



**Royal Forest Department**



**International Tropical  
Timber Organization**

**Management of the Emerald Triangle Protected Forest Complex to Promote  
Cooperation for Transboundary Biodiversity Conservation between  
Thailand, Cambodia and Laos (Phase II)**

**PROJECT: PD 289/04 Rev. 1 (F)**

**Wildlife Consultant Technical Report**

**Mr. TAWEE NOOTONG  
Wildlife Consultant  
Research and Development Institute  
Khon Kaen University**

**May 2010**



**Royal Forest Department**

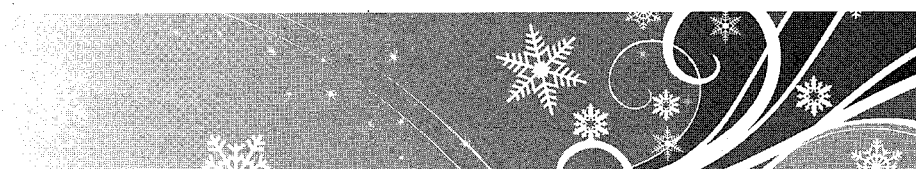
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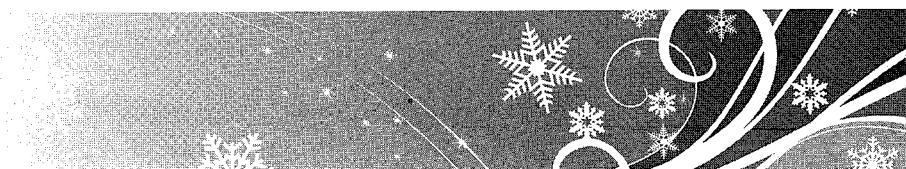
<b>Host Government:</b>	<b>Thailand</b>
<b>Executing Agency:</b>	<b>Royal Forest Department</b>
<b>Project Coordinator:</b>	<b>Mr. Sunan Arunnopparat</b>
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**PROJECT TECHNICAL AND SCIENTIFIC STAFF**  
**(ITTO Project PD 289/04 Rev.1 (F))**

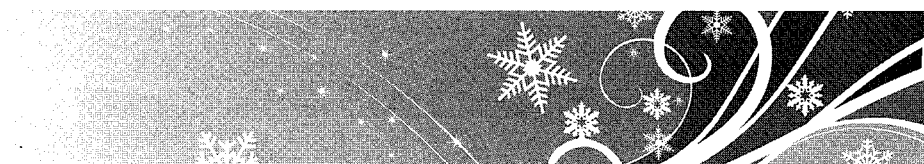
Mr. Sunun Arunnopparat	Project Director/ Coordinator
Mr. Janesak Wichwutipong	Project Deputy Director
Mr. Surasak Lorjitsieng	Project Deputy Director
Mr. Pichai Eaksiripong	Project Accountant
Mr. Preecha Ongrasert	Project Staff
Miss Vachiraporn Phanpinij	Project Staff
Miss Anthiya Intharax	Project Staff
Miss Vipawee Kaewtal	Project Staff
Mr. Uthai Promnari	Field Project Superintendent
Mr. Direck Sirijongprasert	Field Administration Section
Ms. Wanpen Chanthachot	Field Technical Section
Mr. Veera Amornsakchai	Field Information Section
Mr. Pairat Sukusirajit	Field Conservation Section
Mr. Kamol Wisupakan	Project Manager
Ms Authong Sangnet	Project Secretary





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## **The Emerald Triangle Protected Forest Complex Management Vision.**

“The vision for the Emerald Triangle Protected Forest Complex Management is over the next 20 years contribute to long term conservation of the site by progressively implementing, using Ecosystem Management and Joint Management Approaches when appropriate, the strategies and objectives of conservation and management efforts and protect and rehabilitate the site’s full range of ecological systems and native species”



## Acknowledgements

I would like to thank Dr. Komon Pragtong, former Project Manager whose perspectives on people and forest complex and ecosystem level management provided me with insight into the direction. Mr. Kamol wisupakan, Project Technical Advisor, who made it possible for me to incorporate information from phase I. I also thank Mr. Panom Phaewpolsong, Superintendent of Bunthrik-Yotmon Wildlife Sanctuary, who spent of time for site visit and setting the informal workshops, the staffs, Protected Area Committee of Bunthrik-Yotmon Wildlife Sanctuary, villagers and stakeholders who shared the information on landscape species selection.

## Abstract

Consideration for wildlife survey and monitoring in Bunthrik-Yotmon Wildlife Sanctuary, based on the Management of the Emerald Triangle Protected Forest Complex, depend on the idea from the 5<sup>th</sup> IUCN World Park Congress (2003) and An Action Guide to Implement the Convention on Biological Diversity Programme of Work on Protected Areas.

Landscape species selection was the example, took place in the area of Bunthrik-Yotmon Wildlife Sanctuary for wildlife survey and monitoring by the concept of joint management or decision making on landscape species selection by protected area staff and local people who concerned with the natural resources in the area. The landscape species of the Bunthrik-Yotmon Wildlife Sanctuary were selected namely; Asian Elephant (*Elephas maximus*), Barking deer (*Munticus muntjak*) Serow (*Capricornis sumatraensis*) Wild pig (*Sus scrofa*) and Siamese Fireback (*Lophura diardi*). Landscape species will be considered to be or lead to the focal conservation targets in order to set up Site Conservation Management Plan of Bunthrik-Yotmon Wildlife Sanctuary as the example of the Management of the Emerald Triangle Protected Forest Complex.

Threat analysis from previous study which effect to the systems or focal conservation targets in the Emerald Triangle Protected Forest Complex, how to set the Integrated Conservation Management Strategy, especially objectives, strategic actions and indicators are the based idea appeared in the detail of 20 years strategy that indicated in the Project Document.

## Introduction

There are several reasons why the Royal Forest Department (RFD) main agency, adopted a Management of the Emerald Triangle Protected Forest Complex to Promote Cooperation Trans-boundary Biodiversity Conservation between Thailand, Cambodia and Laos (Phase II). In the first instance there is a programmatic explanation based around the fact that the site comprises five legally established and gazetted protected areas. Each of these units needs a management plan to guide decision makers and the notion of preparing five separate management plans for a contiguous site, which shares ecosystem, harbors wide ranging and in many instances threatened species experiences similar threats and opportunities, is simply impractical and unrealistic.

At the same time, and taking into account two other important characteristics (i) the international importance of the site and (ii) the need to apply strategies for conservation management at a forest complex and landscape scale, it was agreed that the planning methodology should endeavor to include all of the above elements.

As well as the above considerations, a number of international forums provided direction for adopting an integrated approach for the management of the protected forest complex. These included the 5<sup>th</sup> IUCN World Park Congress (September, 2003) which reaffirmed the urgent need for extending ecologically viable and social economically beneficial protected area networks.

Without doubt, the most significant of the global efforts to address biodiversity loss are the wide range of interventions developed under the umbrella of Convention on Biological Diversity (CBD) developed a comprehensive Program of Work on Protected Areas (PoWPA). The aim of the PoWPA is to encourage and support signatories to complete ecologically representative networks of protected areas, providing basic protection for all national biodiversity, with a particular emphasis on threatened and endemic species.

As a signatory of the CBD, Government of Thailand is obliged to set about identifying: (a) what needs to be conserved to ensure that, as far as it is possible, the fullest possible range of the nation's ecosystems can be conserved; (b) where these sites are located; and (c) how these areas can be effectively managed.

Of particular significance to the Trans-boundary forest complex are statements included in the PoWPA which emphasize, in clear terms, that protected areas, including national parks and wildlife sanctuaries, are regarded as a primary tool for biodiversity conservation as they act as refuges for species and ecological process that can not survive in intensely managed or altered landscape, provide space for natural evolution, and provide opportunities for future ecological restoration.

Whilst ecosystem approaches recommend that biodiversity should be integrated into management efforts, the role of an effectively functioning protected area system is to provide a secure base for threatened species, ecosystems and ecological process, including those that have yet to be described by science and for which no conservation strategies have been developed. By conserving viable samples of whole ecosystems, it is anticipated that all of the species contained within them will, at least, have a fighting chance to survive.

All of the above trends and nationale support the Department of National Parks, Wildlife and Plant Conservation's decision to: (i) apply the ecosystem approach and (ii) formulate the trans-boundary.

There are a number of other considerations, including the need to ensure that whatever approach the Department of National Park, Wildlife and Plant Conservation adopted, it needed to pursue the ideas associated with adaptive management and these should contain ways protected area managers deal with the complex and dynamic nature of ecosystems and our lack of complete knowledge or understanding of their functioning.

### **A Place called the Emerald Triangle Protected Forest Complex**

The Emerald Triangle Protected Forest Complex as the protected areas or the site is commonly referred on the conservation areas in Southeast Asia, the protected area complex in Thailand part comprises the Phatam National Park, Kaeng Tana National Park, Phu Jong-NaYoi National Park, Yot Dom Wildlife Sanctuary and Bunthrik-Yotmon Proposed wildlife sanctuary, this complex constitutes 174,100 ha. The Phouxeing thong National Biodiversity Conservation Area in Laos Covering 120,000 ha. and the Protected Forest for Conservation of Genetic Resources of Plants and Wildlife in Preah Vihear Province, Cambodia, covering approximately 190,000 ha.

Based on interpretation of Landsat satellite image in 2002 and field survey conducted during the project's phase I, the landscape contains 3 main vegetation types, namely: Dry-Evergreen Forest, Mixed Deciduous Forest and Dry Dipterocarp Forest. More than 288 tree species are identified (Trisurat, 2003, Marod 2003). At least 49 mammals, 145 birds, 30 reptiles and 13 amphibian species are recorded in Thailand's protected areas but large wildlife species such as, wild elephant, banteng, tiger are observed only along the national borders and seasonally migrate across the tri-national boundary. (Bhumpakphan, 2003).

## Objectives

The main proposes of this study were:

1. to conduct Landscape species selection of Bunthrik-Yotmon Wildlife Sanctuary by joint management in local area, and to present and explain the wildlife survey and monitoring techniques to the staff member of Bunthrik-Yotmon Wildlife Sanctuary.
2. to identify the major threats and their causes to wildlife species and their habitats will lead to consider on stresses and sources of stress.
3. to set the idea on information for future Site Conservation Management Plans (SCMP) for Bunthrik-Yotmon Wildlife Sanctuary or for Integrated Conservation Management Plan (ICMS) for the Emerald Triangle Protected Forest Complex.

## Study Sites

Bunthrik-Yotmon is being proposed as a wildlife sanctuary in the Emerald Triangle Protected Forest Complex. It is located to the north of the Phu Jong-Na Yoi National Park. Geographically, Bunthrik is situated between latitudes 14° 37.7'-15° 04.9' N and longitudes 104° 25.7'-105° 37.7'E. or geo-referenced x-y coordinates (546216,161531) at the lower left and x-y coordinates (567549,166739) at the upper right in UTM system Zone 48. It covers an area of 363 square kilometers of 92,350 ha or 226,875 rai. The total length of the sanctuary's boundary is 186.15 km. North to the south, it adjoins the Phu Jong-Na Yoi National Park, to the east is the Laotian and to the west of the sanctuary is agricultural areas and human settlements.

## Vegetation Types

The vegetative types cover of the Bunthrik-Yotmon Wildlife Sanctuary can be classified into three forest types, are; (i) Deciduous Dipterocarp Forest, the dominant species are *Shorea obtusa*, *Shorea siamensis*, *Dipterocarpus tuberculatus* and *Dipterocarpus intricatus*. (ii) Mixed Deciduous Forest, the dominant species are *Pterocarpus macrocarpus*, *Xylia xylocarpa*, *Dalbergia cochinchinensis*, *Dalbergia spp.* *Azelia xylocarpa* and *Lagerstroemia spp.* and (iii) Dry Evergreen Forest, the dominant species are *Dipterocarpus alatus*, *Hopea ferrea*, *Hopea odolata* and *Anisoptera costata*. Old clearings and agricultural lands such as paddy fields and crops stands as well as urban areas and settlements are mostly found on the west of sanctuary.

## Applied Methodology

### Key Principles

Six (6) Key Principles have been developed and applied during the working process as part of the effort needed to achieve consistency and assist formulation of Management of the Emerald Triangle Protected Forest Complex. These principles are recommended as a way to assist and guide the Department of National Park, Wildlife and Plant Conservation to coordinate efforts and to protect the natural, culture and historic values of the site.

#### **Principle 1 Protection, enhancement and rehabilitation of natural environment.**

Taking into account and giving effect to international conventions, legal requirements including the National Park Act B.E. 2504, Wildlife Preservation and Protection Act B.E. 2535, Forest Act B.E. 2484 and Forest Reserve Act B.E. 2507, and other statements of government policy: High priority will be given to retaining and restoring natural biodiversity and protecting threatened indigenous natural resources. The protection of the threatened resources will be based principally on the maintenance of ecosystems and habitats on which they depend.

A diverse range of ecosystems provide opportunities for species, communities and processes to survive. The priority accorded to biodiversity includes geological landforms, soil, landscape and other natural features as well as the established concern for plant and animal species and includes protection of terrestrial and freshwater ecosystems. Protecting



ecosystems from threats such as excessive fire, fragmentation encroachment, hunting (both commercial and subsistence) animal and plant pests are of the priorities.

Through the upcoming two decades-towards the year 2023 (2004-2023) the department will:

- investigate the feasibility of reintroducing species which have disappeared from the region,
- actively manage presently threatened species and their habitats,
- restore critical self-sustaining ecological processes within priority ecosystems (both terrestrial and aquatic)
- ensure that monitoring and research is directed towards decision making and other protected area management functions,
- provide increased priority and protection to rivers, lakes and other natural water bodies, to maintain their intrinsic values, natural water quality, flows and aquatic ecosystems.

### **Principle 2 Protection enhancement and rehabilitation of historic resources.**

The historic resources that will receive highest protection priority are those with unique cultural or scientific value. Through the two decades towards the year 2023, the department will:

- identify and take steps to conserve key historic resources,
- encourage the identification and protection of key historic resources by cooperating with others including communities, NGO's and other partners and stakeholders.

### **Principle 3 Development of effective joint management and other conservation partnerships.**

Protected areas are increasingly managed by partnerships that involve government and non-government. The World Park Congress in Durban (South Africa) in 2003 endorsed recommendations which acknowledge several governance types for protected areas including joint management. This approach is regarded by the Department of National Park, Wildlife and Plant Conservation as a positive way of improving and strengthening the relationship between communities and managers. The Constitution of Thailand also recognizes the role that communities can play in biodiversity conservation.

Joint management as defined by Kothari (2004) involves "The Management of a protected area and its surrounds with the objective of conserving natural ecosystems and their wildlife, as well as of ensuring the livelihood security of local traditional communities, through legal and institutional mechanisms which ensure an equal partnership between these communities and governmental agencies."

#### **Principle 4 Fostering appropriate tourism and recreation use.**

The site embraces a large area, while the area officially designated and/or available for tourism and recreation is comparatively small. The site is currently designated under the Wildlife Preservation and Protection Act B.E.2535 as a Wildlife Sanctuary. The provisions for tourism and recreational use in the Wildlife Preservation and Protection Act are unclear. Tourism and recreation use is considerable e.g. Yot Dom Wildlife Sanctuary and Bunthrik-Yotmon Wildlife Sanctuary.

Some other areas, particularly several national parks, experience periods of intensive visitor pressure. Under the National Park Act, further explained that the use can help to engender support for conservation. It is important, however, to actively manage tourism and recreation use so that visitor experiences are not degraded or compromised through overuse or by stressing or threatening natural or historic values.

Natural quiet, that is an environmental state around which extend influences (for example infrastructure, noise of significant visitor numbers) should be minimized in order to provide for a visitor experience which is unencumbered by outside influences is a paramount protected area manager's responsibility. Degradation of ecosystems and historic places beyond their limits is the Department principal concern, and providing experiences without excluding social or physical carrying capacity is a high management priority.

Commercial concession holders can enhance the experience of visitors and concessions which assist in the protection of natural or historic resources, do not cause significant conflicts with other visitors to an area and contribute to the Department of National Park, Wildlife and Plant Conservation responsibilities, are appropriate. Pressure to develop infrastructure is strong and, if experience of places both in Thailand and internationally is taken into account, this will inevitably increase. Infrastructure development, particularly in relation to increase visitor accommodation, will generally not be permitted as to allow this trend to continue would encourage further losses of conservation values. Through the two decades towards the year 2023 the department will;

- maintain the right of public access to national parks and other approved sites while continuing to protect natural and historic values,
- establish and maintain a good working relationship with visitors, concessionaires and the wider tourism industry, and establish limits to growth for recreational development of a type that requires substantial infrastructure,

- consider moving non-essential facilities from conservation land, i.e. facilities which do not provide for recreation opportunities consistent with the protection of natural values, facilities which create unacceptable environmental, social, physical and visual impacts, and those which contribute to an oversupply of facilities for a particular recreation opportunity,
- investigate the need for additional walking tracks to facilitate appropriate tourism and recreational use.

### **Principle 5 Limiting non-recreation commercial use of conservation land.**

There is a strong and increasing demand from both national and international commercial and business interests to use conservation areas in a range of different ways. Examples include film productions utilizing scenery for backdrops, use of high points for telecommunication utilities and the provision of easements for access to privately held sites. These uses can, in specific instances, be compatible with the primary purpose for which protected areas within the Emerald Triangle Protected Forest Complex were set aside for. This is particularly the case when effects are minor, both in terms of natural and historic values, or where impacts on visitors are minimal.

There are times, however, when it is simply not possible to reduce or mitigate the adverse effects of these activities and in these cases they will not be permitted. An essential requirement for allowing an activity to take place is to definitively establish that the proposed development cannot be undertaken outside the forest complex.

Though the two decades towards the year 2023, the department will;

- ensure non-recreation commercial concessions are only granted where they do not adversely affect forest complex's primary values or their effects can be avoided, remedied or mitigated,
- ensure non-recreation commercial concessions are only granted where they cannot reasonably be undertaken at sites outside forest complex
- grant non-recreation commercial concessions only where appropriate mitigation at the site and public conservation works are undertaken, at the full cost of the proponents, to offset the loss of natural values that occur,
- decline applications where infrastructure requirements increase the scale or impact of structures on the physical landscape.

### **Principle 6 Enhancing community relations**

The Department of National Park, Wildlife and Plant Conservation accepts that it has a moral and social responsibility to promote and support the protection of natural and historic values. The destruction or modification of indigenous flora and fauna and aquatic habitats along with the potential degradation of historic resources are key issues that require

the department of take a lead and to work closely with all levels of government, the community at large and NGO's to achieve these responsibilities.

Community involvement and participation in conservation and education about conservation are key requirements for the protection of natural and historic value into the future. Through the years towards 2023 the department will;

- develop a strong advocacy role for conservation-related issues throughout the site,
- increase the amount and variety of conservation education,
- develop a greater awareness of conservation issues; in both locals and visitors,
- heighten community awareness through education processes of the adverse effects that activities like the disturbance of aquatic ecosystems and the removed of vegetation have on natural and historic values,
- contribute to the development of roles for volunteer/community/school group involvement,
- achieve the protection of indigenous terrestrial and aquatic ecosystems of high value,
- work with key agencies to restore ecosystems to provide for natural processes and community will-being

### **The Planning Approach**

The planning approach for the Emerald Triangle Protected Forest Complex has to find out basic data, especially ecological assessment. The basis of the Conservation Action Plan of the forest complex approach is to design conservation strategies in a way that allow managers to measure there effectiveness. The Conservation Action Plan framework is based around the principles that underpinned the 5-S methodology and include:

1. Systems: the biodiversity targets occurring at a site, and the natural processes that maintain them, that will be the focus of planning.
2. Stresses: the types of degradation and impairment afflicting key attributes of the systems.
3. Sources: the agents generating the stresses.
4. Strategies: the types of conservation actions deployed to abate sources of stress (threat abatement) and altered attributes of the systems (restoration)
5. Success: measures of system viability and threat abatement.

The logic underlying the Conservation Action Plan framework is simple. The implicit conservation goal is to maintain viable occurrences of the systems. By definition, viable occurrences are not significantly stressed. Therefore, the stresses must be abated to ensure viable systems. There are two fundamental approaches to lessen the stress and enhance or maintain the viability of the systems. The first is to abate the sources that are causing the stresses, under the assumption that the stress will subside if the source is removed. The second is to directly abate the stresses that may persist once the source is removed. Thus, conservation strategies are developed and implemented to (1) abate the critical sources of stress and (2) directly restore altered key attributes of the systems. The measures of conservation success assess the effectiveness of various strategies at accomplishing these outcomes, and provide the feedback for revising strategies, as warranted.

Basic data collected during the management of the Phatam Protected Forests Complex to Promote Cooperation for Trans-boundary Biodiversity Conservation between Thailand, Cambodia and Laos (Phase I) and the Management of the Emerald Triangle Protected Forests Complex to Promote cooperation for Trans-boundary Biodiversity Conservation between Thailand, Cambodia and Laos (Phase II). These data suggests that protection as well as rehabilitation strategies, along with associated objective and action step will be needed if these globally significant and important, habits, ecosystems and species are to be maintained /rehabilitated.

The data collected in the site of area could be considered as Focal Conservation Targets or FCT is the term that is used to describe the most important biodiversity features that make the Forests Complex a globally important conservation priority. These are also the main elements which the protected area managers have chosen to concentrate on and have formulated strategies for. General criteria used to select the Focal Conservation Targets included a range of considerations and included:

- Need to fully represent the site's biodiversity,
- Represent assemblages of communities that occur together and are linked by environmental processes,
- Include terrestrial and freshwater ecological communities,
- Significant and/of threatened vegetation associations,
- Fauna which is globally threatened, endangered, or of special concern,
- Assemblages of species with similar conservation requirements,
- Interventions and effort that will ensure the conservation of all native species.

The site's overall composition is, as noted previously, exceptional and includes a range of flora and fauna that demand high levels of international, regional, national and

local government, community and NGO support and commitment. As well, innovative, and as yet untested in Thailand, conservation management approaches and practices, adequate trained staff and other resources will be necessary to support the progressive implementation of the strategies that have been developed during the working process.

## **Analysis and Interpretation of the Data and Results**

### **Landscape Species Selection**

It is necessary to set up landscape species of Bunthrik-Yotmon Wildlife Sanctuary in order to be used for indicator of biodiversity healthy in the area as well as for Site Conservation Management Plan (SCMP) or Conservation Action Plan (CAP) or Integrated Conservation Management Strategy (ICMS) for a management of the Emerald Triangle Protected Forest Complex. Landscape species of Bunthrik-Yotmon were selected and approved by stakeholders such as wildlife sanctuary staff, villagers, Bunthrik-Yotmon Wildlife Sanctuary Committee and other active stakeholders.

Five criteria for landscape species selection for Bunthrik-Yotmon Wildlife Sanctuary were used:

1. Area of wildlife sanctuary
2. Habitat type or Heterogeneity of wildlife sanctuary
3. Vulnerability of species, determined by stakeholders.
4. Ecological role, especially species have strong effects on the structure and function of natural ecosystem.
5. Socio-economic significance.

Five landscape species were selected by the stakeholders, to be representative of Bunthrik-Yotmon Wildlife Sanctuary, Ubolrachathani Province, namely: Asian Elephant (*Elephas maximus*), Barking deer (*Muntiacus muntjak*), Serow (*Capricornis sumatraensis*), Wild pig (*Sus scrofa*) and Siamese Fireback (*Lophura diardi*). Manual for wildlife survey and monitoring was prepared, and staff training was taken place at Bunthrik-Yotmon Wildlife Sanctuary.

From the study on the biodiversity features, especially vegetation types and landscape species, will consider that the Focal Conservation Targets of Bunthrik-Yotmon Wildlife Sanctuary should be (i) Deciduous Dipterocarp Forest (ii) Mixed Deciduous Forest (ii) Dry Evergreen Forest (iv) Asian Elephant (*Elephas maximus*).

The Focal Conservation Targets provide the habitat needs for many of the ecoregion's animal species. These include an assemblage of threatened large vertebrates such as the Endangered Tiger (*Panthera tigris*) Asian elephant (*Elephas maximus*) Banteng (*Bos javanicus*) and other mammal species, bird species, reptile species and amphibian species.



Asian elephant (*Elephas maximus*) example as one of focal conservation target has considerable international conservation interest and is widely recognized by Thai people as symbolic of Thailand. The species is listed as Endangered (IUCN 2000) and is included in Appendix I of CITES.

Elephants are the largest living land animals, with adults sometimes weighing three tons or more. With a large home range (300 km<sup>2</sup>.) the species is found in a variety of forested areas including monsoon forest, rain forest and plantations. The tracks of adult are 35-50 cm. across with five toe marks on the front foot and four on the back.

The species is mainly active during the evening and at night and show a preference to remain in the forest shade during the heat of the day. Diets comprises a broad variety of plants, including palms, bamboo, bananas, twigs, and the bark and leaves from a wide range of tress, shrubs and vines.

As huge and powerful consumers, elephants are considered to be a keystone species in their environment, affecting biodiversity in the regions they inhabit. They open up areas of forest where light-dependent plants can take hold, for example, creating habitat for grazing animals. Such elephant roadways also act as fire-breaks and are littered with partially digested, ready to germinate seeds conveniently fertilized in elephant dung. The well elephants dig in search of water is used by virtually all other wildlife in a given region, particularly during periods of drought.

On the other hand, elephant activity can also be seen as destructive, particularly under the pressures of human landscape transformation that force the animals into smaller areas. As habitat shrinks, their voracious appetite frequently brings them into a conflict situation with local people.

Although elephant numbers, in the past their numbers were greatly reduced by hunting and forest loss. Most impacts are now caused by human conflict, including being killed by farmers.

Distance to water is another important consideration and it has been estimated that a radius of daily movement of 15 km. is also a limiting factor.

### **Threats to Forest Complex Stresses and Sources of stress**

The various things, or actions, that can or already are destroying, degrading or damaging the site's Emerald Triangle Protected Forest Complex are called Stresses. These

elements impact on each Key Ecological Attributes and Viability and relate to size, condition and landscape context, in terms of the ideas that are shown in biodiversity health.

As well as Stress, “root causes” or the direct causes of stress need to be considered and isolated. These are called Sources of Stress. It is important to understand the ideas that are built into both of these ideas i.e. the stresses affecting the conservation targets and the sources of stress. Many management plans overlook the importance of this distinction, which should not be underestimated as effective conservation strategies are needed to address both stresses and sources of stress.

At first glance, the distinction between stresses and sources may appear complicated or unnecessarily confusing. The approach was actually designed to make a complex task easier to understand. More importantly, it is designed to help lead to effective strategies for addressing critical threats.

Identify major stresses, all natural systems are subjected to various disturbances and the Emerald Triangle Protected Forest Complex is certainly no exception. At the scale of planning that is being addressed by the strategies. However, only the destruction, degradation or impairment of focal conservation targets that is caused directly or indirectly by human sources was considered a stress. Most, but not all, stress are caused directly by incompatible, in terms of biodiversity conservation objectives and values, human uses of land, water and natural resources. The key point is that every stress impairs a key ecological attribute associated with a focal conservation target size, condition or landscape context.

Another important point was the stresses that needed to be: (i) current stresses or (ii) have high potential to occur in the next ten years or twenty years under current circumstances and management.

Ranking the stresses, the seriousness of a stress is a function of the following two factors:

**Severity of Damage.** What level of damage to the focal conservation target could reasonably be expected within 10 or 20 years under current circumstances? (Total destruction, serious or moderate degradation or slight impairment).

**Scope of Damage.** What is the geographic scope of impact to the focal conservation targets expected within 10 or 20 years under current circumstance? Is the stress pervasive throughout the target occurrences or localized?

Based upon the best available knowledge, including the various reports prepared under the Management of the Pha Taem Protected Forest Complex to Promote Cooperation for Transboundary Biodiversity Conservation between Thailand, Cambodia and Laos (PPFC) Phase I: PD15/00 Rev.2 (F), workshops, field trips and the individual experience and judgment of working team members, an indicative ranking of every stress was completed.

## **1. Commercial scale Wildlife Trade Hunting/Poaching (Hunting and Collecting Wild Animals)**

This stress involves any killing and trapping of wild animals and the collection of animal products for commercial reasons and includes:

- Bush meat hunting i.e. Wild pigs, Sambar, Banteng, Barking deer, Porcupine, Lizard, Monitor etc.
- Trophy hunting i.e. Banteng, Sambar stags,
- Pet trapping i.e. Hill myna, parakeet, parrot, loris etc.
- Traditional Medicines i.e. Serow, Tiger parts, Pangolin, Bear parts. Geckos etc.
- Other markets: Insect collecting etc.

## **2. Uncontrolled grazing practice (livestock-raising)**

These are actions that convert or degrade habitat and natural systems. In most cases uncontrolled grazing is related to human welfare with a strong association to livelihood, economic expansion and/or subsistence.

## **3. Conflicts for space and resources between humans and wildlife**

This stress relates to competition, which inevitably causes conflict, between humans and wildlife. Almost all human activities will, in some way or another, have varying degrees of impact on wildlife and include: encroachment for agricultural land, human induced fire, grazing, collecting NTFP and wood for fuel, tourism and recreation and infrastructure development.

## **4. Conversion, encroachment and expansion for agriculture**

There are profound effects from human activities on the ecosystems of protected areas in Thailand. Several human activities such as agricultural farming, settlements, forest-product collection, wildlife hunting and domestic animal raising can be typically found in protected areas.

## **5. NTFP harvesting and collection**

Harvesting plants, fungi, and other non-timber, non-animal products for commercial, recreation, subsistence, research or cultural purposes (wild mushroom collection, forage for stall fed animals, orchid collection, bamboo harvesting, rattan harvesting) This stress includes.

- Logging and wood harvesting-Harvesting trees and other woody vegetation for timber, fiber, or fuel (selective commercial logging of iron wood, fuel wood collection, charcoal production).
- Harvesting aquatic wild animals or plants for commercial, recreation, subsistence or cultural purposes

## **6. Alteration to natural fire regimes (Fire & Fire Suppression)**

Uncontrolled and in many cases human-induced fires have potential to significantly modify natural systems. Fire and fire suppression including increases in frequency and/or intensity outside of its natural range of variation would have a significant impact on the most of the site's national and internationally recognized biodiversity and conservation values.

Fire is a serious conservation issue and there is considerable variation on the impact and influence fire has on native species, habitats and landscapes. The site contains both fire-dependent ecosystems and conversely there are other areas where fire will probably cause destruction or loss of native species and habitats. These are known as fire-sensitive ecosystems. Many of the facts associated with fire-dependent and fire-sensitive ecosystems are just beginning to be understood by applying the relative new science of fire ecology.

## **7. Military activities and Existing land-mines at the Trans-boundary area.**

In geological morphology, Thailand is bordered with its neighbours, Laos and Cambodia. There are some openings along the border which have become border passes, Army troops of the three countries have tried to occupy the spots for many years and controlled by the military. The large wild animals could not pass through these military zones, thus the military activities eliminate any possibility of wildlife population movement.

The land-mine traps lay in the forest along the international border between Thailand, Laos and Cambodia, these invisible land-mines have caused serious problems to the movement of wild animals.

## **8. Problematic Protected Area Management and Administration Structure.**

The complex geographic, administrative social-economic and cultural realities of the site strongly indicate that an integrated and cohesive management and administrative structure would greatly enhance management effectiveness and provide increased protection for the site's outstanding national and international biodiversity conservation values.

The term problematic protected area management structure refers to 5 protected areas (three national parks and two wildlife sanctuaries), 5 protected area headquarters, many ranger stations, many sub-districts, communities situated inside and villages located closed to the site boundaries.

The main purpose of the Management of the Emerald Triangle Protected Forest Complex is to conserve the site's outstanding national and international conservation and biodiversity values. Patrolling and enforcement of the Government of Thailand Acts and Regulations are fundamental protected area management responsibility and function. A coordinated approach to patrolling and enforcement that embraces all protected area units is necessary not only for enhanced levels of protection but are also needed for efficiency and management effectiveness reasons.

#### **9. Inconsistent legal mandates.**

There are some areas where a wildlife sanctuary shares a common boundary with an adjacent national park. Both areas share common ecological characteristics, are often within the same administrative district, report to different divisions within the Department of National Park, Wildlife and Plant Conservation, and are managed under two distinctly different sets of legislation.

Where the priority for wildlife sanctuaries is very focused towards conservation of wildlife, the national park system has a tendency to focus much more on tourism recreation with less of an emphasis on biodiversity conservation.

The Guidelines for IUCN Protected Area Management Categories (IUCN, 1994) provide both the purpose of each of categories as well as a reasonably concise definition. These suggest the areas that are administered under the Wildlife Preservation and Protection Act B.E.2535 would probably be most appropriately managed under the Category 1a: Strict Nature reserve where the purpose is "Protected area managed mainly for science"

There are few direct references to tourism or recreational use in wildlife sanctuaries, and in terms of the Act all activities provided for under sections 36 and 37 require written permission.

The purpose of national parks is not clearly defined in the National Parks Act B.E.2504. The explanations given the Category II areas under the IUCN definition are the most appropriate. These define the purpose of a national park as "protected area managed mainly for ecosystem protection and recreation.

#### **10. Lack of standard monitoring and data collection systems.**

Effective conservation of the site requires data about changes occurring in the ecosystems, particularly focal conservation targets.

Overall management will, however require data about changes to social economic and cultural systems. By providing key ecological attribute for each focal conservation target as well as indicative indicators for biodiversity health, the strategy plan provides a realistic starting point to: (i) evaluate existing monitoring and data collection systems (ii) progressively developing a standardized monitoring and data collection system which could be applied across all protected areas within the site.

#### **11. Lack of systematic management effectiveness monitoring:**

Questions that need to be asked gauge management effectiveness include:

- How well is the Emerald Triangle Protected Forest Complex being managed?
- Is the site meet Government of Thailand and the Department of National Park, Wildlife and Plant Conservation management objectives?
- Is the site able to cope with existing and increasing threats and pressures, such as encroachment, hunting, tourism and recreation?

These questions can only be answered if a systematic management effectiveness monitoring program is in place. A management effectiveness evaluation system measures the degree to which management strategies are being implemented and how well these actions are protecting the site's outstanding national and international biodiversity and conservation values.

Overall aim of a management effectiveness monitoring program is to : (i) evaluate and apply the results and (ii) improve, through a program of adaptive management, the site's over all management.

#### **12. Poorly understood/implemented Joint Management Systems and practices.**

Biodiversity and ecosystem functions of protected areas conserved with responsibilities and outcomes of sustainable management shared among authorities, local stakeholders and general public. These focus on conservation of biodiversity of the protected areas including conservation of ecosystems and their functions, such as water catchments, carbon sinks, and local climate regulation. Through these and other functions, ecosystems are important providers of livelihood opportunities locally, nationally and even internationally.

The management of protected areas is to understand the complexity of human activities and behavior in order to maintain ecological integrity of the protected areas. Unfortunately, the luxury of that understanding and knowledge of socio-economic factors related to ecosystems in integrity is hardly attained.



In terms of a joint management, particularly in the context of Thailand's protected area system, is that the complexity associated with joint management including training and resources for full and effective joint management to be successful are significant and should not be underestimated. This is not an argument against joint management but is simply an assessment based on observations, discussion and the personal experiences and comments from a wide range of people.

### **13. Tourism and recreational activities.**

The stresses relate to human activities that alter, destroy and disturb habitats and species and are, usually, associated with non-consumptive uses of the site and include people spending time in protected areas camping, enjoying nature, recreating.

### **Objectives and Strategic Actions**

To bring together and synthesizes all of the data, information, assessment process were formulated in previous work. The objectives and strategic actions will include specifically and measurably describe the actions that protected area managers, stakeholders and other partners will need to undertake to achieve the overall vision and objectives.

The importance of strategies, the way that protected area managers respond, or fail to respond, to the critical threats will be the single most important factor affecting the Emerald Triangle Protected Forest Complex's long term viability and biodiversity health. The analyses carried out during various workshops, field inspections and discussions with key informants, clearly indicate that, in the most cases, critical threats stem from incompatible human uses and include: fire, which fragments, forested ecosystems and is not well understood, infrastructure developments, illegal agricultural practices that degrade adjoining forest and water resources and hunting which impacts on species viability.

The framework should developing conservation a strategy assumes that abating the critical threats will alleviate the current or future stresses to the ecosystem resulting in healthy. Threat abatement strategies focus on abating or removing one or more sources of stress. However, in many instances, a focal conservation target has been degraded by historical threats that require some form of active restoration. In these situations, a restoration strategy which directly enhances or restores the viability of a focal conservation target will be required.

Developing conservation strategies also involves deciding how protected area managers, stakeholders, and other partners can work together to overcome critical threats and restore degraded focal conservation targets. Strategies need to include (i) specific objectives and (ii) the specific actions required to progressively work towards achieving those objectives.

Objectives need to be realistic and take into account and recognize the Emerald Triangle Protected Forest Complex and the strategies must work in the real world. Realities include things such as: the resources available to invest in conservation action are limited; capacity and commitment of protected area staff range from highly qualified and committed through to individuals who lack innovation and the motivation for making changes, the need to understand the complexities of biodiversity conservation and the perverse forces that are working against sustainability.

There are a wide range of conservation actions that can be used to work toward achieving biodiversity conservation objectives. Each of these will have different ranges of effectiveness in the diverse situations that will be encountered and accordingly, an attempt has been made to identify actions that will most efficiently achieve desired outcomes-given the realities and circumstances that protected area managers must work within.

Also, there will always be uncertainty about the real or potential effectiveness of any action in a given situation. Uncertainty is, however, another of the realities that needs to be addressed and is definitely not a reason for adopting a “do-nothing” option. Taking action in the face of uncertainty requires a clear statement of intended outcomes for each action that protected area managers decide to invest in. Added to this is the need for an explicit mechanism for measuring the effectiveness of actions and the contribution they are making to achieve their intended outcomes. By doing this protected area managers can determine if the return they are obtaining on the investment of resources, including money, manpower, advocacy, conservation education and awareness, capacity building, community mobilization and participation etc, is acceptable and, when necessary adapt approaches towards more appropriate methods.

Setting Objectives and Selecting Strategic Actions, should focus on, (i) a critical threat or (ii) a degraded focal conservation target key ecological attribute. The point where strategic actions are implemented to accomplish a particular objective is an important distinction. Action can be taken directly at the critical threat or at other contributing factors further back in the causal chain. For example, tiger, a single species target that is stressed by a decline in availability and abundance of prey species. This decline is directly caused by several things including “Uncoordinated patrolling and enforcement systems.” The objective and strategic action steps in this example need, therefore, to focus on a threat abatement approach that will effectively address a critical threat.

Conservation strategy broad courses of action that include one or more objectives, the strategic actions required to accomplish each objective, and the specific action steps required to complete each strategic action. Objectives-specific statements detailing the

desired accomplishments or outcomes of a particular set of activities within the Emerald Triangle Protected Forest Complex. Typically there is a need for multiple objectives.

Objectives are set for abatement of critical threats and for restoration of degraded key ecological attributes. They can also be set, however, to address outcomes related to other specific conservation actions. These could be directed towards the acquisition of resources, or addressing administrative, management and organizational structural issues. If implementation steps are well conceptualized and designed, realization of the Emerald Triangle Protected Forest Complex objectives should lead to the fulfillment of the overall vision. A good objective meets the criteria of being specific, is measurable, relevant and time limited.

Strategic actions-Interventions undertaken by protected area managers, stakeholders and/or partners designed to reach the Emerald Triangle Protected Forest Complex objectives. A good action meets the criteria of being linked to objectives, focused, strategic, feasible and appropriate.

### **Direct and Structural Threats to Focal Conservation Targets**

The analysis that was carried out on Sources of Stress (threat) revealed that there are two reasonably clear divisions. On one hand there are a number of Direct Threats and these are related to impacts on focal conservation targets such as Uncontrolled Grazing Practices, Commercial Scale Wildlife Trade Hunting and Poaching, NTFP Harvesting and Collecting etc. Most of these are well known and have been documented over a long period of time by numerous researchers, protected area managers and other observers.

As well as these, however, there are a number of extremely serious threats that are referred to here as Structural Threats. This category of threats is not commonly discussed or if it is, the commentary is often specifically and inconclusive. Included in this category are: Problematic PA Management and Administrative Structures, Inconsistent Legal Mandates, Lack of Standard Monitoring and Data Collection Systems, and Uncoordinated Patrolling and Enforcement Systems.

Both the Vision and Objectives are compromised equally by Direct Threats and Structural Threats. For this reason a number of what some may identify as radical objectives and strategic actions have been developed.

**Table 1 Some Example of the Objectives, Strategic Actions and Indicators 5**

	<b>Strategic Actions</b>	<b>Indicators</b>
<b>Objective</b>	A. By 2023 complete a Gap Analysis and Evaluation to include; Representation Gaps, Ecological Gaps and Management Gaps	
<b>Strategic Action</b>	Incorporate ecosystem-based monitoring approaches including wildlife distribution, abundance, threat, fire, human disturbance, encroachment, infrastructure development and tourism/recreation into patrolling and monitoring protocols.	Staff, funding and other resources are allocated.
<b>Objective</b>	B. By 2023 Commission a comprehensive study to assess the economic value of the Emerald Triangle Protected Forest Complex	
<b>Strategic Action</b>	Establish protocols for working with Universities, NGO's and other partners to undertake a coordinated approach for establishing research priorities	Staff, funding and other resources are allocated.
<b>Strategic Action</b>	Take into account relevant findings and recommendations from all related assessments.	Economic valuation based on transparent methodologies
<b>Objective</b>	C. By 2023 a coordinated patrolling, enforcement and monitoring programme will be established and non-compliance will be reduced by (tbd)% from 2003 levels.	
<b>Strategic Action</b>	Give effects to and apply relevant sections from Competence Standards for Protected Area Jobs and Training Needs Assessment.	Training and operational procedures incorporated into an operational manual.
<b>Objective</b>	D. By 2023 formulate and integrated Fire Management Plan	
<b>Strategic Action</b>	Facilitate ways that the role of fire within the site's various ecosystems can be better understood.	Staff, funding and other resources are allocated.

	<b>Strategic Actions</b>	<b>Indicators</b>
<b>Strategic Action</b>	Monitor fire regime including the pattern of variation in fire intensity, occurrence, frequency, forest type and area burned and cause i.e. human induced, control management burning etc.	Fire regime departure from natural.
<b>Objective</b>	E. By 2023 a comprehensive suite of research priorities and guidelines directed towards supporting the Management Objectives and Strategic Actions	
<b>Strategic Action</b>	Undertake further site-wide surveys and research aimed at identifying the full range of indigenous species, habitats and ecosystems	Research priorities represent a balance of biodiversity conservation, protected area management and socio-economic themes
<b>Objective</b>	F. By 2023 a process to establish Conservation Management Agreements with approved communities that occupy or utilize areas within the Emerald Triangle Protected Forest Complex will be complete.	
<b>Strategic Action</b>	Take account of the 1998 Cabinet Resolution on solving conflict with communities in protected areas into the process for formulating CMA and defining and implementing processes of zonation	Conservation Education and Community Awareness Manual and User Guide.
<b>Strategic Action</b>	Undertake community-use zone planning which ensures conservation values are maintained/rehabilitated while the legitimate rights of residents are protected.	Defensible valuation criteria including, (i) Direct use values, (ii) Indirect use values, (iii) Option values and, (iv) Non use values.

## Objectives and Strategic Actions

**Objective A.** Rationale, the overall objective of the Programme of Work on Protected Areas is: to encourage countries to complete ecologically-representative networks of protected area, providing basic protection for all national biodiversity, with particular emphasis on threatened and endemic species. Gap Analysis will involve comparing the distribution of biodiversity with configuration, size, juxtaposition, and IUCN's protected area management categories. The main aim of the gap analysis is to rationalize the inconsistencies of size and designation and to present a coherent design for the protected area units which will, in future.

**Objective B.** Rationale, the benefits provided the Emerald Triangle Protected Forest Complex's ecosystems are inadequately defined, poorly understood, and are under exponential pressures from a diverse range of interest groups and developers. Growth in human populations, which demand more land for agriculture and settlements and increased economic prosperity, has translated directly into increased conversion of natural ecosystems, including forests, wetlands and riparian areas, to agricultural and other uses.

Simultaneously, there is increased demand for ecosystem inputs, such as water for irrigation, water to urban areas, fiber, soil fertility. There are also corresponding increases and pressure on the capacity of natural ecosystems to assimilate waste, including air and water pollution and solid waste. In short, society is demanding more and more from the site's ecosystems even as its capacity to meet these needs is being reduced by the range of stresses and threats which have been isolated and discussed in this document.

Stating that the site's ecosystems and the services they provide are valuable immediately leads to the question-how valuable? This is a vitally important question and is the central idea and justification for development this objective. Many other things are valuable to society. To sell biodiversity conservation, protected areas and the importance of the Emerald Triangle Protected Forest Complex's internationally and nationally significant ecosystems to politicians, business, and the community at large, it is vital that the Department of National Park, Wildlife and Plant Conservation managers and administrators understand and can provide evidence that ecosystems and conservation can, and in many instances do already, pay their way. There is a growing body of evidence that ecosystems are a first-class investment that provides and rate of return that is impossible to fully calculate. Of equal significance, once an ecosystem is destroyed or demanded it is impossible, or prohibitively expensive to restore its full range of services.



An often overlooked fact is that protected areas are the only land-use that leaves all other options open for future generations. Once the decision has been made to convert a natural area to agriculture, to divert a river system, the implications are irrevocable. Maintaining and rehabilitating the site's ecosystems will require significant expenditure of resources over the long term and there are, of course, many competing claims for these same resources. The reality is that when the Government of Thailand allocates more resources and effort to biodiversity conservation, it may mean having fewer resources to address other pressing needs, such as improving education, health or infrastructure. Conserving the site's ecosystems and the goods and services they provide will, in all probability, also involve foregoing other uses of these ecosystems, and the benefits that would have been derived from those uses.

To assess the consequences of different courses of action, it's not enough to know that ecosystems are valuable. We also need to know how valuable they are, and how that value is affected by different forms of management.

This assessment will seek to clarify how a valuation can be conducted to answer specific policy questions. In particular, it will distinguish four distinct approaches to valuing the Emerald Triangle Protected Forest Complex's ecosystems, including;

1. Determining the value of the total flow of eco-service benefits, from the Emerald Triangle Protected Forest Complex.
2. Determining the net benefits of interventions or activities that are currently altering or impacting ecosystem conditions.
3. Examining how the costs and benefits of the site's ecosystem services and values are distributed.
4. Identifying potential financing sources for ongoing biodiversity conservation and protected area management requirements.

**Objective C.** Rationale, integrated the Emerald Triangle Protected Forest Complex patrolling, enforcement and monitoring program relates to Goal 1.4 in the CBD Program of Work for Protected Areas states to “substantially improve site-based area planning and management.” (CBD PoW PA 2005)

Uncoordinated patrolling and enforcement systems was identified during this study as a significant stress with severe and a long-term implications for the site's conservation values and overall integrity.

Objectives for an integrated patrolling, enforcement, and monitoring approach within the Emerald Triangle Protected Forest Complex include:

1. To ensure staff have regular contact with their protected area unit and the people who live and work in it,
2. To undertake general monitoring of the condition of their protected area unit and changes to that condition over time,
3. To improve protected area managers, and staff understanding of the geography, natural resources and conservation values of their protected area unit,
4. To develop staff field skills and methods in conservation management, and
5. To undertake related conservation activities, including conservation education and awareness, collection of village information, fire suppression, general liaison and enforcement.

**Objective D.** Rationale, priorities to further develop and implement the objective, following the points;

1. Understand the role of fire in the ecosystems being managed and the influence any changes in the fire regime have on key ecosystem characteristics and conservation values.
2. Document, promote and, where necessary, modify the beneficial aspects of traditional fire use, and develop the knowledge, capacity and technology to apply fire safely where it is needed.
3. Reduce the incidence of human-caused ignitions in places where too much fire is a problem through community-based education programs including incentives capacity-building and training either to reduce the need for burning and/or reduce the probability of needed burns escaping control.
4. Develop laws and policies that ease restrictions on the use of prescribed fire and provide mechanisms to reduce the liability costs incurred by agencies and landowners for escaped prescribed burned.
5. Develop and implement adequate and cost effective detection, prediction and response tools and procedures to respond to inevitable unwanted fires and manage them to minimize impacts, while also providing a process to take advantage of potential benefits that they may present.
6. Promote programs such as payment for ecological services to landowners and to the holders of communal lands for maintaining appropriate fire regimes through their

judicious placement of prescribed burns and fire breaks, and where appropriate, support community fire brigade that can both fight fires and conduct prescribed burns.

7. Link community-based fire management programs to poverty reduction, food security and human welfare initiatives.

8. Gain buy-in and support from local communities living and working in and around fire dependent conservation zones to work with conservation area staff to take advantage of, and perhaps modify, the burning they do to better meet conservation goals.

9. Promote a “two faces of fire” message, i.e. good fires versus bad fires instead of the typical “prevent all fires” campaigns. In fire-dependent ecosystems, good fires are those that fall within an appropriate range for the fire regime that maintains the desired ecosystem but cause little or no economic damage or loss. Good fires in fire sensitive ecosystems include necessary agricultural fires that remain under control. Tools and knowledge to limit escaped agricultural fires and manage other fires can be available through community-based fire management programs.

10. Incorporate ecological information and the Integrated Fire Management framework into fire curricula and Training Programs.

**Objective E.** Rationale, knowledge of the species, populations, and habitats, which are of most significance to biodiversity conservation, is an essential prerequisite for developing effective conservation management strategies for the Emerald Triangle Protected Forest Complex. Information about the nature, history and significance of human interactions with biodiversity values is equally essential. In addition to their contribution to the development of protected area management goals and strategies, these data sets provide a focus for other aspects of the programme, such as biodiversity linked development interventions, patrolling and monitoring.

In the CBD Program of Work for Protected Areas emphasizes the use of science as a basis for effective biodiversity conservation and protected area management. The goal for this theme state “To ensure that scientific knowledge contribute to the establishment and effectiveness of protected areas and protected area systems” (CBD PoWPA 2005).

**Objective F.** Rationale, village conservation agreements could be considered as a basis for the progressive development of a decision-making approach that is based on Joint Management. A working definition for joint management, is “Joint management is the active participation in the management of the Emerald Triangle Protected Forest Complex by the community of all individuals and groups having some connection with, or an interest in the complex”

A four step process is suggested:

Step 1 Orientation of the protected area staff and village communities to; the general concept of the protected areas including global, national and local objectives and rationale, the Emerald Triangle Protected Forest Complex objectives, philosophy, structure, expected outcomes, stakeholders participation, monitoring and evaluation, possible application of ICDP processes and cooperative/joint management concepts.

Step 2 Collecting and understanding information; consider and understanding information, what happens with information now and after? Village assessment, processing-synthesizing and feedback to village.

Step 3 Develop joint management principles and processes; establish village institution/organization (options include village council, user groups/conservation committee, key group etc.) awareness raising, work-out options/solutions/activities/procedures, initiate/discusses and reach agreement for monitoring and evaluation arrangements, village/community agreement-areas, resource uses, level of use, development options and procedures.

Step 4 Implement joint management principles and process; staff and community development in joint management systems, mobilize communities and capacity development enforcement, monitoring and evaluation and implement village development and other conservation linked interventions.

## Conclusions

Biodiversity conservation and protected area planning is an activity most people do in one form or another every day. It is also a specialized skill practiced by corporate superintendents and staffs of five protected areas, and cooperative with stakeholders. Planning is fundamentally something done to help us look into the future and, in particular, to formulate future courses of action.

Planning can also be defined as a process for determining “What should be” and selecting strategic actions which over time will help protected area superintendents at all level to achieve the objectives.

Contemporary approaches to protected area planning have, over the last few years, tended to move towards strategic approach. Some example explanation as it the process that has been applied to formulate this work, Strategic planning can be defined as:

planning which is conducted from a strategic perspective, that is, the primary emphasis for strategic planning is to isolate particular issues and to address them within a broader context. The primary focus for strategic planning is, therefore, a process that provides direction and cohesiveness rather than prescribes detail.

Landscape species selection in Bunthrik-Yotmon Wildlife Sanctuary was conducted, and is one part of the process of wildlife survey and monitoring and strategic planning which joint management approach had been used. The landscape species were selected by the staffs and stakeholders and if possible will use for Site Conservation Management Planning (SCMP) of Bunthrik-Yotmon Wildlife Sanctuary is concerned with how to manage the sanctuary on the land use designation has been determined. Both land use and typically deal with a wide range of management issues.

## **Recommendations**

Department of National Park, Wildlife and Plant Conservation has to consider the landscape species of the Emerald Triangle Protected Forest Complex (3 national parks and 2 wildlife sanctuaries) by setting the workshops or meetings, the participants should consist of the superintendents, Protected Area Committees, villagers, and other stakeholders. These landscape species will be use for consideration on focal conservation targets of this complex and can available for management strategies.

The parts of five protected areas in Thailand, part of the Emerald Triangle Protected Forest Complex, which the border is connected to Laos and Cambodia. Landscape species may travel between three countries, should have cooperative research and survey and plan to set up management strategies.

Department of National Park, Wildlife and Plant Conservation has to apply the ecosystem management and joint management approaches and formulate the Integrated Conservation Management Strategies of the Emerald Triangle Protected Forest Complex and are based around the idea of a 20 year-strategies that provide (i) a detailed analysis and overview of principle conservation values and major management issues, and (ii) definitive and cohesive strategic guidance for management of the sites that makeup the Emerald Triangle Protected Forest Complex.

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## Annex



**Figure 1 : Stakeholders meeting at  
Bunthrik-Yotmon Wildlife Sanctuary**

**Figure 2 : Wildlife data collection training  
at Bunthrik-Yotmon Wildlife Sanctuary**







*Barking deer (Muntiacus muntjak)*



Siamese Fireback(*Lophura diardi*)



Wild pig (*Sus scrofa*)



Asian elephant( *Elephas maximus*)



Serow(*Capricornis sumatraensis*)

**Figure 3: Five Landscape Species were selected by Stakeholders.**





**Figure 4 : Tracks and signs of Landscape Species were found in Bunthrik-Yotmon Wildlife Sanctuary**





**Wildlife Consultant**

**Mr. TAWEE NOOTONG**

**Wildlife Consultant**

**Research and Development Institute**

**Khon Kaen University**

***The Royal Forest Department (RFD)***

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61 Paholyothin Road, Chattujak, Bangkok 10900, Thailand

Tel: (662) 561-4292-3 Ext. 549, 639