and sunset, so the average sunrise and sunset time is recommended to display at prominent camping sites (Figure 4-3).

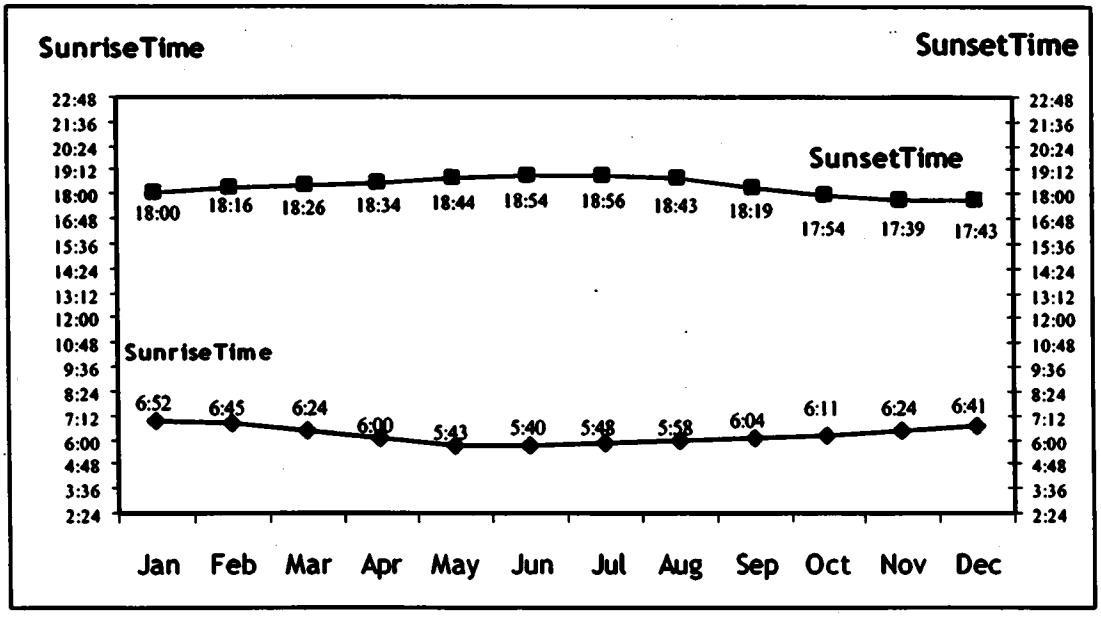


Figure 4-3 Average Sun rise and Sunset time in Nan Province 2007

Source: Thailand Meteorological Department, 2007

Table 4-8 Environmental aspects in Sri Nan National Park.

Environmental Aspects	Type of Tourist Sites in Sri Nan National Park					Restaurant	Accommodation	Restroom
	Landform	Rapid	Cave	Mountain	Reservoir			
Number of tourists	●	●	●	●	●		●	
Garbage	●	●	●	●	●	●	●	
Water usage				●	●	●		●
Wastewater				●	●	●	●	●
Energy				●			●	●
Car park	●			●				
Carrying capacity				●				

Some environmental aspects such as number of tourists and garbage are proposed to concern in every types of tourist site, whereas water usage, waste water, energy, car park, and carrying capacity were suggested in specific areas. Mountain was highly recommended for monitored every environmental aspect.

The information on biodiversity, attractive flora, faunas and tourist sites were focused. At Sao Din, 134 plant species were found and have been identified into 113 genera and 57 families (Bunma, 2004). There were 17 useful plant species, among these 9 species are used as food, 5 species for medicine, and 3 species used in another purpose.

Based on questionnaire surveyed, tourists were interested in unique species such as Dig Diam "*Gardenia Turgida* Roxb" and Yah Khem Na Li Ka "*Heteropogon contortus* (L.) Roem&Schult" at Sao Din, and Chan Pha "*Dracaena loureisi* Gagnep" at Pha Chu Cliff. There are a lot of wild animals inhabiting in the park such as banteng, gaur, serow, muntjac, binturong, pheasant, monitor lizard, elephant, bear, deer, barking dear, tiger, wild pig, wild dog, big-headed turtle, birds, snakes, and peacock which ve been recorded nearby Nan River.

At Kang Luang many fish species have been found such as *Hemibagrus filamentus, Puntilus brevis, Morulius chrysophykadian, Hemibagrus filamentus, Pangasianodon hypophthalmus, Hinicorhynchus lobatus,Hinicorhynchus siamensis, Micronema apagon, Channa micropeltes,* and *Oxyeleotris marmoratus* . As same as Pak Nai Fishery Village, many fish species have been recorded, such as *Rasbola* sp., *Ompok krattensis, Pangasianodon gigas, Mastacembelus armatus, Syncrossus helodes, Yasuhikotakia Nigrolineatus* and some of these are rare species.

4.3.2 Sustainable Management

The information of tourist activities, statistics and behaviors were collected. Some environmental aspects such as water usage, waste management, garbage loads, number of vehicles, parking area, infrastructure, accommodation, and carrying capacity were thoroughly investigated.

The information of tourist activities, statistics and behaviors has been collected. More than 78% of tourists visited SNNP between December and April (Department of National Park, 2006) for camping, admiring sea of mist, sunrise and sunset (Figure 4-4).

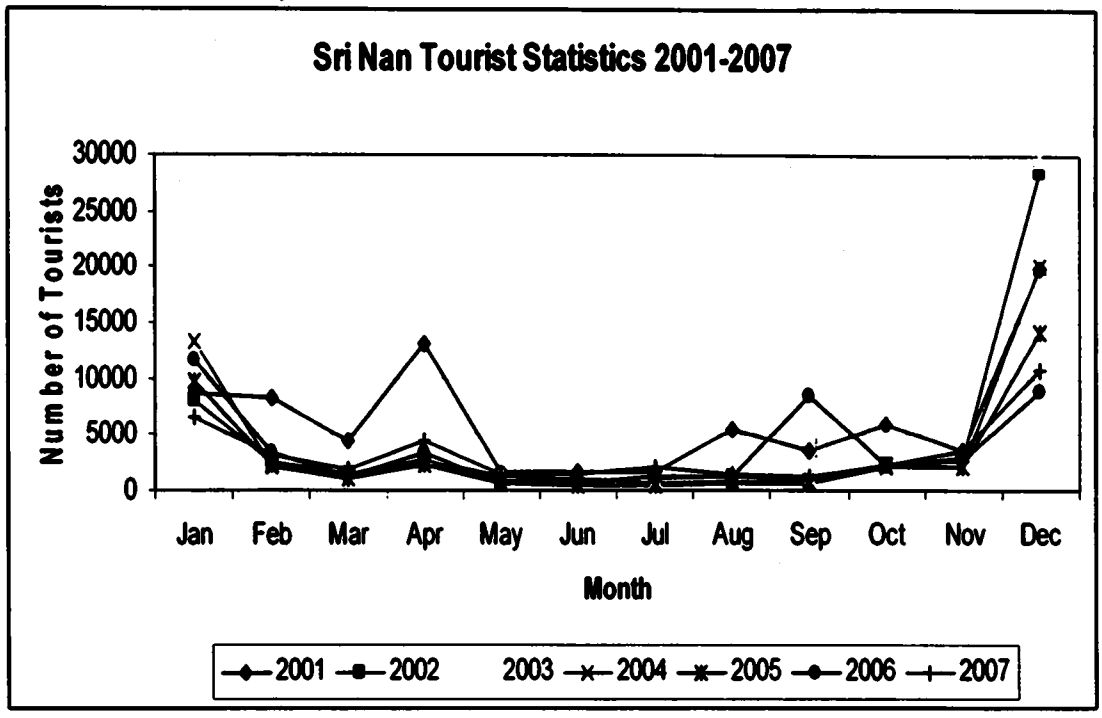


Figure 4-4 Tourist statistics in Sri Nan National Park from 2001-2007

Among this, 49.15% stayed overnight camping. Presently, SNNP has two main camping sites, Doi Sa Mer Dao and Pha Chu, covering 4,295 square meters and the car parks close to camping sites are not enough to support the tourists during high season (Figure 4-5). Examples of environmental problems caused by tourist impact are the lack of camping site and car park, water shortage, waste management, and overcrowding. Therefore, behaviors and resources consumptions of the tourists were also investigated (Table 4-9). Furthermore, this research was conducted to assess the optimum carrying capacity of the camping sites and car parks (Table 4-10).

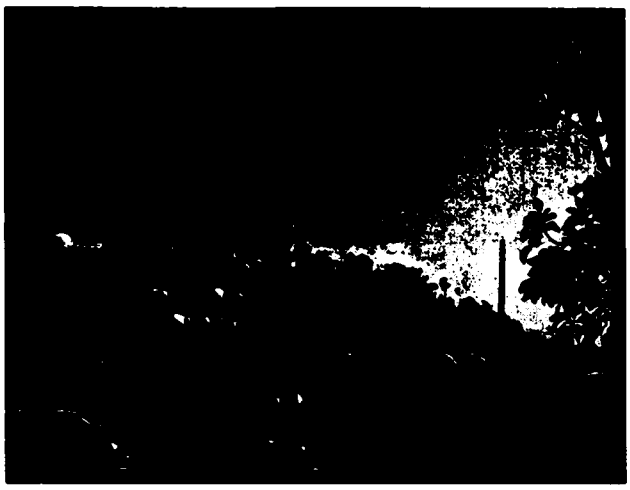


Figure 4- 5 Camping site and car park at Doi Sa Mer Dao Mountain

Camping area = Σ(1+2+3) = Σ (500 + 435 + 43) = 1,520 m^2

Car park area = 1,551 m^2

Table 4-9 Data of tourists at Doi Sa Mer Dao during new year 2006-2007

Number (maximum)	2006	2007
Tent	141	211
Car	89	130
Tourists	643	811

Determination of Carrying Capacity

Physical Carrying Capacity (PCC) is defined as the maximum number of visitors that can physically fit into a defined space, over a particular time and can be expressed according to the following formula:

$$PCC = A \times V/a \times Rf$$

In this study, optimum space for tourists for relaxing is approximately 2 square meters per person (Florida Department of Environmental Protection, Division of Recreation and Parks) and the average length of stay for tourists which are approximately 1 night (tourist's statistics). Therefore, the physical carrying capacity at Doi Sa Mer Dao and Pha Chu was calculated as follow:

Doi Sa Mer Dao = 1520 x 0.5 x 1 = 760 tourists

Pha Chu = 2775 x 0.5 x 1 = 1,387 tourists

Table 4-10 Resource consumption of tourists in camping site at SNNP

Aspects	Average Standard	Current Situation	Status
Camping area ($2m^2$/person) [a]	Doi Sa Mer Dao = 760 Pha Chu = 1387	Doi Sa Mer dao = 811* Pha Chu = 561	Exceed Lower
Area of tent (m^2/tent)	10 (3 persons)[b] Doi Sa Mer Dao = 152 Pha Chu = 277	7(4 persons) Doi Sa Mer Dao = 211 Pha Chu = 120	 Exceed Lower
Water consumption (liters/person)	One -day trip: 19 Camping: 114 [b] Camping: 145 [c]	10.8	Lower
	Doi Sa Mer Dao = 250 Pha Chu = 312	Doi Sa Mer Dao = 811 Pha Chu = 561	Exceed Exceed
Waste generated (Kg/person/day)	One day trip: 0.02-0.06 [b] Camping: 0.06-0.45 [b]	0.60	Exceed
Car area(m^2/ car) Numer of cars	> 12 [b] Doi Sa Mer Dao = 129 Pha Chu = 60	12.8 Doi Sa Mer Dao = 130 Pha Chu = 65	Normal Exceed Exceed

Sources:

* Maximum number of tourists

[a] Florida Department of Environmental Protection, Division of Recreation and Parks.

[b] The study of Carrying capacity in Khao Yai National Park. Asia Lab and Consultant. Final Report.

[c] German Federal Agency for Natural Conservation (GFANC). 1997.

Study results showed that tourists need the space of at least 2 square meters per person. From the physical carrying capacity, Doi Sa Mer Dao is possible to support 760 tourists and 1,387 tourists at Pha Chu. During New Year, Doi Sa Mer Dao had tourists visited exceed the capacity. However, due to the water shortage problem during high season, limiting factor of the optimum number of tourists is the water supply.

At present, water supply in the water storage tanks for tourists at Doi Sa Mer Dao is 2700 liters and 3370 litters at Pha Chu. The meter was established at each camping site for calculating the water consumption of tourists.

Water consumption of tourists at camping sites are different based on the location, in Mediterranean region tourist consumes water approximately 145 liters/ tourist/ day (Gossling, 2001) while at Khao Yai National Park, the water consumption of tourist is 114 liters/ tourist/ day. In this study, most tourists like to visit SNNP during winter when the weather is very cold (5-20 degree Celsius). As a result, they consumed water only for necessary activities such as cleaning dishes and toilet use. Only 10.8 liters of water was estimated to be consumed per person per day. As a consequent, the suitable number of tourists that should stay overnight camping in SNNP is approximately 550 persons per night.

However, wastewater from canteen and toilets are discharged straight to the environment without wastewater treatment system. Therefore, to reduce the environmental impact to fragile protected area, usage of chemical detergent should be avoided. Thus, the environmental friendly cleanser was provided to SNNP staff and tourist during high tourist season (Figure 4 - 6).

Figure 4-6 Environmental friendly cleanser for staff and tourists

Waste management system is also considered in the study. Waste characteristics in SNNP showed that 49% of the total waste generated by tourists was organic. Recyclable wastes such as plastic, glass bottle, polyethylene, and aluminum can comprised to another 51% of the total waste (Figure 4-7). Therefore, waste separation should certainly be implemented in the national park.

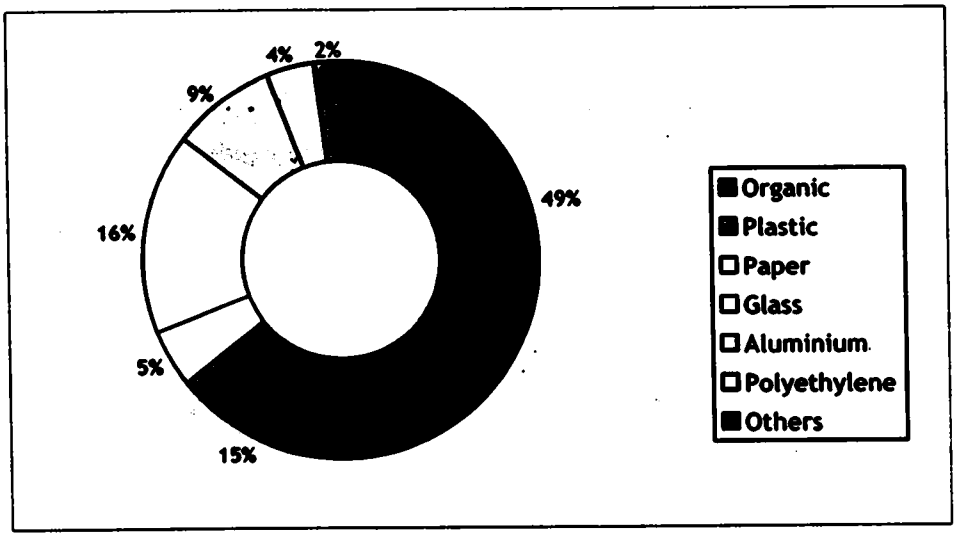


Figure 4-7 Percent of waste generated in Sri Nan National Park

Currently, solid waste from SNNP was transferred to open burning in Na Noi District; therefore the waste separation was established. The organic wastes and non-toxic should be transferred to landfill and open burning, while other wastes should be transferred to the recycle process. In addition 20 garbage bins, bags and environmental awareness sign for encourage tourists to separate waste were inaugurated for SNNP (Figure 4 - 8).

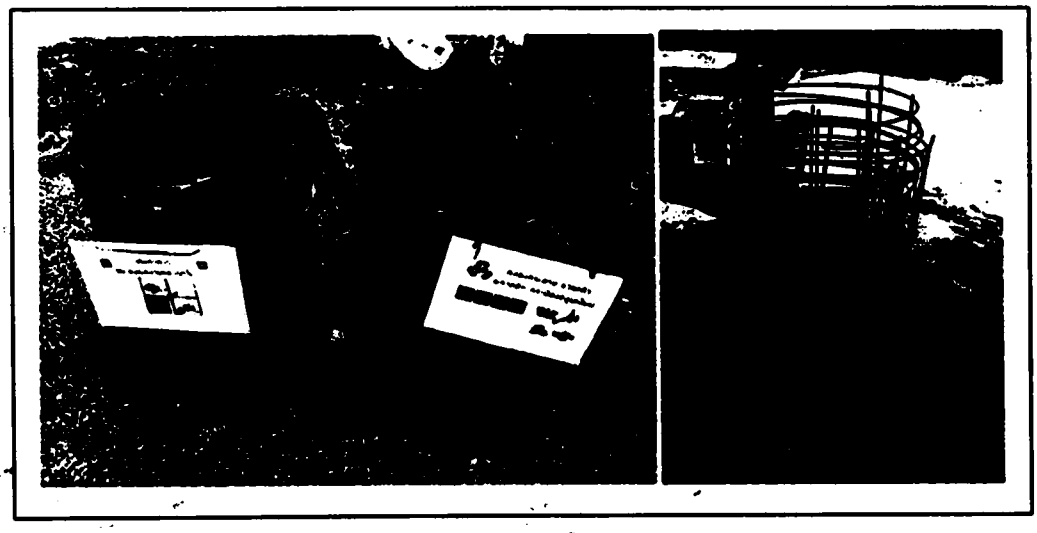


Figure 4-8 Garbage bins provided for Sri Nan National Park

From observation after waste separation implementation to the park, some tourists collaborated to separate their wastes. However, some of them can not notice the symbol when they disposed the garbage in night time. Many tourists improved their behaviors and had responsibility to bring garbage back, especially for the recycle such as bottles and aluminum can.

Environmental friendly cleanser was also received good attitude from staff and tourists. They were used this product instead of their own cleanser during their stay in the park. Therefore, this implementation was able to reduce some severe environmental impacts to national park and nearby ecosystem during high tourist season. Moreover, the mitigation can also apply to other national parks in order to initiate tourist's environmental awareness for ecotourism development.

4.3.3 Environmental education

Baseline information on flora, fauna, and tourist sites in SNNP were collected. Additionally, the enhancement of ecotourism activities, nature trail, eco-camping sites, and media coverage program were also developed in the prominent tourist sites.

The information on prominent flora, fauna and tourist sites were collected in SNNP. The attractive tourist sites are Sao Din Na Noi, Pha Chu, Doi Sa Mer Dao, Kaeng Luang and Pak Nai Fishery Village. The major purpose of tourists visit in SNNP is for admiring sea of mist and relaxing in natural beauty environment by staying overnight camping at Pha Chu and Doi Sa Mer Dao. Tourist activities in SNNP are presently focused on camping and admiring the beautiful scenery.

As a result, some environmental friendly activities such as eco-camping, star observation, landscape interpretation, bird watching, environmental youth camp should be developed in SNNP. These activities encourage tourists and young generation to discover beyond the nature. The way to increase natural resources protection awareness among tourists is to enhance their understanding on relationships between living species in the ecosystem because they can not save and conserve the nature without loving and understanding the value of natural environment.

Some materials and book were arranged to the park such as eco-camping guidebook, bird guide, stream detective's package, telescopes, star maps, and environmental friendly game (Figure 4- 9). Eco-camping book was initiated awareness of tourists and staffs about enhance their alternative ways to reduced environmental impacts with simplified techniques (Appendix D).

Many tourists were interested in eco-camping guidebook and some of them will spread this idea to their family, friends and colleagues. Telescope for star observation is suitable environmentally educative activity for tourists to discover

beyond the universe, especially at Doi Sa Mer Dao and Pha Chu. From provided materials to support the idea of eco-camping site in SNNP, tourists are encouraged to learn more in environment and ecosystem and can be changed their behaviors from tourists to become eco-friendly tourists. This circumstance can indicate that the successful ecotourism development in SNNP is due to suitable environmental management system.

4.3.4 People Participation

The stakeholders participated in this research were divided into two groups, local people (tourists, local people and park officers), and policy makers (government, sub-district administration organization, tourist agency, NGOs, and local academic institutes). Relevant stakeholders were interviewed for the suggestions on ecotourism development.

The stakeholders in SNNP who participated in ecotourism development include national park officers, tourists, local people, tourism operators, and local academic institutes. The in-depth interview and questionnaire revealed that people understood the concept of ecotourism and took human impact on environment into consideration. Currently, the park officers come from the area close to the national park. Local people also involved with tourism activities by selling their local food, seasonal fruits, and local handicraft to tourists (Figure 4-10). Some of them have involved throughout the ecotourism process beginning with planning and participating in tourism activities, evaluating tourism impact, and monitoring situation of natural resources in the national park.

Figure 4- 9 Telescopes, star maps and environmental friendly game for SNNP

Figure 4 - 10 Local people sell food and local products at tourist site

4.4 Tourist characteristics and perceptions based on specific questionnaire

Tourist characteristics, behaviors, and perceptions in Sri Nan National Park have been conducted by specific designed questionnaire. The data was collected at prominent tourist sites in Sri Nan which are Sao Din, Doi Sa Mer Dao, Pha Chu, Kang Luang, and Pak Nai Fishery Village during New Year 2006, 2007, and 2008. A Total of 372 questionnaires were evaluated, tourist's characteristics were classified in Table 4 - 11.

Table 4 - 11 General information of tourist's characteristics in SNNP

Characteristics		Tourists	Percentage
Gender	Male	193	51.9
	Female	179	48.1
	Total	372	100.0
Age (years)	Below 15	12	3.20
	15 - 20	37	9.90
	21 - 25	50	13.40
	26 - 30	100	26.90
	31 - 40	98	26.30
	More than 40	75	20.20
	Total	372	100.00
Level of Education	Primary school	10	2.70
	Secondary school	60	16.10
	Bachelor degree	248	66.70
	Master or higher degree	46	12.40
	Others	8	2.20
	Total	372	100.00
Occupation	Student	70	18.80
	Government officer	35	9.40
	Organization	12	3.20
	Research	3	0.80
	Self employed	71	19.10
	Company officer	169	45.40
	Other	12	3.20
	Total	372	100.00

Table 4 - 11 (cont.)

Characteristics		Tourists	Percentage
Coming from	Bangkok	175	47.04
	Nan	43	11.56
	Samut Prakarn	21	5.65
	Chonburi	21	5.65
	Pathumthani	15	4.03
	Uttaradit	12	3.22
	Suphan Buri	11	2.96
	Others	74	19.89
	Total	372	100.00
Time	First time	254	73.4
	2 times	56	16.2
	3 times	18	5.2
	More than 3 times	18	5.2
	Total	346	100.00
Transportation	Car	184	50.70
	Pick up	54	14.90
	Four-wheel	47	12.90
	Van	46	12.70
	Public transportation	15	4.10
	Motorcycle	13	3.60
	Bus	3	0.80
	Other	1	0.30
	Total	363	100.00

Among 372 tourists, 51.80 percent were male and another 48.10 percent were female. The ages of prominent tourist groups were between 26 - 30 years; followed by 31- 40 years, and more than 40 years which are 26.90, 26.30, and 20.30 percent, respectively. The education information showed that 66.70 percent graduated bachelor degree and the major group has been working as company officer as much as 45.40 percent.

When focus at the place of tourist coming from, it is very interesting that almost 50 percent of tourists came from Bangkok and nearby provinces such as Samut Prakarn, Chonburi, and Pathumtani where as only few tourists 11.56 percent came from Nan. It showed that Sri Nan National Park is very popular for tourists from Bangkok and most are office people who came to relax during long weekend. In addition, more than 70 percent of tourists visited Sri Nan for the first time, showing that the promotion and advertisement is very important to encourage the new coming tourist. The percentage of tourist return is 26.60 even Sri Nan is quite far from Bangkok.

The information of transportation was showed that 78.5 percent of tourist traveled by private transportations which are cars, pick up, and four - wheel vehicles. Only 4 percent were traveled by public transportation.

The reasons to visited SNNP and tourism activities were classified into 12 topics which are relaxing, wildlife watching, flora watching, bird watching, rafting, research/study, admiring sea of mist, admiring scenery, bicycle riding, trekking, photography, waterfall relaxing, and other reasons (Table 4 - 12).

Table 4 - 12 Reason of tourists for visiting Sri Nan National Park and their activities

Activities	Reason to visit		Tourism's activities	
	Frequency	% of cases	Frequency	% of cases
Relaxing	319	85.8	296	79.6
Admiring Sea of mist	222	59.1	250	67.2
Admiring scenery	218	58.6	245	65.9
Photography	176	47.3	230	61.8
Flora watching	40	10.8	61	16.4
Trekking	21	5.6	34	9.1
Wildlife watching	17	4.6	18	4.8
Bird watching	16	4.3	28	7.5
Rafting	6	1.6	8	2.2
Studying	4	1.1	6	1.6
Bicycle riding	6	1.6	3	0.8
Waterfall relaxing	2	0.5	6	1.6
Others	12	3.2	9	2.4

More than 85% of tourists came to SNNP for relaxing followed by admiring sea of mist (59.1%), admiring scenery (58.6%), and photography (47.3%) which was correlated with their activities at SNNP. Therefore, to enhance ecotourism activities, passive ecotourism should be developed based on tourist's behavior and interest. Tourist's behaviors and attitudes were representing in table 4 - 13.

Table 4 - 13 Tourist's behaviors and attitudes in Sri Nan National Park

Tourist's behaviors and attitudes		Tourists	Percentage
Overnight	Yes	337	90.60
	No	35	9.40
	Total	372	100.00
Length of stay	One day trip	35	9.40
	1 night	262	70.40
	2 nights	51	13.70
	3 nights	17	4.60
	4 nights	4	1.10
	5 nights	2	0.50
	8 nights	1	0.30
	Total	372	100.00
	Average 1.33 day		
Crowded impact	High impact	140	37.90
	Moderate impact	167	45.30
	Low impact	37	10.80
	No impact	25	6.80
	Total	369	100.00
Garbage bin	Enough	160	44.20
	Not enough	202	55.80
	Total	362	100.00
Willingness to bring garbage back	Agree	260	72.8
	Disagree	97	27.2
	Total	357	100.00

Table 4 - 13 (cont.)

Tourist's behaviors and attitudes			Tourists	Percentage
Willingness to pay for waste management	10 Baht		18	23.70
	20 Baht		28	36.80
	30 Baht		6	7.90
	40 Baht		4	5.30
	50 Baht		12	15.80
	100 Baht		7	9.20
	150 Baht		1	1.30
	Total		76	100.00
	Mode	20 Baht		
	Average	33.29 ± 3.33		

Interestingly, more than 90 percent of tourists stayed overnight in SNNP with average length of stay approximately 1 night by camping. When asking about the perception of crowded situation during high tourist season, more than 82.20 percent answered that it had moderate to high impact. Therefore, the carrying capacity, and regulations at the camping site should be considered especially during high tourist season.

55.80 percent of tourists suggested that the garbage bin still was not enough and 72.80 percent was willing to bring garbage back after their visit otherwise tourists recommend paying for waste management. Thus, opened questionnaire was designed for their attitudes, tourists willing to pay average 33.29 ± 3.33 Baht/person and major group of tourists agreed to pay at 20 Baht/ person which is similar rate as the national park fee. Therefore, the environmental fee for tourists who visit national park should be set between 20 - 40 baht.

The results of tourist attitude and infrastructure in SNNP were show in Table 4 - 14.

Table 4 - 14 Tourist's attitude in infrastructure

Attitude			High	Medium	Low
Appreciation	Accommodation		161	185	14
		%	44.7	51.4	3.9
	Restaurant		53	231	59
		%	15.5	67.3	17.2
	Visitor center		186	164	13
		%	51.2	45.2	3.6
Necessary of infrastructure	Restaurant		142	163	51
		%	39.9	45.8	14.3
	Accommodation		119	158	71
		%	34.2	45.4	20.4
	Telephone		132	121	88
		%	38.7	35.5	25.8
	Tent for rent		170	146	34
		%	48.6	41.7	9.7
	Car park		250	96	16
		%	69.1	26.5	4.4
	Electric		150	140	59
		%	43.0	40.1	16.9

More than 50 percent of tourists had medium appreciate in restaurant and accommodation where as 51.20 percent had highly appreciate in visitor center. Most necessary infrastructure in the national park should compose of telephone or signal of mobile phone, tent and accessories for rent, car park, and electric, while restaurant and accommodation aspects were evaluated in medium necessary. The suggestions and recommendations from tourists were grouped in Table 4-15.

Table 4 - 15 Tourist's appreciation and suggestions in Sri Nan National Park

	Topics	Frequency	Percentage
Tourist's appreciation		(n = 324)	
	Sea of mist	111	34.26
	Panoramic scenery	88	27.16
	Staff friendly and service mind	49	15.12
	Beautiful atmosphere, landscape	43	13.27
	Fresh, cool, and clean air	43	13.27
	Clean toilet	40	12.35
	Natural environment	32	9.88
	Calm, few tourists, unique of Sao Din	21	6.48
	Sunrise, sunset, comfortable to stay and camping	17	5.25
	Coffee corner service	12	3.70
	Star observation, Pha Hua Sing	7	2.16
	Pha Chu, Doi Sa Mer Dao, viewpoint	7	2.16
	Others	11	3.40
Impact to ecosystem		(n = 142)	
	Construction of infrastructure	40	28.17
	Garbage	22	15.49
	Road	16	11.27
	Restaurant	14	9.86

Table 4 - 15 (cont.)

	Topics	Frequency	Percentage
Impact to ecosystem (cont.)	Unlimited tourists	10	7.04
	Electricity	9	6.34
	Illegal logging	8	5.63
	Over development	7	4.93
	Car park	5	3.52
	Others (e.g. noise, camping site)	12	8.45
Recommendation for development		(n = 188)	
	Keep it natural as present	38	20.21
	Enlarge camping site, fine new one	33	17.55
	Enlarge car park area	23	12.23
	Develop landscape, plant more tree, colorful flower, garden	22	11.70
	Promotion in tourist magazine, website	16	8.51
	Increase and check quality of toilet	14	7.45
	Limited number of tourists, enhance tourism activities	12	6.38
	Add more signs to the park, develop new view points, improve road condition, prepare sleeping bag for rent, zoning at camping site	8	4.26
	Others	17	9.04

Tourists highly appreciated sea of mist, panoramic scenery, staff's friendly and service mind, beautiful landscape, cool and fresh air, clean toilet, natural environment, calm, the uniqueness of Sao Din, the comfortable to visit and camping, coffee service, respectively.

In tourist's opinions, the major impact to ecosystem is construction of infrastructure such as home and unnecessary buildings which contrast to the nature. Garbage is the second impact followed by road construction, restaurant, unlimited number of tourists, electricity, illegal logging, over development and car park.

The precious recommendations from tourists to develop SNNP are very interesting and contrast. 20.21 percent would like to keep it natural and do not need any artificial development, whereas 17.55 percent recommended to develop new camping site and car park. Some of them suggested planting more trees and flowers. The tourism promotion is also recommended especially in internet and tourism magazine. Limited number of tourists, increasing tourism activities, adds more sign to the park, develop new view points, improve road condition, prepare sleeping bag for rent, zoning at camping site are very valuable comments from tourists.

From entire studied included staff's interviewed, and tourist's questionnaires, several interrelated aspects that influenced the potentiality and success of ecotourism within a national park, as well as the links between natural areas, local people, and tourism have been highlighted in the SWOT analysis.

4.5 SWOT Analysis for ecotourism development in SNNP

The SWOT analysis will be described in detail on strength, weakness, opportunity, and threat of the high potential tourist site for ecotourism which are Sao Din, Doi Sa Mer Dao and Pha Chu. The idea of how to enhance collaboration, maintain environmental quality, and increase potential of SNNP for ecotourism development by SWOT analysis were described below:

The assessment of natural resources value, tourism potential, and tourism impact evaluation can be used in SWOT analysis for planning and development of ecotourism in prominent tourist site of SNNP. The four major components were considered:

Strength: the strength of national park in terms of natural resources and tourist site diversity, flora and fauna attraction, route scenery, tourist activities, environmental educative media, aerial utilizing plan, cultural diversity, proper time to visit (tourism calendar), government policy, environmental and waste management;

Weakness: the weakness of national park includes road condition, safety, proper time to visit, tourist activities, educative media, lodging capacity, camping space, restroom availability, waste management, local community participation, and staff capacity;

Opportunity: the opportunity of a national park to be developed as a suitable tourist site composes of potential suitable tourism activities, local community participation, government policy, site advertisement, lodging management, environmental condition, and educative media development ability;

Threat: the threat for ecotourism development includes natural resources conservation, optimum tourist amount, road condition, financial support, government policy, and staff capacity.

SWOT analysis for Sao Din

Strength

- Remarkable species at Sao Din "*Gardenia Turgida* Roxb", in Thai "Dig Diam", which always shakes its top when touched at any branches, and another species is *Heteropogon Contorlus* (L.) Roem & Schult or in Thai "Ya Khem Na Ri Ka", which twists itself clockwise when touched by the water. These species are very attractive for tourists.

- Sao Din has a distinctive geological landform, resembling a small version of the Grand Canyon. Geological evidences showed these pinnacles dated back to the late Tertiary period, about 30,000-10,000 years ago. Fossil and ancient tools were also discovered. Sao Din has a nature trail that is available for tourist to appreciate the beauty and history of the area.

- The local park officer at this site is an expertise on Sao Din history and geography.

Weakness:

- Due to there's no specific route, tourists are allowed to walk and touch and disturb the natural landform.

- Car park location is closed to the landform site and may disturb the fragile landform.

Opportunity:

- Provide the tourists with the guide book for nature trail and Sao Din with the information on history and background of the area, prominent species, geology, and natural resource conservation.

- Develop shuttle bus or a public transportation service at the junction to Sao Din for tourist season. In addition, non-fuel transportation such as rental carriage or bicycle is also recommended. Tourists can appreciate local life style and experience activities such as tamarind picking, weaving practice, and purchase local products. This could help local community to anticipate in tourism industry.

Threat:

- Attitude of local people and the park staffs on promoting tourism nearby national park.

SWOT analysis for Pha Chu

Strength:

- Pha Chu Clift has the longest flag pole in Thailand and provides good viewpoint to overlook the sea fog and Nan River.

- The location of camp site and lodging is convenient for family and senior tourists. Especially, overnight camping during winter season is very impressive for the nature lovers to admire beautiful sea of mist.

- Based on the questionnaires, tourists were impressed by the park officers at prominent tourist sites for their kindness, service mind, and expertise on history and important aspects of the area.

Weakness:

- Camp space and car park area has limitation during high tourist season.
- Wastewater discharge to natural environment.

Opportunity:

- Encourage astronomy observatory with cosmic guide map and book for rent or sale. The profit made from this activity can be used for national park maintenance and improvement.
- Develop eco-camp training, such as tent set-up workshop, first-aid techniques.
- Establish waste management campaign, especially in high tourist season, by encouraging tourist to separate and minimize waste.
- Develop booklet, brochure, or website on environmental youth camp in SNNP at information center.
- Environmental friendly cleansers are recommended for tourists and staffs especially in high tourist season.
- Establish a volunteer program for the experts on bird watching, trekking, and camping to work with the park especially in high tourist season.
- Set the early booking program for camping site and zoning into quiet zone, cooking zone, and family zone.

Threat:

- Progressively increment of uncontrolled mass of tourist in the national park.

SWOT analysis for Doi Sa Mer Dao

Strength:

- Surrounded by rich biodiversity among massive mountains and hill ranges with several spectacular natural environment and forest habitat.
- Camp site at Doi Sa Mer Dao is a magnificent spot for admiring sun rise, sun set, and sea of mist with a 360 degree view angle.

Weakness:

- Road condition to Doi Sa Mer Dao, Sao Din and Kok Sua are gravel-paved, which are not appropriate for commuting in rainy season.
- Staffs and financial support for promoting tourist activities are insufficient because it is a newly announced national park.

Opportunity:

- Encourage astronomy observatory with cosmic guide map and book for rent or sale. The profit made from this activity can be used for national park maintenance and improvement.
- Develop eco-camp training, natural photograph short course workshop.
- Establish waste management campaign, by encouraging tourist to separate and minimize waste.
- Develop shuttle pick up for tourists to and from Doi Sa Mer Dao and Pha Chu in peak seasons such as New Year celebration and Father's day holiday, which can reduce the traffic problems, air pollution, and increase camping area by converting the parking space to camp sites.

Treat:

- The area of Doi Sa Mer Dao is surrounded by corn field, therefore camping site area is not possible to expand.
- Human-caused forest fire occurs in dry seasons.
- Logging occurs around national park border.
- Progressively increment of uncontrolled mass of tourist in the national park.
- In order to increase the number of tourists at camping site, the proper wastewater treatment system should be implement and provide more water supply tanks for tourists.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The study was conducted in Sri Nan National Park from 2005-2007. Primary objectives of this study are 1) assessment of tourist site potential and 2) application of environmental management system for ecotourism development in Sri Nan National Park.

5.1 Assessment of tourist site potential

Proper indicators that imply the potential of tourist site for ecotourism in Sri Nan National Park were established and categorized based on 4 components of ecotourism. Of all the identified 20 indicators that indicated tourist site potential, 6 indicators represent nature-based tourism, 8 indicators represent sustainable management tourism, 4 indicators represent environmentally educative tourism, and 2 indicators represent people participation.

The nature-based tourism indicators consisted of visiting occasion, site popularity, route scenery, site uniqueness, aesthetic value, and flora and fauna diversity. The sustainable management tourism indicators included road condition, distance from the main road or headquarters, waste management, parking area, infrastructure and accommodation, safety, environmental impact, and water quality. Environmental education indicators involved environmentally educative media, environmentally educative activities, research and database, and staff's environmental and ecological knowledge. The last component was the indicators of people participation, which included an income from tourism to local people, and an involvement of local people with planning and tourism. The selected indicators were separated into two groups; common indicators for all tourist site evaluation, and specific indicators for each tourist site.

Selected indicators may be used to assess the status of relationships between people and protected areas. Relationship indicators are measurable variables which may be used to reflect antagonistic or symbiotic links between people and resources. An evaluation employing such indicators can provides insight into the challenges and possibilities for local development, environmental management, and ecotourism.

The results showed that 2 nature sites of SNNP, "Pha Chu Clift" and "Sao Din Landform", were ranked as very high potential for ecotourism because of their fascinating natural appearance. Doi Sa Mer Dao Mountain was ranked as good potential, whereas Pak Nai and Kang Luang were ranked as moderate potential site for ecotourism. The benefit of increasing potential tourist sites in SNNP was to enhance the tourism activities and develop interpretation program. Sustainable management mitigation also recommended for an establishment of waste management system such as preparing more bins in high season and encouraging tourists to be aware of waste separation.

However, the recommended indicators could be changed depending on tourism activity and should be continually monitored by the national park staffs. Particularly, the environmental aspects such as water supply, water quality, and waste management should be examined annually, especially around camping sites and popular tourist destinations.

5.2 Environmental management system for ecotourism development

EMS can be used to solve some environment impacts from tourism in SNNP by integrating the holistic approaches. The major problems occurred during high tourism season are camping site and car park limitation, water shortage, and waste management. To solve such problems and maintain tourist site potential, the integration of environmental techniques has been applied and investigated in SNNP. A baseline of tourism in the protected area was established by reviewing the current provision of services and facilities in SNNP, as well as the interactions between tourism, conservation and the local community.

The specifically designed questionnaire was used to collect attractive flora and fauna species information found at tourist sites and the tourists' appreciation for nature. In addition, baseline information on carrying capacity, solid waste management, water consumption, and eco-camping site were thoroughly studied.

From tourist's statistics, more than 78% of tourists visited SNNP between December and April for camping, admiring sea of mist, sunrise and sunset. Among these, 49.15% stayed overnight. Tourists had a strong interest in unique species such as *Gardenia Turgida* Roxb "Dig Diam" and *Heteropogon contortus* (L.) Roem&Schult "Yah Khem Na Li Ka" at Sao Din, and *Dracaena loureisi* Gagnep "Chan Pha" at Pha Chu Cliff.

The study on camping site areas showed that a tourist needed the space of at least 2 square meters. Due to the water shortage during high season, limiting factor of the optimal amount of tourists is the water supply. As a consequent, the appropriate number of tourists that should stay overnight camping in SNNP is approximately 550 persons per night.

The study on tourist behaviors indicated that the tourists consumed water only for necessary activities such as cleaning dishes and toilet use. Thus, only 10.8 liters of water was estimated to be consumed per person per day. Without wastewater treatment, in effort to reduce environmental impact on fragile ecosystem, the environmental friendly cleanser was provided to SNNP staff and tourist during high tourist season.

Waste characteristics study in SNNP showed that 49% of the total wastes generated by tourists were organic. Recyclable garbage such as plastic, glass bottle, polyethylene, and aluminum made up another 51%. At present, solid waste from SNNP was transferred to Na Noi District for an open-air burning. As a consequence, waste separation program was established at the camp sites. Organic and non-toxic wastes should be collected in the same bin and transferred to a landfill site or an open-air burning location, while other wastes should be collected and transferred to the recycle process. Twenty garbage bins, bags and environmental awareness sign were prepared for SNNP in order to encourage tourists on waste separation.

The study on tourist's perceptions and behaviors was based on specific questionnaire questions. From tourist demographic age and behaviors, the appropriated activities for soft ecotourism were recommended. Soft ecotourism identified the appropriate ecotourism activities for short visit, multi-purpose trip, physical passive, and emphasis on interpretation (Weaver, 2001 cited in Alampayand and Libosada, 2003). Therefore, some environmental friendly activities such as eco-camping, astronomy observation, landscape interpretation, bird watching, and environmental youth camp should be developed in SNNP. As a result, some books and materials were arranged to the park such as eco-camping guidebook, bird guide, stream sampling kit, telescopes, cosmic maps, and

environmental friendly games. The environmental management system for specific tourist sites in SNNP was summarized in Table 5-1.

The baseline data of visitor profile included numbers, age-group, length of stay, mode of travel, activities, perceptions in environmental impact, and behaviors. This profile would be useful in analyzing and separating visitors into different tourist types and their needs. The questions implied the additional facilities and leisure opportunities that the tourists would like to see at the site.

The questionnaire also revealed that tourists drive their own transportation to SNNP. Therefore, car park was ranked as a crucial facility. Furthermore, majority of the tourists, over 70%, visited SNNP for the first time. In order to increase amount of tourists visiting SNNP, advertisement on websites or tourism magazines were recommended. However, tourists amount should not exceed the carrying capacity of the ecosystem and the park facilities as mentioned before.

The major reasons that the tourists visited SNNP, when asked about their appreciation in this national park, included relaxing, admiring sea of mist, and admiring scenery. Particularly, the staff's service mind and friendliness at every prominent tourist sites had made more impression on them.

Approximately 70% of the tourists agreed on the same opinion to bring the garbage out of the park, whereas some of them preferred to pay for the waste management fee of 20 baht per person.

Study on the level of participation between local people and tourism activities in SNNP suggested that the park officers are currently from the surrounding area of the national park. Local people got involved in tourism activities by selling their local food, seasonal fruits, and local handicraft to the tourists.

Table 5-1 Environmental management system for specific tourist sites

Tourist site	Environmental aspects	Problem in SNNP	Mitigation
Sao Din	- tourism impact - Garbage - Car park	- Tourists disturb landform - Littering - Distance of car park to landform	- Recommend tourists to follow the trail while walking and do not touch the fragile landform. - Prepare soil sample and specimen of dominant plants. - Arrange telescope at the high area which can view surrounding. - Set the photography corner. - Inform tourists to avoid littering by putting sign board and slogan. - Zoning: car park, education, souvenir and relaxation zone.
Doi Sa Mer Dao, Pha Chu	- Number of tourists - Garbage - Water usage - Wastewater - Car park - Carrying capacity	- Limitation of camping site and car park - Waste management - Wastewater - Tourist activity - Carrying capacity	- Set capacity of camping site and car park and provide another suitable area in tourist season. - Develop waste separation program for staff and tourists. - Encourage tourist and staff to use environmental cleansers. - Develop more tourist activities such as star observation and eco-camping guide book for tourists. - Set the booking system for camping sites before high season.

Table 5-1 (cont.)

Tourist site	Environmental aspects	Problem in SNNP	Mitigation
Kang Luang	- Garbage - Water quality	- Waste management - Safety - Water quality	- Prepare separate bins. - Inform tourists to avoid littering by putting sign board and slogan. - Display safety sign, do and don't - Training life guard skill, first aids for staff and prepare staff to stay during tourist season. - Set the toilet and washing corner away from water body.
Pak Nai	- Tourism impact - Garbage - Wastewater	- Waste management - Water quality	- Prepare waste separation bins. - Avoid discharge of waste water into the reservoir. - Encourage floating restaurant to use environmental friendly cleanser and grease tap. - Prepare sanitary septic tank for park's bungalow. - Monitor water quality annually.

5.3 Recommendations on ecotourism development in Sri Nan National Park

5.3.1 The appropriate indicators to assess the potential of tourist sites may be varied due to the characteristics and uniqueness of the site. The method used to determine the indicators should be divided into 2 groups; the scientists/or experts group by using scientific method with sample test kit or laboratory techniques, and the local staffs group by integrating the simplified techniques with local technologies.

5.3.2 Various studies on national park visitors around the world have shown that nature tourists generally accept conditions different from their home more than other types of tourists. They do not demand international glamour, but are satisfied with or want to use local goods and materials and eat local foods, and that they are more demanding in seeking information about their destination (Boo, 1990). Some recommendations from tourists presented in the similar way to keep the national park as it's being in natural way.

5.3.3 According to the evaluation on uniqueness of the tourist sites, Nan Province was found significance for its aquatic ecosystem (waterfalls, natural water bodies, rapids and hot spring). Thus, ecotourism activities should avoid massive tourism on white-water rafting, and should prepare wastewater treatment system at some potentially impacting areas such as canteens, camp areas, and bungalows (Thirakhupt *et. al*, 2007).

5.3.4 SNNP has several popular tourist sites such as Sao Din Na Noi, Doi Sa Mer Dao camping site, Pha Chu Cliff, Pak Nai Fishery Village, and Kang Luang which are easily to visit in 1 - 2 days. The alternative travel routes with nearby national parks are highly recommended especially in high tourist season.

5.3.5 Investigate water quality at Kang Luang or at Nan River, compare before and after provided environmental cleanser for staffs and tourists.

5.3.6 Establish the early booking system for camping at Doi Sa Mer Dao and Pha Chu in high tourist season. From this study, Doi Sa Mer Dao can support 760 tourists or 152 tents and 129 cars. Pha Chu (include area nearby Headquarters) available for 1387 tourists or 277 tents and 60 cars. According to early booking, camping site zoning should be implementing in SNNP and divided into quiet zone, cooking zone, and family zone.

5.3.7 Closed the park during rainy season from tourism activities are highly recommended in order to keep the ecosystem recovery and for safety transportation.

Finally, to achieve the long term ecotourism development, SNNP needs to continue evaluating and monitoring tourism situation and its impacts on the prestigious environment on a regular basis by the park staffs and the local stakeholders.

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APPENDICES

APPENDIX A
General information of tourism in Sri Nan National Park

Table 1 - A General information of tourism in Sri Nan National Park

Data	Sri Nan National Park
Declaration	2007
Location (Amphoe)	Na Noi
Distance from Nan	70 km.
Contact address	P.O. 14, A. Na Noi, Nan 55150
Telephone no.(Headquarters)	054-701-106, 081-020-6655
Head Officer	Mr. Sombat Wiangkum
Area (km^2)	934
Suitable Duration to Visit	November - April, Sea fog viewing
Special Events	April 13-15 Songkran festival at Sao Din
Weather Condition	Average 24C, avoid going in rainy season
Prominent Faunas	Peacock, birds, Asian wild dog, Pig-tailed macaque
Prominent Flora	*Gardenia Turgida* Roxb., *Dracaena loureisi* Gagnep
Nature-trail	Doi Sa Mer Dao - Pha Hua Sing 1 km
Trail	Pha Chu - Headquaters, 3 km
Prominent Tourist Sites	Sao Din Natural Earth Pillars, Pak Nai Fishery Village, Luang cave, Kang Luang Rapid, Pha Chu Clift, Doi Sa Mer Dao Hilltop, Pha Hua Sing Cliff,
Tourism Activities	Environmentally educative trekking , sea fog viewing
Number of Tourists(2007)	40,236
Accommodation	4 bungalows, 2 campgrounds
Tent for Rent	31

Table 1 - A (cont.)

Data	Sri Nan National Park
Road Condition	Roads to Kock Sua and Sao Din are laterite, Roads to Headquarters are asphalt and concrete.
Car park (location and capacity)	2 car parks at Doi Samer Dao supported 120 cars, Pha Chu supported 65 cars
Interpretation	Brochure, Visitor Information Center
Electricity	24 hrs, except at Doi Sa Mer Dao
Water supply	Sao Din: artesian well, Headquarters, Pha Chu and Doi Sa Mer Dao: raw water from mountain
Restaurant	Headquarters: support 50 tourists Sao Din, Doi Sa Mer Dao: none (sale food in tourist seasons)
Public rest room	12 rooms at Sao Din, 24 rooms at Doi Sa Mer Dao
Plan for limiting number of tourists	No
Pets	Allow
Number of Checkpoints	3
Local guide provided	Yes
Waste separation	No
Waste disposal site	Outside at Na Noi by open air burning
Wastewater treatment	No
Staff	Bureaucracy 1,Permanent 1, Non-permanent 60-70
Researches	Flora and Fauna , Peacock Sao Din: Flora and *Gardenia turgida* Roxb.
Current Problem	1. Influential group is cutting forest in protected area. 2. Tourists are very crowded during the festival and weekend.

Note: the data was collected during year 2005-2007

APPENDIX B
EVALUATION FORM FOR INDICATORS

Table B-1 Evaluation form for common indicators

Indicators	Point	Score	Source
Occasion for visit : โอกาสในการเดินทางไปท่องเที่ยว พิจารณาถึง โอกาสในการเข้าถึงแหล่งท่องเที่ยว ช่วงเวลาที่สะดวกและเหมาะสมในการเดินทางเพื่อมาท่องเที่ยว			
▶ ท่องเที่ยวได้เพียง1 ครั้งในรอบปี หรือเพียงช่วงเวลาสั้นๆ ประมาณ 1-4 สัปดาห์	0		Adapted from UNEP (2005)
▶ ท่องเที่ยวได้เพียงแค่ช่วงเวลาสั้นๆ มีระยะเวลาประมาณ 1-3 เดือน	1		
▶ ท่องเที่ยวได้ เพียงแค่ฤดูเดียว (ประมาณ 4 เดือน)	2		
▶ ท่องเที่ยวได้เกือบตลอดทั้งปี (มากกว่า 8 เดือน)	3		
▶ ท่องเที่ยวได้ตลอดทั้งปี แต่ความสวยงามแตกต่างกันในแต่ละช่วงเวลา	4		
▶ ท่องเที่ยวได้ตลอดทั้งปี โดยที่ความสวยงาม ไม่เปลี่ยนแปลงในแต่ละช่วงเวลา	5		
Popularity of the site: ความมีชื่อเสียงของแหล่งท่องเที่ยว พิจารณาจากความเป็นที่รู้จักของนักท่องเที่ยว เช่น หากมีนักท่องเที่ยวที่เดินทางมาจากภูมิภาคอื่นเป็น แสดงว่าเป็นที่รู้จักในระดับประเทศ			
▶ เริ่มเปิดเป็นแหล่งท่องเที่ยว	0		Adapted from ERIC (2003)
▶ รู้จักเฉพาะคนในพื้นที่ หรือตำบลเท่านั้น	1		
▶ เป็นที่รู้จักเฉพาะของคนในจังหวัด	2		
▶ เป็นที่รู้จักของนักท่องเที่ยวในจังหวัดใกล้เคียง	3		
▶ เป็นที่รู้จักในระดับประเทศ	4		
▶ มีชื่อเสียงในระดับนานาชาติ หรือ ระดับโลก	5		

Table B-1 Evaluation form for common indicators (cont.)

Indicators	Point	Score	Source
Route scenery: ความสวยงามของเส้นทางจากที่ทำการอุทยานฯ หรือถนนสายหลักเพื่อเข้าสู่แหล่งท่องเที่ยว พิจารณาจากความเป็นธรรมชาติของเส้นทางที่เข้าสู่แหล่งท่องเที่ยว (ข้อละ 1 คะแนน)			
▶ เส้นทางผ่านพื้นที่ป่าที่อุดมสมบูรณ์ ร่มรื่น หรือมีสภาพเป็นธรรมชาติ	1		
▶ ระหว่างสามารถพบเห็นนก หรือ สัตว์ป่าได้	1		
▶ สามารถมองเห็นทิวทัศน์ในมุมกว้างได้	1		
▶ เส้นทางตัดผ่านแหล่งชุมชนท้องถิ่น สามารถพบเห็นวัด บ้านเรือน ที่เป็นเอกลักษณ์เฉพาะถิ่น	1		
▶ ระหว่างทางสามารถพบเห็นปรากฏการณ์ธรรมชาติเช่น สามารถเห็นพระอาทิตย์ขึ้น พระอาทิตย์ตก ทะเลหมอก ได้ในระหว่างการเดินทาง	1		
Road condition: สภาพถนนที่เข้าสู่แหล่งท่องเที่ยว ถนนที่เข้าสู่แหล่งท่องเที่ยวพิจารณาจากเส้นทางช่วงถนนสายหลัก หรือที่ทำการอุทยานแห่งชาติเข้าสู่แหล่งท่องเที่ยว			
▶ ยังไม่มีถนนเข้าสู่แหล่งท่องเที่ยว	0		
▶ ใช้ถนนที่เป็นเส้นทางของชาวบ้านต้องเดินทางผ่านพื้นที่รกร้างไร่นา หรือเส้นทางมีสภาพขรุขระมาก	1		
▶ ถนนลูกรังดินแดง	2		
▶ ถนนลาดยางหรือเป็นคอนกรีต สภาพถนนขรุขระเป็นบางช่วง	3		
▶ ถนนลาดยางหรือเป็นคอนกรีตตลอดเส้นทาง เส้นทางคดเคี้ยวและลาดชันสูง	4		
▶ ถนนลาดยางหรือเป็นคอนกรีต ตลอดเส้นทาง เส้นทางมีความคดเคี้ยวและลาดชันน้อย	5		

Table B-1 Evaluation form for common indicators (cont.)

Indicators	Point	Score	Source
Distance from the main road or Headquarters: ระยะทางจากถนนสายหลัก หรือที่ทำการอุทยาน ระยะห่างของแหล่งท่องเที่ยวกับถนนหลักหรือ ที่ทำการอุทยาน พิจารณาในด้านระยะทางและเวลา ที่ใช้ในการเดินทาง			
▶ อยู่ห่าง > 30 กิโลเมตร ใช้เวลา>1 ชั่วโมง	0		Adapted from UNEP (2005)
▶ อยู่ห่าง 21-30 กิโลเมตร ใช้เวลา < 1 ชั่วโมง	1		
▶ อยู่ห่าง 11 -20 กิโลเมตร ใช้เวลา < 40 นาที	2		
▶ อยู่ห่าง 5-10 กิโลเมตร ใช้เวลา < 20นาที	3		
▶ อยู่ห่างไม่เกิน 5 กิโลเมตร ใช้เวลา < 10 นาที	4		
▶ แหล่งท่องเที่ยวอยู่ติดกับถนนสายหลักสามารถเดินเท้าได้สะดวก ใช้เวลาประมาณ 5 นาที	5		
Waste management: การจัดการขยะในแหล่งท่องเที่ยว ในด้านจำนวนถังขยะ ที่ตั้ง การคัดแยก การเก็บขน และการกำจัดขยะ (ข้อละ 1 คะแนน)			
▶ มีถังขยะเพียงพอในจุดท่องเที่ยวที่สำคัญ	1		
▶ มีการคัดแยกประเภทขยะในแหล่งท่องเที่ยว และมีการรณรงค์ให้นักท่องเที่ยวร่วมกันแยกประเภทขยะ	1		
▶ ไม่มีขยะตกค้างในแหล่งท่องเที่ยว	1		
▶ ขยะนำไปกำจัดนอกพื้นที่อุทยานแห่งชาติ หรือกำจัดภายในพื้นที่อย่างถูกต้องตามหลักสุขาภิบาล	1		
▶ มีการใช้ประโยชน์จากขยะ เช่น นำไปขายเพื่อนำรายได้มาดูแลแหล่งท่องเที่ยว หรือทำปุ๋ยหมัก	1		

Table B-1 Evaluation form for common indicators (cont.)

Indicators	Point	Score	Source
Parking area: พื้นที่จอดรถ พิจารณาในด้าน ตำแหน่งที่ตั้ง ความพอเพียง ความสะดวก ความปลอดภัย (ข้อละ 1 คะแนน)			
▶ อยู่ห่างจากแหล่งท่องเที่ยวที่มีความเปราะบาง เช่น ธรณีสัณฐาน มากกว่า 100 เมตร ไม่ทำลายทัศนียภาพ	1		
▶ พื้นที่เพียงพอโดยเฉพาะในช่วงเทศกาล หรือมีการวางแผนทำพื้นที่จอดรถสำรอง	1		
▶ รถสามารถเข้า ออก สวนกันได้โดยสะดวก	1		
▶ มีความปลอดภัย ไม่อยู่ใกล้กับหน้าผา หรือพื้นที่ที่มีความเสี่ยงในการยุบตัว ไม่เคยมีคดีโจรกรรม	1		
▶ ไม่อยู่ไกลจากแหล่งท่องเที่ยวเกินกว่า 1กิโลเมตร	1		
Infrastructure and accommodation: โครงสร้างพื้นฐานและระบบสาธารณูปโภค พิจารณาการกำจัดของเสีย ตำแหน่งของการสร้างสิ่งปลูกสร้าง การออกแบบและก่อสร้างที่มีความกลมกลืนกับธรรมชาติหรือใช้วัสดุที่ไม่ทำลายสิ่งแวดล้อม (ข้อละ 1 คะแนน)			
▶ มีการจัดการด้านสิ่งก่อสร้างและสาธารณูปโภค สถานปฐมพยาบาล ที่เหมาะสมกลมกลืนกับสภาพพื้นที่ หรือไม่มีการก่อสร้างสิ่งปลูกสร้างในบริเวณแหล่งท่องเที่ยว	1		Adapted from ERIC and Bumi Kita (2007)
▶ มีการบริการด้านอาหารและเครื่องดื่มที่ถูกสุขลักษณะและเพียงพอ	1		
▶ มีการจัดเก็บและกำจัดของเสียอย่างถูกวิธี เช่น มีระบบบำบัดน้ำเสีย ก่อนปล่อยสู่ธรรมชาติ	1		
▶ ระยะห่างระหว่างที่ตั้งของที่พัก ร้านอาหารกับแหล่งน้ำ เช่น แหล่งน้ำขนาดใหญ่ควรปลูกสร้างระยะห่างไม่น้อยกว่า 12 เมตร	1		
▶ การจัดการด้านที่พักผ่อนสำหรับนักท่องเที่ยวอย่างเหมาะสม เช่น ม้านั่ง ศาลาพักผ่อน ที่กลมกลืนกับสภาพแวดล้อม	1		

Table B-1 Evaluation form for common indicators (cont.)

Indicators	Point	Score	Source
Environmentally educative media: สื่อในการให้ความรู้ด้านสิ่งแวดล้อม มีศูนย์บริการนักท่องเที่ยวที่แสดงข้อมูลความสำคัญของแหล่งท่องเที่ยว และองค์ประกอบด้านนิเวศวิทยา ผลกระทบจากการท่องเที่ยว เป็นต้น (ข้อละ 1 คะแนน)			
▶ มีศูนย์บริการหรือมีการกำหนดพื้นที่เพื่อเป็นศูนย์บริการอย่างชัดเจนและมีเจ้าหน้าที่ประจำ	1		ERIC (2006)
▶ มีสื่อหลากหลายประเภทในการให้ข้อมูลข่าวสารในศูนย์บริการแก่นักท่องเที่ยว เช่น แผ่นพับ ป้าย โปสเตอร์ คู่มือ นิทรรศการ	1		
▶ มีเจ้าหน้าที่ประชาสัมพันธ์ที่มีอัธยาศัยดี และสามารถอธิบายถึงลักษณะ คุณค่าของแหล่งท่องเที่ยวได้	1		
▶ สื่อมีความน่าสนใจและเป็นข้อมูลปัจจุบัน	1		
▶ ภาษาที่ใช้ในสื่อประเภทต่างๆ มีทั้งภาษาไทยและภาษาอังกฤษ	1		
Research and database: งานวิจัยและฐานข้อมูลที่เกี่ยวข้องกับแหล่งท่องเที่ยว พิจารณาถึงงานวิจัยและฐานข้อมูลที่เกี่ยวข้องกับทรัพยากรธรรมชาติและสิ่งแวดล้อม ในแหล่งท่องเที่ยว (ข้อละ 1 คะแนน)			
▶ มีการศึกษาข้อมูลพื้นฐานระบบนิเวศ พืช สัตว์	1		ERIC (2006)
▶ มีการศึกษา/วิจัยในด้านความหลากหลายทางชีวภาพ ประชากรพืช สัตว์ ในพื้นที่	1		
▶ มีการศึกษาด้านการจัดการแหล่งท่องเที่ยวและ ผลกระทบจากการท่องเที่ยว	1		
▶ มีการเก็บรวบรวมข้อมูลงานวิจัย และฐานข้อมูลทรัพยากรของแหล่งท่องเที่ยวอย่างเป็นระบบ	1		
▶ มีการติดตามประเมินผลการศึกษาและวิจัย ทั้งในระยะสั้นและระยะยาว	1		

Table B-1 Evaluation form for common indicators (cont.)

Indicators	Point	Score	Source
Income from tourism activities to local people: ชุมชนมีรายได้จากกิจกรรมการท่องเที่ยว ชุมชนมีรายได้จากการจำหน่ายสินค้า ผลผลิตในชุมชน หรือมีส่วนร่วมในการทำกิจกรรมที่เป็นส่วนหนึ่งของการท่องเที่ยว โดยเฉพาะในช่วงเทศกาลท่องเที่ยว(ข้อละ 1 คะแนน)			
▶ ชุมชนมีรายได้จากการขายอาหารและผลิตภัณฑ์ในชุมชน			ERIC (2006)
▶ ชุมชนมีรายได้จากการนำเที่ยวและให้บริการในกิจกรรมการท่องเที่ยว เช่น รถรับจ้าง เรือรับจ้าง			
▶ ชุมชนมีรายได้หรือเงินเดือนจากการถูกจ้างงานโดยบริษัทนำเที่ยวหรือเจ้าของพื้นที่			
▶ ชุมชนมีรายได้จากการให้บริการด้านที่พัก เช่น การจัดโฮมสเตย์ เกสต์เฮ้าส์			
▶ ชุมชนมีรายได้จากการแสดงศิลปะพื้นเมือง			
Local people involved with planning and tourism management: คนในท้องถิ่นได้มีส่วนร่วมในการบริหารจัดการการท่องเที่ยว มีตัวแทนหรือผู้นำชุมชน ตัวแทนสถานศึกษามีส่วนร่วมในการวางแผน จัดการการท่องเที่ยว อาจตั้งเป็นชมรมหรือดำเนินโครงการเพื่ออนุรักษ์แหล่งท่องเที่ยว (ข้อละ 1 คะแนน)			
▶ มีตัวแทนของชุมชนในการร่วมวางแผนหรือบริหารจัดการการท่องเที่ยว			ERIC (2006)
▶ ชุมชนมีส่วนร่วมในการดูแลรักษาทรัพยากรธรรมชาติในพื้นที่ท่องเที่ยว			
▶ ชุมชนมีส่วนร่วมในการรักษาวัฒนธรรมท้องถิ่น			
▶ กิจกรรมการท่องเที่ยวเป็นที่ยอมรับของคนในท้องถิ่น			
▶ มีการก่อตั้งองค์กรหรือโครงการอนุรักษ์ต่างๆ ที่เกิดจากท้องถิ่น ซึ่งมีบทบาทต่อการจัดการการท่องเที่ยว			
คะแนนรวม			

APPENDIX B-2: EVALUATION FORM FOR INDICATOURS OF MOUNTAIN

Table B-2 Indicators of mountain.

Indicators	Point	Score	Source
Uniqueness of the site **ความมีคุณค่าของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			Adapted from ERIC (2003)
▶ เป็นต้นกำเนิดของต้นน้ำ ลำธาร มีแหล่งน้ำ	1		
▶ เป็นป่าสมบูรณ์ หรือมีความเป็นธรรมชาติ	1		
▶ มีระบบนิเวศที่หลากหลาย หรือเฉพาะถิ่น	1		
▶ พบถ้ำ หรือ ธรณีสัณฐาน หรือ ซากดึกดำบรรพ์	1		
▶ นักท่องเที่ยวเดินทางมาเพื่อชมธรรมชาติ หรือพักแรมที่บริเวณนี้	1		
คะแนน			
Aesthetic value **ความสวยงามของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			Adapted from ERIC (2003) and ERIC (2006)
▶ บริเวณภูเขา มีบริเวณที่สามารถชมทัศนียภาพของพระอาทิตย์ขึ้น พระอาทิตย์ตก ทะเลหมอก	1		
▶ ภูเขาความสูง โดดเด่นจากบริเวณพื้นราบ	1		
▶ พบน้ำตกถ้ำ หรือ ธรณีสัณฐานบริเวณภูเขา	1		
▶ มีพรรณไม้หายาก/ เฉพาะถิ่น/ ไม้ดอกที่สวยงาม	1		
▶ ตัวภูเขามีรูปลักษณ์สวยงาม แปลกตา	1		
คะแนน			
Diversity of flora and fauna **ความหลากหลายของชนิดพืชและสัตว์ที่พบในพื้นที่** (ข้อละ 1 คะแนน)			Adapted from Forest (1995)
▶ มีพรรณไม้/สัตว์ที่หายาก	1		
▶ มีพรรณไม้/สัตว์ที่ใกล้สูญพันธ์	1		
▶ พบพรรณไม้/สัตว์เฉพาะถิ่น	1		
▶ พบพืชและสัตว์ที่น่าสนใจ พบเห็นได้ง่าย	1		
▶ มีระบบนิเวศที่หลากหลายมากกว่า 3 ชนิด	1		
คะแนน			

Table B-2 Indicators of mountain (cont.)

Indicators	Point	Score	Source
Safety **ความปลอดภัยในการท่องเที่ยว** (ข้อละ 1 คะแนน)			
▶ มีการติดตั้งป้ายหรือสัญลักษณ์ เตือนอันตรายระหว่างทางและในแหล่งท่องเที่ยว	1		
▶ มีการให้คำแนะนำนักท่องเที่ยวในการปฏิบัติตนอย่างถูกต้องก่อนการพักแรม หรือเดินป่า	1		
▶ มีหน่วยปฐมพยาบาลหรืออุปกรณ์ปฐมพยาบาลเบื้องต้น เตรียมไว้ในบริเวณที่พักหรือศูนย์บริการนักท่องเที่ยว	1		
▶ อุปกรณ์ที่ใช้ประกอบการพักแรม เช่น เต็นท์ อุปกรณ์เสริมอื่นๆ อยู่ในสภาพที่ดี ไม่ชำรุด	1		
▶ มีเจ้าหน้าที่อยู่ประจำในแหล่งท่องเที่ยวอย่างน้อย 1 คน โดยเฉพาะในช่วงเทศกาลท่องเที่ยว พร้อมกับวิทยุติดตามตัว	1		
คะแนน			
Environmental impact **ผลกระทบด้านสิ่งแวดล้อมจากการท่องเที่ยว** ผลกระทบต่อแหล่งท่องเที่ยว ในด้าน ขยะ น้ำเสีย เสียงรบกวน มลพิษทางอากาศ การรบกวนสัตว์ป่า การทำลายพืชและหน้าดินถูกทำลายจากการคมนาคม เดินป่า หรือกางเต็นท์พักแรม (ผลกระทบน้อย มีคะแนนมาก)			Adapted from UNEP (2007)
▶ พบผลกระทบในทุกๆ ด้าน	1		
▶ พบผลกระทบ 4-5 ด้าน	2		
▶ พบผลกระทบ 2-3 ด้าน	3		
▶ พบผลกระทบเพียง 1 ด้าน	4		
▶ ไม่พบผลกระทบสิ่งแวดล้อมในทุกๆ ด้าน	5		
คะแนน			

Table B-2 Indicators of mountain (cont.)

Indicators	Point	Score	Source
Water quality **คุณภาพน้ำ (ข้อละ 1 คะแนน)**			Adapted from UNEP (2007) Commonwealth (1995)
▶ มีการรณรงค์ให้นักท่องเที่ยวใช้ผลิตภัณฑ์ทำความสะอาดที่เป็นมิตรต่อสิ่งแวดล้อม ลดการใช้น้ำมันทำอาหาร และร่วมกันประหยัดน้ำ	1		
▶ คุณภาพน้ำของแหล่งน้ำในบริเวณใกล้เคียงไม่พบการปนเปื้อนหรือสัตว์น้ำตายผิดปกติ	1		
▶ ห้องสุขาควรอยู่ห่างจากแหล่งน้ำธรรมชาติอย่างน้อย 100 เมตร หรือ อย่างน้อย 50 เมตร สำหรับการล้างภาชนะ	1		
▶ มีการติดตั้งบ่อดักไขมันบำบัดน้ำทิ้งจากห้องครัวและร้านอาหารก่อนปล่อยสู่ธรรมชาติ	1		
▶ มีระบบบำบัดน้ำเสียจากบ้านพัก โรงครัว และห้องสุขา ก่อนปล่อยสู่แหล่งธรรมชาติ	1		
คะแนน			
Environmentally educative activities **กิจกรรมการท่องเที่ยวที่ให้ความรู้ด้านสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			Adapted from WTO (2004)
▶ มีกิจกรรมที่หลากหลายให้นักท่องเที่ยวสามารถเรียนรู้ระบบนิเวศ พรรณพืช สัตว์ป่า ดาราศาสตร์ ปรากฏการณ์ทางธรรมชาติให้กับนักท่องเที่ยว	1		
▶ มีคู่มือหรือเอกสารประกอบการท่องเที่ยวให้นักท่องเที่ยวศึกษา	1		
▶ มีเส้นทางศึกษาธรรมชาติ หรือ คู่มือสื่อความหมายธรรมชาติให้กับนักท่องเที่ยวได้ศึกษา	1		

Table B-2 Indicators of mountain (cont.)

Indicators	Point	Score	Source
▶ มีแผนที่แสดงอาณาเขต จุดสนใจ ข้อมูลแหล่งท่องเที่ยว พืชและสัตว์ชนิดเด่นที่พบในพื้นที่	1		
▶ มีการให้ความรู้และคำแนะนำในการปฏิบัติตนของนักท่องเที่ยวก่อนการพักแรมหรือเดินป่า	1		
คะแนน			
Knowledge in environmental and ecology of staff and guide บุคลากรมีความรู้ในด้านนิเวศวิทยาและสิ่งแวดล้อม (ข้อละ1 คะแนน)			
▶ มีเจ้าหน้าที่ด้านนิเวศวิทยา สิ่งแวดล้อม หรือการสื่อความหมายธรรมชาติ	1		
▶ มีการอบรมบุคลากรในด้านการอนุรักษ์ทรัพยากรธรรมชาติ	1		
▶ เจ้าหน้าที่สามารถอธิบายถึงความสำคัญของแหล่งท่องเที่ยว ป่าไม้ ระบบนิเวศในพื้นที่	1		
▶ มีการจัดกิจกรรมค่ายศึกษาธรรมชาติในพื้นที่	1		
▶ มีการศึกษาวิจัยและรวบรวมข้อมูลด้านนิเวศวิทยาและพรรณพืชและสัตว์ป่าโดยมีเจ้าหน้าที่เป็นส่วนหนึ่งของทีมวิจัย	1		
คะแนน			
คะแนนรวม			

APPENDIX B-3

EVALUATION FORM FOR INDICATORS OF LANDFORM

Table B-3 Indicators of landform

Indicators	Point	Score	Source
Uniqueness of the site **ความมีคุณค่าของแหล่งท่องเที่ยว** (ข้อละ 2 คะแนน)			Adapted from ERIC (2003)
▶ หาดูได้ยาก พบเฉพาะในจังหวัดหรือภูมิภาคเท่านั้น	2		
▶ มีตำนานหรือความเชื่อท้องถิ่นที่เกี่ยวข้องกับสถานที่	2		
▶ มีป่าอยู่ในพื้นที่ธรณีสัณฐาน	2		
▶ มีแหล่งโบราณคดีหรือพบหลักฐานที่มีความสำคัญทางประวัติศาสตร์	2		
▶ มีซากพืชซากโบราณหรือซากดึกดำบรรพ์	2		
คะแนน			
Aesthetic value **ความสวยงามของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			Adapted from ERIC (2003)
▶ มีทิวทัศน์สวยงามโดยรอบ	1		
▶ มีธารน้ำไหลผ่าน	1		
▶ มีป่าอยู่ในพื้นที่ธรณีสัณฐาน	1		
▶ มีป่าอยู่รอบพื้นที่ธรณีสัณฐาน	1		
▶ สถานที่มีความงดงามและโดดเด่นตามธรรมชาติ	1		
คะแนน			

Table B-3 Indicators of landform (cont.)

Indicators	Point	Score	Source
Diversity of flora and fauna **ความหลากหลายของชนิดพืชและสัตว์ที่พบในพื้นที่ (ข้อละ 1 คะแนน)**			
▶ พบพืชหลายชนิดในพื้นที่	1		
▶ พบพืชเฉพาะถิ่น พบได้ในบริเวณนี้เท่านั้น	1		
▶ มีพืชที่ใกล้จะสูญพันธุ์หรือพบได้ยาก	1		
▶ พบสัตว์ป่าหลายชนิด	1		
▶ พบร่องรอยของสัตว์หลายชนิดบริเวณรอบพื้นที่	1		
คะแนน			
Safety **ความปลอดภัยในการท่องเที่ยว (ข้อละ 1 คะแนน)**			
▶ นักท่องเที่ยวมีความปลอดภัยจากการท่องเที่ยว	1		
▶ ไม่พบเหตุการณ์ดินถล่ม หรือ แผ่นดินไหวในบริเวณจังหวัดใกล้เคียงในรอบ 5 ปีที่ผ่านมา	1		
▶ ไม่มีการเกิดอุบัติเหตุ ภัยธรรมชาติจากการยุบตัวของพื้นที่ ในรอบ 5 ปีที่ผ่านมา	1		
▶ ไม่พบร่องรอยหรือหลักฐานการพังทลาย ทรุดตัว หรือเปลี่ยนแปลงสภาพในรอบ 5 ปีที่ผ่านมาจากการท่องเที่ยว	1		
▶ ไม่ร่องรอยหรือหลักฐานการพังทลาย ทรุดตัว หรือเปลี่ยนแปลงสภาพในรอบ 5 ปีที่ผ่านมาตามธรรมชาติ	1		
คะแนน			

Table B-3 Indicators of landform (cont.)

Indicators	Point	Score	Source
Environmental impact **ผลกระทบด้านสิ่งแวดล้อมจากการท่องเที่ยว** **(ข้อละ 1 คะแนน โดยผลกระทบน้อย จะมีคะแนนรวมมาก)**			
▶ ไม่พบเห็นร่องรอยการปีนป่ายธรณีสัณฐาน	1		
▶ ไม่พบเห็นร่องรอยการสึกกร่อน กัดเซาะอันเกิดจากมนุษย์	1		
▶ มีคำอธิบายและข้อควรปฏิบัติในการเดินชมธรณีสัณฐานแจ้งให้นักท่องเที่ยวทราบ	1		
▶ ไม่พบเห็นขยะ สิ่งปฏิกูล ในบริเวณธรณีสัณฐาน	1		
▶ พื้นที่จอดรถ อยู่ห่างจากธรณีสัณฐาน > 100 เมตร	1		
คะแนน			
Environmentally educative activities **กิจกรรมการท่องเที่ยวที่ให้ความรู้ด้านสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			
▶ มีการจัดเส้นทางศึกษาธรรมชาติในพื้นที่	1		
▶ มีป้ายอธิบายให้นักท่องเที่ยวได้ทราบถึงประวัติ คุณค่า ความสำคัญของพื้นที่ หรือร่องรอยคุณค่าทางประวัติศาสตร์และโบราณคดี	1		
▶ มีการอธิบายผลกระทบจากการรบกวนธรณีสัณฐานให้นักท่องเที่ยวได้ทราบ	1		
▶ มีจุดสนใจให้นักท่องเที่ยวได้ศึกษา	1		
▶ มีเจ้าหน้าที่ท้องถิ่นหรือมัคคุเทศก์น้อย นำชมแหล่งท่องเที่ยว	1		
คะแนน			

Table B-3 Indicators of landform (cont.)

Indicators	Point	Score	Source
Local knowledge in environmental and ecology of staff and guide **บุคลากรมีความรู้ในด้านนิเวศวิทยาและสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			
▶ บุคลากรสามารถอธิบายสาเหตุ และที่มาของการเกิดธรณีสัณฐานให้นักท่องเที่ยวได้ทราบ	1		
▶ บุคลากรทราบถึงผลกระทบจากการท่องเที่ยวที่มีต่อธรณีสัณฐาน	1		
▶ บุคลากรสามารถถ่ายทอด ประวัติศาสตร์ เรื่องราว คุณค่าของธรณีสัณฐานได้อย่างดี	1		
▶ บุคลากรมีความรู้เกี่ยวกับชนิดพืชที่สำคัญ หรือ พืชชนิดเด่นในพื้นที่	1		
▶ บุคลากรมีความรู้เกี่ยวกับสัตว์ประจำถิ่นที่พบในพื้นที่	1		
คะแนน			
คะแนนรวม			

APPENDIX B-4: INDICATORS OF RESERVOIR

Table B-4 Indicators of Reservoir

Indicators	Point	Score	Source
Uniqueness of the site **ความมีคุณค่าของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			Adapted from ERIC (2003)
▶ ขนาดของพื้นที่ มีอาณาเขตกว้างมากกว่า 50 ตารางกิโลเมตร	1		
▶ มีเกาะขนาดต่างๆ อยู่ในพื้นที่	1		
▶ น้ำมีคุณภาพดีสามารถนำมาใช้อุปโภคได้	1		
▶ มีความเชื่อมโยงกับแหล่งน้ำอื่น	1		
▶ มีคุณค่าในด้านเกษตร พลังงาน คมนาคม ท่องเที่ยว	1		
คะแนน			
Aesthetic value **ความสวยงามของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			
▶ สีเป็นธรรมชาติ	1		
▶ น้ำมีความใสสะอาด	1		
▶ ไม่มีกลิ่นเหม็นหรือไม่พบการทิ้งขยะในแหล่งน้ำ	1		
▶ ไม่พบปลาหรือสัตว์บางชนิดตายในแหล่งน้ำ	1		
▶ ทัศนียภาพโดยรอบมีความเป็นธรรมชาติ	1		
คะแนน			
Diversity of flora and fauna **ความหลากหลายของชนิดพืชและสัตว์ที่พบในพื้นที่**(ข้อละ 1 คะแนน)			
▶ จำนวนชนิดของพืชน้ำ > 10 ชนิด	1		
▶ จำนวนชนิดของปลา > 10 ชนิด	1		
▶ จำนวนชนิดของนกน้ำ > 10 ชนิด	1		
▶ จำนวนชนิดของสัตว์สงวนและคุ้มครองที่พบ> 3 ชนิด	1		
▶ เป็นที่อยู่อาศัยเฉพาะถิ่นของพืชและสัตว์หายาก	1		
คะแนน			

Table B-4 Indicators of Reservoir (cont)

Indicators	Point	Score	Source
Safety **ความปลอดภัย ในการท่องเที่ยว** (ข้อละ 1 คะแนน)			
▶ ไม่เคยพบการเกิดอุบัติเหตุทางน้ำจากกิจกรรมการท่องเที่ยว	1		
▶ ไม่พบการเกิดอุบัติเหตุทางน้ำจากการคมนาคม	1		
▶ มีอุปกรณ์ป้องกันภัย ชูชีพ หรือห่วงยาง บนเรือโดยสาร หรือแพขนานยนต์ และมีการอบรมเจ้าหน้าที่ในด้านการให้ความช่วยเหลือผู้จมน้ำ	1		
▶ ไม่พบเหตุการณ์ภัยธรรมชาติหรือน้ำท่วมในรอบ 5 ปีที่ผ่านมา	1		
▶ ไม่พบสัตว์ที่เป็นอันตรายหรือมีความดุร้ายในแหล่งน้ำและบริเวณใกล้เคียง	1		
คะแนน			
Environmental impact **ผลกระทบด้านสิ่งแวดล้อมจากการท่องเที่ยว** (ข้อละ 1 คะแนน โดย ผลกระทบน้อยจะมีคะแนนรวมมาก)			
▶ ปลาบางชนิดที่เคยพบในอดีต ยังคบพบเห็นได้	1		
▶ จำนวนปลาที่ชาวบ้านเคยจับได้ไม่ต่างไปจากปีก่อน	1		
▶ ไม่มีการจับปลาจำนวนมากมาจำหน่ายเป็นของที่ระลึกให้กับนักท่องเที่ยว โดยเฉพาะปลาที่หายากและใกล้สูญพันธ์	1		
▶ น้ำทิ้งน้ำทิ้งจากที่พัก แพอาหาร ผ่านระบบบำบัดน้ำเสียก่อนปล่อยสู่แหล่งน้ำ	1		
▶ ไม่พบขยะบริเวณแหล่งน้ำ	1		
คะแนน			

Table B-4 Indicators of Reservoir (cont.)

Indicators	Point	Score	Source
Water quality **คุณภาพน้ำ (ข้อละ 1 คะแนน)**			Adapted from ERIC (2003)
▶ พบปลาชิว ปลาตะเพียน ปลากระดี่	1		
▶ สีเป็นธรรมชาติ สีเขียว ฟ้าอ่อน	1		
▶ มีความใสสามารถมองเห็นปลาที่อยู่ในน้ำได้ชัดเจน	1		
▶ น้ำไม่ส่งกลิ่นเหม็น	1		
▶ ไม่พบปลาบางชนิดตายอย่างผิดปกติในบางฤดูกาล	1		
คะแนน			
Environmentally educative activities **กิจกรรมการท่องเที่ยวที่ให้ความรู้ด้านสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			Adapted from BBEC (2003)
▶ มีการจัดกิจกรรมให้นักท่องเที่ยวได้ศึกษา ถึงสิ่งมีชีวิตในแหล่งน้ำ นก พืชน้ำ เช่น ล่องเรือดูนก			
▶ นักท่องเที่ยวได้ร่วมศึกษาวิถีชีวิตของชาวบ้าน โดยการทำกิจกรรมร่วมกัน เช่น เรียนรู้วิธีการจับสัตว์น้ำ การประกอบอาหารท้องถิ่น			
▶ มีกิจกรรมที่หลากหลาย ให้นักท่องเที่ยวศึกษา เช่น เดินชมธรรมชาติ พายเรือแคนู ขี่จักรยาน			
▶ มีคู่มืออธิบายถึงคุณค่าและความสำคัญของระบบนิเวศในบริเวณนี้			
▶ มีป้ายแสดงแผนที่ และสิ่งมีชีวิตชนิดเด่นที่พบเห็นได้ในแหล่งน้ำ			
คะแนน			

Table B-4 Indicators of Reservoir (cont.)

Indicators	Point	Score	Source
Local knowledge in environmental and ecology of staff and guide บุคลากรมีความรู้ในด้านนิเวศวิทยาและสิ่งแวดล้อม (ข้อละ 1 คะแนน)			
▶ มีบุคลากรประจำแหล่งท่องเที่ยวและสามารถให้ความรู้ถึงลักษณะทางกายภาพ ชีวภาพ และนิเวศวิทยาของแหล่งน้ำ	1		
▶ บุคลากรทราบถึงสัตว์ชนิดเด่น ปลาที่พบในพื้นที่	1		
▶ บุคลการสามารถอธิบายนักท่องเที่ยวในด้านผลกระทบด้านสิ่งแวดล้อมที่พบในพื้นที่	1		
▶ บุคลากรประจำแหล่งท่องเที่ยวเคยได้รับการอบรมด้านนิเวศวิทยา การอนุรักษ์ทรัพยากรธรรมชาติ	1		
▶ มีชาวบ้าน หรือ ผู้ให้บริการขับเรือรับจ้างที่สามารถให้ความรู้เรื่องสิ่งมีชีวิตที่พบในพื้นที่	1		
คะแนน			
คะแนนรวม			

APPENDIX B-5: INDICATORS OF RAPID

Table B-5 Indicators of rapid

Indicators	Point	Score	Source
Uniqueness of the site **ความมีคุณค่าของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			Adapted from ERIC (2003)
▶ ความกว้างของลำน้ำบริเวณที่เป็นแก่งมากกว่า 50 เมตร	1		
▶ ความยาวของลำน้ำบริเวณที่เป็นแก่งมากกว่า 50 เมตร	1		
▶ น้ำไหลแรงมากและมีปริมาณมาก	1		
▶ แก่งมีความแรงของลำน้ำมากและมีความแตกต่างระหว่างเหนือแก่งและใต้แก่งมาก	1		
▶ ป่าไม้โดยรอบมีความอุดมสมบูรณ์	1		
คะแนน			
Aesthetic value **ความสวยงามของแหล่งท่องเที่ยว** (ข้อละ 1 คะแนน)			
▶ น้ำมีสีธรรมชาติ อาจมีสีน้ำตาลในฤดูฝน	1		
▶ น้ำไม่มีกลิ่นเหม็น	1		
▶ ไม่มีสิ่งก่อสร้างอยู่รอบบริเวณแหล่งน้ำ	1		
▶ สภาพโดยรอบมีความเป็นธรรมชาติ	1		
▶ มีความสวยงามทั้งในหน้าน้ำและหน้าแล้ง	1		
คะแนน			

Table B-5 Indicators of rapid (cont.)

Indicators	Point	Score	Source
Diversity of flora and fauna **ความหลากหลายของชนิดพืชและสัตว์ที่พบในพื้นที่** (ข้อละ 1 คะแนน)			
▶ พบพรรณไม้ขึ้นในบริเวณแก่งหลายชนิด	1		
▶ สภาพป่าโดยรอบมีความอุดมสมบูรณ์	1		
▶ พบปลาหลายชนิดและมีความชุกชุม	1		
▶ พบปลาทั้งบริเวณทั้งเหนือแก่งและใต้แก่ง	1		
▶ พบนกหลายชนิดในพื้นที่	1		
คะแนน			
Safety **ความปลอดภัย ทั้งจากปัจจัยภายในและภายนอก**(ข้อละ 1 คะแนน)			
▶ มีอุปกรณ์ให้ความช่วยเหลือเช่นห่วงยาง ชูชีพ เชือก อยู่ในบริเวณแหล่งท่องเที่ยว	1		
▶ มีป้ายเตือนให้นักท่องเที่ยวระวังความปลอดภัย	1		
▶ มีเจ้าหน้าที่คอยดูแลเรื่องความปลอดภัย	1		
▶ ไม่เคยมีประวัติเรื่องการเกิดเหตุอันตราย	1		
▶ มีการอบรมบุคลากรในด้านการการล่องแก่งและการช่วยเหลือผู้ประสบภัยทางน้ำ	1		
คะแนน			

Table B-5 Indicators of rapid (cont.)

Indicators	Point	Score	Source
Environmental impact ผลกระทบด้านสิ่งแวดล้อมจากการท่องเที่ยว (ข้อละ 1 คะแนน หากมีผลกระทบน้อย จะมีคะแนนรวมมาก)			
▶ ไม่มีการก่อสร้างถาวรในบริเวณแหล่งท่องเที่ยว	1		
▶ มีการปล่อยน้ำทิ้ง โดยไหลซึมผ่านพื้นที่ธรรมชาติ หรือระบบบำบัดน้ำเสียก่อนปล่อยลงสู่แหล่งน้ำ	1		
▶ ไม่พบการทิ้งขยะในแหล่งน้ำ	1		
▶ ไม่พบขยะ เศษอาหาร ในบริเวณแหล่งท่องเที่ยว	1		
▶ ไม่พบการจับสัตว์น้ำเพื่อการท่องเที่ยว	1		
คะแนน			
Water quality คุณภาพน้ำ (ข้อละ 1 คะแนน)			Adapted from BRT (2007)
▶ พบแมลงน้ำบางชนิด เช่น ตัวอ่อนแมลงเกาะหิน ตัวอ่อนแมลงชีปะขาว ตัวอ่อนแมลงหนอนปลอกน้ำ	1		
▶ น้ำใสสะอาดเป็นธรรมชาติ อาจมีสีน้ำตาลในฤดูฝน	1		
▶ น้ำไม่คล้ำดำ หรือเปลี่ยนเป็นสีเขียวอย่างชัดเจน	1		
▶ น้ำไม่ส่งกลิ่นเหม็นเน่าเสีย	1		
▶ พบปลา นก อาศัยอยู่ตามธรรมชาติ ไม่พบการตายอย่างผิดปกติ	1		
คะแนน			

Table B-5 Indicators of rapid (cont.)

Indicators	Point	Score	Source
Environmentally educative activities **กิจกรรมการท่องเที่ยวที่ให้ความรู้ด้านสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			
▶ มีป้ายให้ความรู้เรื่องความสำคัญของแหล่งท่องเที่ยว ระบบนิเวศ พืช สัตว์ที่พบในพื้นที่	1		
▶ มีคู่มือการล่องแก่งให้นักท่องเที่ยวได้ศึกษา	1		
▶ นักท่องเที่ยวได้รับการอบรมข้อควรปฏิบัติตน ก่อนการล่องแก่ง	1		
▶ มีกิจกรรมที่หลากหลายให้นักท่องเที่ยวได้เรียนรู้ใน ด้านนิเวศวิทยาและผลกระทบต่อสิ่งแวดล้อม	1		
▶ มีกิจกรรมให้นักท่องเที่ยวได้เรียนรู้ถึงลักษณะทาง กายภาพ ธรรมชาติของสายน้ำและแก่ง	1		
คะแนน			
Local knowledge in environmental and ecology of staff and guide **บุคลากรมีความรู้ในด้านนิเวศวิทยาและสิ่งแวดล้อม (ข้อละ 1 คะแนน)**			
▶ มีบุคลการประจำแหล่งท่องเที่ยวและสามารถให้ ความรู้ถึงลักษณะทางกายภาพ นิเวศวิทยา	1		
▶ บุคลากรทราบถึงสัตว์ชนิดเด่น พืช สัตว์ในพื้นที่	1		
▶ บุคลากรให้คำแนะนำนักท่องเที่ยวถึงข้อควรปฏิบัติ เพื่อลดผลกระทบต่อสิ่งแวดล้อม	1		
▶ มีการอบรมบุคลการในด้านการการล่องแก่ง ภัย ธรรมชาติและการช่วยเหลือผู้ประสบภัยทางน้ำ	1		
▶ มีคนในพื้นที่ช่วยให้ความรู้ด้านระบบนิเวศ	1		
คะแนน			
คะแนนรวม			

APPENDIX C

แบบสำรวจความคิดเห็นของนักท่องเที่ยวต่อการท่องเที่ยวเชิงนิเวศ
ในอุทยานแห่งชาติ.....จังหวัดน่าน

คำชี้แจง : โปรดตอบคำถามโดยใส่เครื่องหมาย ✓ ลงในช่องว่างหน้าคำตอบที่ท่านเลือก หรือใส่หมายเลข แสดงลำดับที่ลงในช่องว่างที่ตรงกับความคิดเห็นของท่านมากที่สุด

ข้อมูลทั่วไป

1. เพศ ○ ชาย ○หญิง

2. อายุ

○ต่ำกว่า 15 ปี ○ 15-20 ปี ○21-25 ปี ○26-30 ปี
○31- 40 ปี ○ มากกว่า 40 ปี

3. ระดับการศึกษา

○ประถมศึกษา ○มัธยมศึกษา ○ปริญญาตรี
○สูงกว่าปริญญาตรี ○อื่นๆ โปรดระบุ.....

4. อาชีพ

○นักเรียน/นักศึกษา ○รับราชการ ○รัฐวิสาหกิจ
○นักวิจัย ○ธุรกิจส่วนตัว ○พนักงานบริษัท
○อื่นๆ โปรดระบุ.....

ข้อมูลเกี่ยวกับการท่องเที่ยว

5. โปรดเรียงลำดับเหตุผลของการเดินทางมาท่องเที่ยวที่นี่ โดย ลำดับที่ 1 หมายถึง เหตุผลลำดับแรก , ลำดับที่ 2 หมายถึง เหตุผลลำดับที่ 2 ..... (ท่านสามารถเลือกเรียงกี่ลำดับก็ได้)

เหตุผล	ลำดับที่	เหตุผล	ลำดับที่
1) พักผ่อน	.....	7) ชมทะเลหมอก	.....
2) ดูสัตว์ป่า	.....	8) ชมทิวทัศน์	.....
3) ชมพรรณไม้/ดอกไม้	.....	9) ขี่จักรยาน	.....
4) ดูนก	.....	10) เดินป่า	.....
5) ล่องแก่ง	.....	11) ถ่ายรูป	.....
6) ศึกษา/วิจัย	.....	12) เล่นน้ำตก	.....
		13) อื่นๆ โปรดระบุ.....	

ข้อมูลเกี่ยวกับการท่องเที่ยว (ต่อ)

6. ท่านเดินทางมาจากจังหวัดใด .....

7. ท่านมายังอุทยานแห่งนี้เป็นครั้งที่ .....

8. ท่านต้องการมาพักแรมหรือไม่

○ ต้องการพักแรม จำนวน.....คืน ○ ไม่พักแรม (ไป - กลับ)

9. ท่านเดินทางมายังอุทยานแห่งนี้โดยทางใด

○รถยนต์ ○ รถประจำทาง ○รถบัส ○รถตู้ ○รถกระบะ
○รถขับเคลื่อน 4 ล้อ ○รถจักรยานยนต์ ○อื่นๆ โปรดระบุ.....

10. กิจกรรมใดบ้างที่ท่านทำในการมาท่องเที่ยวที่นี่ (เลือกได้หลายข้อ)

○พักผ่อน ○ดูสัตว์ป่า ○ชมพรรณไม้/ดอกไม้ ○ดูนก
○ล่องแก่ง ○ศึกษา/วิจัย ○ชมทะเลหมอก ○ชมทิวทัศน์
○ขี่จักรยาน ○เดินป่า ○ถ่ายรูป ○เล่นน้ำตก
○อื่นๆ โปรดระบุ.....

11. ท่านคิดว่า จำนวนนักท่องเที่ยวในช่วงเทศกาลมีผลต่อการพักผ่อนของท่านในระดับใด

○ไม่มีผล ○มีผลน้อย ○มีผลปานกลาง ○มีผลมาก

12. ท่านมีความพึงพอใจต่อการบริการของอุทยานแห่งนี้ในระดับใด

1) ด้านที่พัก	○มาก	○ปานกลาง	○น้อย
2) ด้านอาหาร	○มาก	○ปานกลาง	○น้อย
3) ด้านศูนย์บริการนักท่องเที่ยว	○มาก	○ปานกลาง	○น้อย

13. สิ่งอำนวยความสะดวกต่อไปนี้ ท่านคิดว่ามีความจำเป็นในระดับใด

1) ร้านอาหาร	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น
2) บ้านพัก	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น
3) โทรศัพท์	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น
4) เต็นท์ให้เช่า	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น
5) พื้นที่จอดรถ	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น
6) ไฟฟ้า	○จำเป็นมาก	○จำเป็น	○ไม่จำเป็น

ข้อมูลเกี่ยวกับการท่องเที่ยว (ต่อ)

14. ท่านคิดว่าจำนวนถังขยะที่อุทยานเตรียมไว้เพียงพอหรือไม่

○เพียงพอ ○ไม่เพียงพอ

15. ท่านเห็นด้วยหรือไม่ที่อุทยานจะกำหนดให้นักท่องเที่ยวนำขยะกลับไปออกทิ้งนอกอุทยาน

○ไม่เห็นด้วย ท่านยินดีร่วมจ่ายค่ากำจัดขยะให้กับอุทยานเป็นจำนวนเงิน ..... บาท

○เห็นด้วย

16. ท่านประทับใจสิ่งใดในอุทยานแห่งนี้

.....

.....

.....

.....

16. ท่านคิดว่า อุทยานควรพัฒนาอย่างไรเพื่อเพิ่มจำนวนนักท่องเที่ยว

.....

.....

.....

.....

17. ข้อเสนอแนะอื่นๆ

.....

.....

.....

.....

ขอขอบคุณที่ท่านสละเวลาให้ข้อมูลที่เป็นประโยชน์ต่อผู้วิจัย

วันที่.....

QUESTIONNAIRE FOR ECOTOURISM DEVELOPMENT IN _____ NATIONAL PARK, NAN PROVINCE

Please answer the question and/or mark (✓) in the blank

General Information

1. Gender ○ Male ○ Female

2. Age

○ < 15 ○ 15-20 years ○ 21-25 years ○ 26-30 years

○ 31- 40 years ○ > 40 years

3. Education

○ Primary school ○ Secondary school ○ Bachelor degree

○ Master degree or higher ○ Others.....

4. Occupation

○ Student ○ Government officer ○ State Enterprises

○ Researcher ○ Entrepreneur ○ Company employee

○ Others.....

Tourism Information

5. Please identify the priority of reason to visit this national park (1, 2, 3, ...)

Reason	No.	Reason	No.
1) Relaxing	.....	7) Admiring sea fog	.....
2) Wildlife watching	.....	8) Admiring scenery	.....
3) Flora watching	.....	9) Bicycle riding	.....
4) Bird watching	.....	10) Trekking	.....
5) Rafting	.....	11) Photography	.....
6) Study/research	.....	12) Waterfall relaxing	.....
		13) Others.....	

Tourism Information (cont.)

6. Where are you from? .....

7. How many times have you visited this national park? .....time

8. Do you plan to spend the nights over (If yes, how many)?

O Yes.....night O No (One - day Trip)

9. What's your mode of travel?

O Car O Public transportation O Bus O Van O Pick-up
O Four-wheel O Motorcycle O Others.....

10. What're your activities in this national park? (≥1 activity)

O Relaxing O Wildlife watching O Flora watching O Bird watching
O Rafting O Study/research O Admiring sea fog O Admiring scenery
O Bicycle riding O Trekking O Photography O Waterfall relaxing
O Others.....

11. How does number of tourist during high season impact your leisure time?

O no impact O low impact O moderate impact O high impact

12. What's your satisfaction toward national park services?

1) Accommodation	O High	O Medium	O low
2) Food, restaurant	O High	O Medium	O low
3) Visitor information	O High	O Medium	O low

13. How are the following infrastructures necessary in this national park?

1) Restaurant	O High	O Medium	O low
2) Accommodation	O High	O Medium	O low
3) Telephone, signal	O High	O Medium	O low
4) Tent for rent	O High	O Medium	O low
5) Car park	O High	O Medium	O low
6) Electricity	O High	O Medium	O low

Tourism Information (cont.)

14. Do you think that the park provide enough garbage bin?

O Yes, enough O No, not enough

15. Do you agree to take garbage back to outside of the park when you finished your trip?

O Agree

O Disagree, and willingness to pay for waste management to the park..... Baht

16. Please inform your impression and appreciation in national park.

.....

.....

.....

.....

17. How to develop national park to support the increasing of tourists?

.....

.....

.....

.....

Comments and Suggestions

.....

.....

.....

.....

.....

.....

Thank you very much, have a nice journey!

Date.....

APPENDIX D

Eco-camping Guidebook

ขยะ....ไปไหน.....

คุณทราบไหมว่า...ปลายทางของสิ่งเหล่านี้ คือที่นี่

ในช่วงเทศกาลท่องเที่ยว ขยะจำนวนมากกว่า 1 ตัน ถูกเผา ทำลายรวมกัน ณ ที่แห่งนี้ ทำให้สารพิษตกค้างในดินและบรรยากาศ อีกหลายสิบ หลายร้อยปี.....

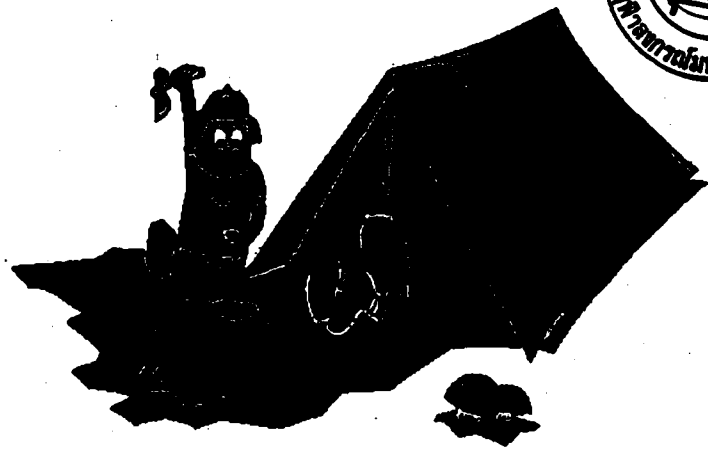
คุณช่วยได้ ด้วยการ ลดขยะ ช่วยกันแยกขยะ เป็น 2ประเภท

เศษอาหาร ขยะที่เผาได้ ไม่อันตราย นำไปเผา	ขวดแก้ว กล่องกระดาษ พลาสติก, กระป๋อง อลูมิเนียม นำไปรีไซเคิล

เพียงเท่านี้ คุณก็เป็นส่วนหนึ่งในการร่วมกันดูแลโลกใบเล็กๆ นี้ได้

เกร็ดเล็กน้อยเกี่ยวกับการพักแรมเชิงนิเวศ

Eco-camping Tips



สำหรับ

นักท่องเที่ยวผู้มีหัวใจรักธรรมชาติ

อุทยานแห่งชาติศรีน่าน จ.น่าน

โดย โครงการการจัดการการท่องเที่ยวเชิงนิเวศ จ.น่าน

หลักสูตรสหสาขาวิชาวิทยาศาสตร์ สิ่งแวดล้อม

และคณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ธันวาคม 2550

ผู้ที่ชื่นชอบกิจกรรมกางเต็นท์
คือผู้รักธรรมชาติ
ทับใจ ในอากาศบริสุทธิ์ น้ำใส
ภูมิทัศน์อันงดงาม
ทำอย่างไร ที่จะช่วยให้ธรรมชาติที่เราเห็น
เป็นอย่างที่ควรจะเป็น
และเป็นอย่างนี้ ตราบนานเท่านาน

เพราะเรา เชื่อว่า...
ด้วยสองมือของคุณ สามารถช่วยกันดูแล
ผืนแผ่นดิน ภูเขา ป่าไม้ สายหมอก ได้
เพราะ...ทุกสิ่งที่เราทำ
สามารถเปลี่ยนแปลงโลกเสมอ.....

การรับมือกับอากาศหนาวจัดบนยอดดอย

หลายๆ คนเวลาไปเที่ยวบนยอดดอย จะใส่เสื้อยืดผ้าฝ้ายหนาๆ หลายๆ ชั้น ทับด้วยแจกเกตยีนหรือเสื้อแม้วที่เพิ่งซื้อมาใหม่ แต่พออยู่บนดอยที่อากาศทั้งชื้นและเย็นก็จะมีอาการหนาวสั่น การใส่เสื้อหลายๆ ชั้นช่วยให้อุ่นได้ในสภาพอากาศหนาว แต่ค่อนข้างแห้ง

ถ้ามาเจอลมแรงๆ อากาศหนาวชื้น ลมเย็นจะทะลุเสื้อพาความอบอุ่นออกไป เช่นเดียวกับผ้าฝ้ายที่จะอมความชื้นไว้ใกล้ๆ ผิวหนัง จะทำให้รู้สึกหนาวสะท้าน

ควรหลีกเลี่ยงแจ็กเก็ตผ้าฝ้าย ทันมาใส่ไนลอน สวมทับเสื้อไหมพรมสังเคราะห์ ชั้นในสุดอาจเป็นเสื้อยืดนุ่มๆ เพียงแค่ 3 ชั้นก็จะทำให้คุณรู้สึกอุ่นสบายขึ้น

หรืออีกทางเลือกหนึ่ง ลองใช้ถุงดำ เจาะรู สวมทับบนเสื้อยืดแล้วใส่แจ็กเก็ตทับอีกรอบหนึ่งก็น่าจะรับมือกับความหนาวได้อย่างสบาย ☺

ข้อมูลประกอบ

KNOW HOW & KNOW WHY: ลมฟ้าอากาศ
108 ไอเดีย CAMPING
คู่มือการท่องเที่ยวและใช้ชีวิตในธรรมชาติ Outdoor Tips

☺ 5 ขั้นตอนในการเก็บเต็นท์อย่างถูกต้อง ☺

เมื่อเริ่มเก็บเต็นท์ ควรเตรียมผ้าหรือกระดาษ สำหรับทำความสะอาด โดยเฉพาะในตอนเช้าที่อากาศค่อนข้างชื้น

1. เก็บฟลายชีตก่อน ซึ่งควรผึ่งให้แห้งก่อนจะเก็บ แล้วจึงเก็บสมอบก เช็ดคราบดินให้สะอาดก่อนเก็บใส่ถุง
2. ผึ่งเต็นท์ให้แห้ง ถ้าพื้นเต็นท์เปียกชื้น ให้ตะแคงตัวเต็นท์บนกราวด์ชีต หันพื้นเต็นท์ขึ้นมาผึ่ง เทฝุนละอองภายในให้หมด
3. เก็บโครงเต็นท์ใส่ถุง และใช้เป็นแกนในการม้วนเก็บตัวเต็นท์ ควรพับแกนโครงเต็นท์จากตอนกลางไปหาปลายทั้งสองด้าน จะทำให้การยืดตัวของสายอีลาสติกเป็นไปอย่างสม่ำเสมอ
4. เมื่อพับเต็นท์ อย่ารูดซิปปิดประตูหน้าต่างจนหมด ควรเหลือช่องว่างขนาดใหญ่ไว้ไล่อากาศ
5. ม้วนพับฟลายชีตรอบตัวเต็นท์อีกทีหนึ่ง หากถุงเก็บมีที่ว่างให้ม้วนแยกต่างหากโดยไม่ต้องพันไว้กับตัวเต็นท์

เพียงแค่นี้...การเก็บเต็นท์ก็ไม่ใช่เรื่องยากอีกต่อไป ☺

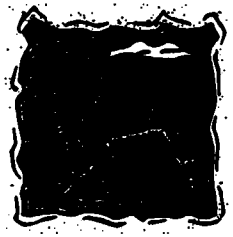
ท่องเที่ยวอย่างมีน้ำใจ

- แบ่งปัน ที่กางเต็นท์ -

คุณทราบไหม
เมื่อเทศกาลปีใหม่ ปี 2549
นักท่องเที่ยว กว่า 1000 คน
เดินทางมากางเต็นท์พักแรมที่อุทยานแห่งชาติศรีน่าน

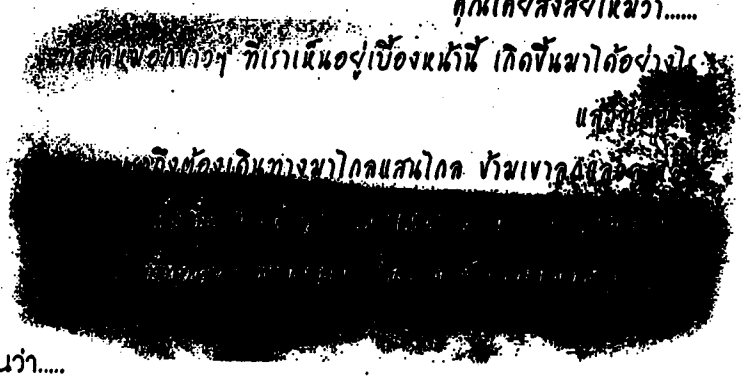
หากนักท่องเที่ยว 1 คน
ต้องการใช้พื้นที่เพื่อพักผ่อน 2 ตารางเมตร
ที่ตรงนี้...จะมีนักท่องเที่ยวเพียงไม่เกิน 550 คนต่อวัน

เราสามารถแบ่งปัน พื้นที่แห่งนี้ด้วยกัน ความเอื้ออาทรก็จะทำให้มีผู้ได้รับความสุขเล็กๆ ที่เกิดขึ้นท่ามกลางหุบเขาแห่งน้ำใจแห่งนี้เพิ่มมากขึ้น



อีกสิ่งหนึ่งที่เราสามารถแบ่งปันกันได้ คือ
--- ความสงบสุข ---
หากเราช่วยกันรักษาความสงบ ไม่ส่งเสียงดัง รบกวนเพื่อนร่วมเต็นท์ใกล้เคียง ก็จะทำให้ทุกคนมีความสุขในการพักผ่อนอย่างแท้จริง ☺

หยดน้ำแห่งรุ่งอรุณ



คุณเคยสงสัยไหมว่า.....

ปรากฏการณ์ต่างๆ ที่เราเห็นอยู่เบื้องหน้านี้ เกิดขึ้นมาได้อย่างไร

แม้ว่าจะ

ต้องเดินทางมาไกลแสนไกล ข้ามเขาลูกนี้ไป

ว่ากันว่า.....

หมอก คือ กลุ่มละอองน้ำ หรือผนึกน้ำแข็งขนาดเล็กๆ ที่ลอยอยู่ในอากาศ อยู่ใกล้พื้นดิน ส่วนใหญ่แล้วหมอกเกิดจากอากาศชื้นที่มีอุณหภูมิลดลงจนถึง จุดน้ำค้าง (dew point) หรืออากาศชื้นได้รับความชื้นเพิ่มเข้าไปจนอิ่มตัว ไอน้ำส่วนเกินจะกลั่นตัวเป็นหยดน้ำเกิดเป็นหมอก

หากในยามค่ำคืนมีอากาศเย็น ท้องฟ้าแจ่มใส สายลมอ่อนๆ พื้นดินซึ่งโดนแดดมาตลอดทั้งวันจะคายความร้อนอย่างรวดเร็วโดยการแผ่รังสีเป็นหลัก เมื่อพื้นดินเย็นลง อากาศที่ติดอยู่ที่พื้นก็จะเย็นตามไปด้วย พอเย็นจนถึงจุดน้ำค้าง ก็จะทำให้ไอน้ำที่อยู่ในอากาศใกล้ๆ พื้น กลั่นตัวเป็นหยดน้ำ เกิดเป็นหมอกพื้นดิน (ground fog) ซึ่งจะพบเห็นบ่อยในตอนเช้าตรู่ เมื่อแดดออก อากาศร้อนขึ้น ก็จะทำให้หยดน้ำในหมอกระเหยไป

ใช้เตาอย่างไร ให้ประหยัดเชื้อเพลิง

ข้อแนะนำสำหรับทำอาหารหรือต้มน้ำก็คือ ตวงน้ำให้พอดีกับปริมาณที่ต้องการใช้ และป้องกันลมโดยการใช้แผ่นอลูมิเนียมฟลอยด์มาทำที่ป้องกันลมก็ได้...

ภาชนะที่ใช้ควรเลือกก้นหม้อที่เป็นสีดำด้าน ขนาดให้พอดีกับหัวเตา ก็จะช่วยให้อาหาร ร้อนและสุกเร็ว ภาชนะที่เป็นอลูมิเนียมจะร้อนเร็วกว่าสแตนเลส ☺

ทำเลทองของการกางเต็นท์

ควรเลือกที่โล่งๆ อากาศจะโปร่ง ถ่ายเทได้ดีกว่า ไม่มียุงและแมลงรบกวนมากนัก หากอยากตื่นเช้า ควรเลือกกางเต็นท์ที่หันหน้าไปทางทิศตะวันออก โดยมีดงไม้อยู่ด้านหลัง และแสงแดดยังช่วยไล่ความอับชื้น ในตอนบ่ายดวงอาทิตย์ก็จะคล้อยหลัง มีเงาไม้มาบังเต็นท์ทำให้ไม่ร้อนและมีร่มเงา ให้นั่งเล่นได้ด้วย

ควรหลีกเลี่ยงบริเวณลานหิน เพราะในตอนกลางคืนลานหินจะคายความร้อนออกไปหมด ทำให้เย็นจนแทบจะนอนไม่ได้เลยทีเดียว

ควรเลือกบริเวณหญ้า จะช่วยให้หลับสบายไม่ร้อนไม่เย็นเกินไป ☺

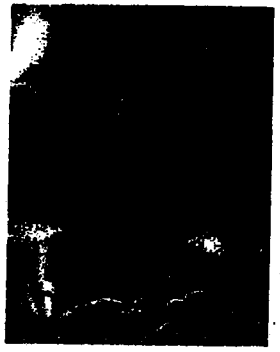
ล้างจานอย่างไร ไม่ทำลายสิ่งแวดล้อม

น้ำยาล้างจานที่ขายโดยทั่วไปจะมีความเป็นด่างสูง มีฟอสเฟตเป็นส่วนผสม ช่วยกำจัดคราบไขมันได้ดี แต่เป็นสารเคมีที่ถูกย่อยสลายได้ยากโดยแบคทีเรีย จึงตกค้างอยู่ในน้ำและระบบนิเวศ

เมื่ออุปกรณ์การรับประทานอาหาร เปื้อนคราบไขมัน ควรใช้กระดาษทิชชูทำความสะอาดเบื้องต้นก่อน หรือเตรียมเบกกิ้งโซดาไปก็ช่วยได้ หากคุณก่อเตาไฟก็อาจนำน้ำขี้เถ้ามาใช้แทนได้เช่นกัน

ช่วงเทศกาลนี้ อุทยานแห่งชาติศรีน่านได้จัดเตรียมน้ำยาล้างจานที่เป็นมิตรต่อสิ่งแวดล้อม สามารถย่อยสลายได้ในธรรมชาติ ให้นักท่องเที่ยวได้ใช้ตามจุดต่างๆ

ในการเดินทางท่องเที่ยวธรรมชาติครั้งต่อไป คุณอาจเตรียมอุปกรณ์ทำความสะอาดที่เป็นมิตรต่อสิ่งแวดล้อม ไม่ว่าจะเป็นสบู่ แชมพูสระผม ยาสีฟัน น้ำยาล้างจาน ฯลฯ เพื่อช่วยกันลดปัญหาสิ่งแวดล้อมและรักษาทรัพยากรธรรมชาติ



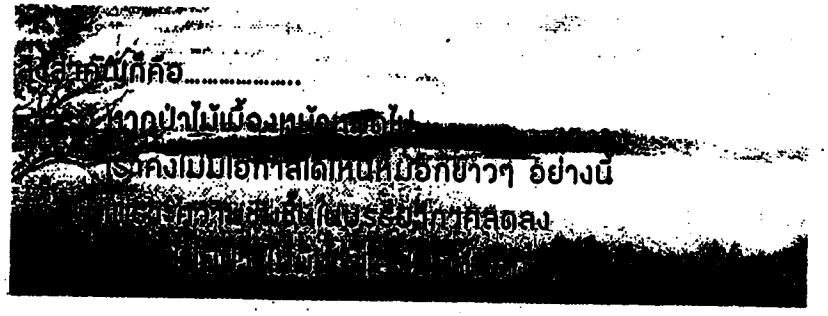
การเริ่มต้นดูแลสิ่งแวดล้อม
ไม่ใช่เรื่องยากและไกลตัวอีกต่อไป
สามารถทำได้ด้วยสองมือของเรา.....
ตั้งแต่นาทีนี้....ด้วยสองมือ...ด้วยหัวใจ....

หมอกที่ว่านี้ อาจเกิดบริเวณหุบเขา ถ้าพื้นดินเหนือหุบเขาเย็นตัวลง โดยการแผ่รังสีไปในช่วงกลางคืน อากาศที่อยู่เหนือพื้นดินในบริเวณนั้นจะเย็นตัวตามไปด้วย อากาศเย็นนี้จะเคลื่อนตัวลงไปในหุบเขา และรวมตัวกันมากเข้าเมื่ออุณหภูมิในหุบเขาลดลงจนถึงจุดน้ำค้าง ซึ่งจะเกิดเป็นหมอกหุบเขา ปกคลุมจนทั่วบริเวณ

ทะเลหมอกที่เรามาเฝ้ารอดูกันอยู่นี้ เพราะความสวยงามอลังการที่ทำให้ยอดเขา ดูเหมือนเกาะแก่งที่โผล่ขึ้นมากลางทะเล ซึ่งแท้จริงก็คือ หมอกหุบเขานั่นเอง

สิ่งที่จะทำให้เกิดทะเลหมอกคือ
อากาศเย็นๆ (Cool)
ท้องฟ้าแจ่มใสไร้เมฆ (Clear) และลมสงบเงียบ (Calm)

ถ้ามีครบทั้ง 3 อย่างนี้แล้ว พรุ่งนี้เช้า เราเตรียมถ่ายรูปสวยๆ กับทะเลหมอกกันได้เลย เวลาหมอกลงจัด ควรขับขี่ด้วยความระมัดระวัง จะได้ท่องเที่ยวอย่างมีความสุข และปลอดภัย



ความลับแห่งรัตติกาล:

ปัจจุบัน อุทยานแห่งชาติศรีน่าน
มีกล้องดูดาวและแผนที่ดาว จัดเตรียมไว้
ให้กับผู้ที่สนใจจะค้นหาความลับแห่งรัตติกาล

สามารถติดต่อได้ที่ศูนย์บริการนักท่องเที่ยว
หรือที่ทำการอุทยานแห่งชาติ ☺

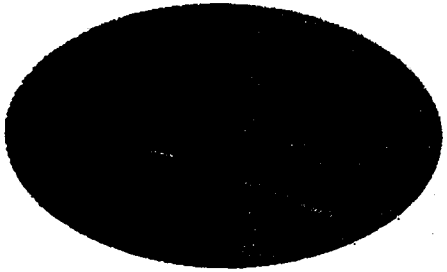
เกร็ดเล็กน้อยสำหรับนักกางเต็นท์ รุ่นใหม่ หัวใจสีเขียว:

บริโภคอย่างคุ้มค่า (sustainable consumption)

กินอย่างสร้างสรรค์ : ลดการใช้น้ำมัน

ความสุขเล็กๆ ของการกางเต็นท์ มาจากความเป็นธรรมชาติ และเรียบง่ายของอาหารการกิน เช่น การปิ้ง ย่าง ต้ม มากกว่า ทอด หากจำเป็น อาจใช้น้ำมันในช่องบะหมี่กึ่งสำเร็จรูป หรือ ควรเลือกใช้เนยก้อนเล็กๆ ใช้เพียงเล็กน้อยเพื่อที่จะได้ไม่รบกวน แหล่งน้ำ และเต็นท์ข้างเคียงด้วย

คราบไขมัน เป็นสารอินทรีย์ที่ ไม่ละลายน้ำ เมื่อถูกลงปล่อย ลงไปในธรรมชาติ จะแผ่เป็น แผ่นฟิล์มบางๆ ปิดกั้นผิวน้ำ ทำให้ออกซิเจนในน้ำลดลง น้ำใสๆ ก็จะกลายเป็นน้ำเสียได้



ช่วยกันหลีกเลี่ยงการใช้น้ำมันกันดีกว่า
นอกจากจะช่วยรักษาธรรมชาติแล้ว ยังเป็นการรักษาสุขภาพอีกด้วย

BIOGRAPHY

Ms Tatsanawalai Uttarasakul was born on June 27th, 1976, in Nakhon Pathom Province. She received a Bachelor of Science degree in Environmental Science and Technology in 1999 from Faculty of Environment and Resources Studies, Mahidol University and Master of Environmental Science in 2002 from Inter - department of Environmental Science, Graduate School, Chulalongkorn University. She worked as research associate in Thailand Environmental Institute during 2002-2003 and continued her study in Inter - department of Environmental Science, Graduate School, Chulalongkorn University in 2003. She received the scholarship for her Ph.D. study since 2005 from Suan Sunandha Rajabhat University and will be lecturer at the Department of Environmental Science, Faculty of Science and Technology after her graduation.