Endangered Elephants in Megatha Forest

Karen State, Burma

Karen Environmental and Social Action Network (KESAN)

KESAN

ENDANGERED
Elephants
IN MEGATHA FOREST
KAREN STATE, BURMA

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Made in Thailand
Printed by Wanida Press, Chiang Mai, 2010

ISBN: 978-974-496-540-0

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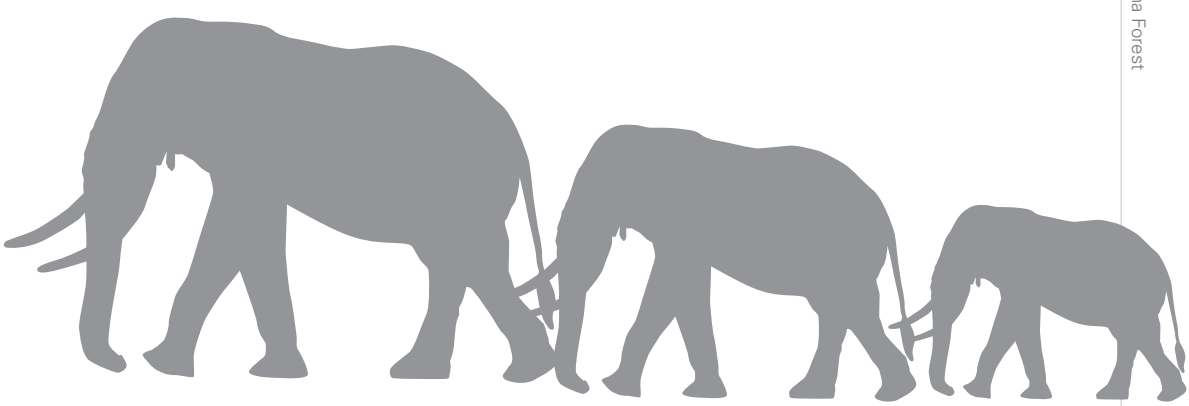
Abstract

Megatha Forest is a 156 sq km protected Wildlife Sanctuary in Karen State. The Karen Social and Environmental Action Network (KESAN) sent a study team to the forest. The team spent two years looking for elephants and talking to local people and forest officials about elephants and other biodiversity. The team estimates that the population is 15 elephants, in 2-3 small groups of 3-7 individuals each.

Historic and current threats to the elephants include the effects of war, poaching for ivory and capture of living wild elephants for markets in Thailand and China. Habitat destruction from mining is ongoing, and while logging has recently been reduced in the area there continue to be long term impacts.

Besides elephants, 60 other animal species were identified in Megatha forest, with over one third at risk of extinction, appearing in the IUCN Redlist and/or CITES Appendices. Widely diverse habitats, including three distinct forest types, were also noted. Therefore, the biodiversity of the Megatha Forest is significant, and KESAN plans to engage in further efforts to document this biodiversity and conserve the forest.



Acknowledgments

This research was conducted to investigate the conservation status of wild elephants in Kawthoolei (Karen) State, Burma. The project and report have been jointly implemented by KESAN and the Karen Forestry Department office in Dooplaya District, Karen State, Burma. The field surveys were conducted independently by the Karen Environmental and Social Action Network, and facilitated by KESAN members in Karen State. Training, technical support and field work costs were provided by KESAN and EarthRights International (ERI). Additional support was provided by local leaders and villagers.

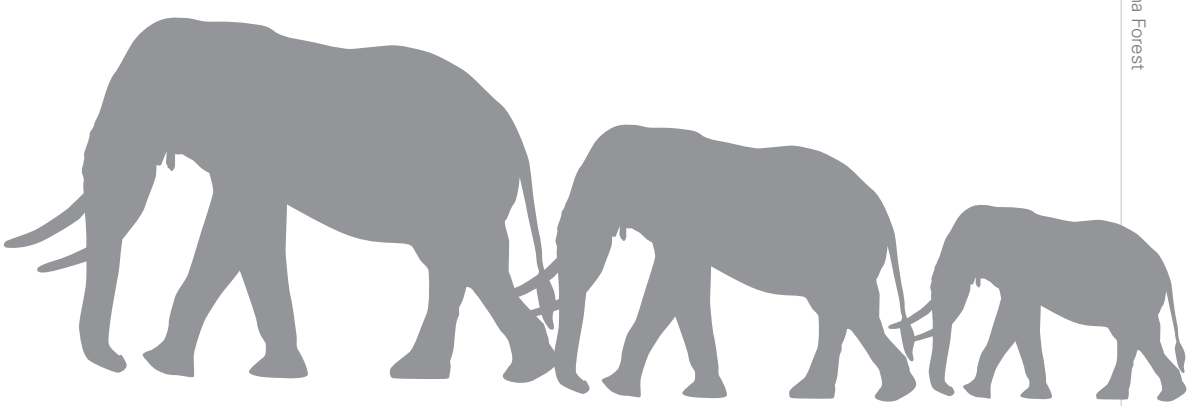
First of all we must thank all leaders and forest staff for their efforts in support of these research activities. In particular, within Dooplaya District we thank and fondly remember Saw Thay Wor Do, local forest leader; we also thank Saw Chit Latt, Saw Htoo Rah, Saw Nay Kaw, Saw Kaw K Paw Moo, and other staff for management, training, and support. Also, thanks go to Saw Shwe Maw and Saw Hsami for their support and encouragement. Moreover, we thank Saw Maw Htoo for giving training before our field work. We thank the Dooplaya research team members, especially Saw Chen Poe and Saw Browning, for leading the team into the deep forest. Our thanks also go to KESAN (Karen Environment and Social Action Network) and the ERI International Alumni Program, who provided resources for the research.

Again, KESAN and the Research Team would like to thank all of the people who assisted with this research. In particular, university and NGO experts provided significant help with comments and proof reading. Several anonymous reviewers in the U.S. provided valuable proofreading. We also thank our friend Ms. Pimjai Klaisri from Mahidol University very much for her contribution regarding estimating the height of elephants by using their foot print size. Ms. Lyndy Worsham of TBBC created the excellent map of Megatha Forest on Page 10. Finally, we must give our greatest thanks to the residents from many villages located around Megatha wildlife sanctuary, who shared their time, knowledge, experience and homes with us while we recorded our findings.

KESAN

Acronyms

CITES	Convention on International Trade in Endangered Species
DKBA	Democratic Karen Buddhist Army
IDP	Internally Displaced Person, forced from their home by war
IUCN	International Union for the Conservation of Nature
Kawthoolei	Karen People's chosen name for the Karen state
KESAN	Karen Environmental and Social Action Network
KNLA	Karen National Liberation Army
KNU	Karen National Union
MTE	Myanmar Timber Enterprise, SPDC's logging company
NGO	Non-Governmental Organization
RECOFTC	Regional Community Forestry Training Center, Kasetsart Univ., Thailand
SPDC	Burma's ruling junta, the State Peace and Development Committee
WEFCOM	Thailand's Western Forest Complex, adjacent to Megatha Forest
WWF	World Wildlife Fund



Executive Summary

A team of ethnic Karen researchers from the Karen Environmental and Social Action Network (KESAN) has undertaken this study to begin documentation of the wild elephant population and rich biodiversity in Megatha Forest (also known as Megatha Wildlife Sanctuary) in a corner of Karen State that is part of the elephants' native habitat. The report describes the method and results of the wild elephant survey in Megatha Forest by a cooperative team of researchers made up of stakeholders, including KESAN, the Dooplaya Forest Department staff, and local villagers. The research took place from May 2008 to November 2010.

The study area includes lowland, hills and valleys, with elevations from about 400 meters to 1052 meters. The forest in the area can be categorized as semi-evergreen, mix-deciduous, meadows and bamboo dominated forests, which vary from slightly disturbed to undisturbed. This forest is under the local administration of Karen Forest Department, Dooplaya District Office, but direct threats to wild elephants and other wildlife remain, in large part due to civil war in Burma and industrial resource extraction.

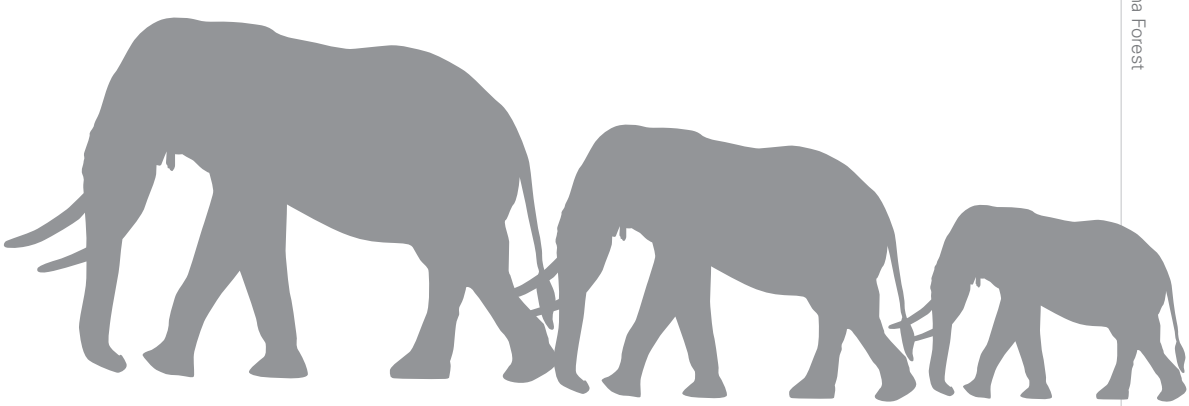
In this study, we used both primary survey and secondary survey research techniques. The primary research method is to survey and collect data by direct sighting of the species through personal encounters and evidence of presence. For primary data collation, we prepared forms for each of the surveyors to fill out during their survey days. We recorded the evidence both with eye contact and evidence auch as tracks, feces, sleeping sites, and vocalizations. Secondary survey and data collection involved interviewing local experts, forest officers, hunters and poachers. We selected many different kinds of people in the communities to share their knowledge of wild elephants and other animal populations. We probed the threat status, wildlife trade, and conflicts affecting wildlife, using both structured and semi-structured interviews.

The elephant population is not very large so the surveyors had difficulty estimating the population through direct observation. The total number of wild elephants found to reside in this forest is estimated to be 15 individuals. There are also many other kinds of large animals in this forest, but only some could be recorded by the team because the focus was primarily on elephants. Further study of large animals in Karen State in encouraged, with KESAN offering willing assistance.

The field surveys also recorded 60 other species, including 27 mammals, 23 birds, 8 reptiles and 5 amphibians. Out of 60 species, 9 are listed as Endangered in the IUCN Red List, 7 are Vulnerable, and 6 are Near Threatened. With this accounting, it can be seen that the Megatha Forest provides a good example of an intact ecosystem, but because 22 out of 60 species are at risk, the forest faces significant threats.

These threats, including ongoing war and militarization and accelerating natural resource exploitation, may seriously degrade the Megatha Forest. Logging and mining permitted by the Burmese State Peace and Development Council (SPDC) and its Myanmar Timber Enterprise (MTE) are rapidly depleting the remaining natural forest in the area, leading to the loss of at least one severely endangered species, the Sumatran rhinoceros. Therefore, KESAN makes the following recommendations to conserve Megatha Forest:

1. **Do not seek war.**
2. **Do not allow logging and mining.**
3. **Do not allow rubber plantations that will result in forest encroachment.**
4. **Strict enforcement of poaching laws.**



I.
Introduction

The current view of most people who know about Burma – especially biodiversity scientists – is that Karen State is like the dark side of the moon. There has been no study of the area due to decades of conflict, and scientists have never even taken a brief glance at this State. Many wildlife researchers from Burma and Thailand have published biodiversity information about the surrounding areas, but the biodiversity and richness in Karen State has never been mentioned in such reports.

This story of wild elephants takes place in the rich forests of Karen State. Megatha Forest is set in an unusually diverse landscape made up of mixed-deciduous forest, semi-evergreen forest and bamboo dominant forest. Ethnic Karen villages are found here, where Burma's Karen State and Thailand's Sangklaburi District meet. The international border was not recognized by the indigenous Karen forest farmers who call both Megatha forest and Thung Yai Naresuan forest in Thailand their home until quite recently.

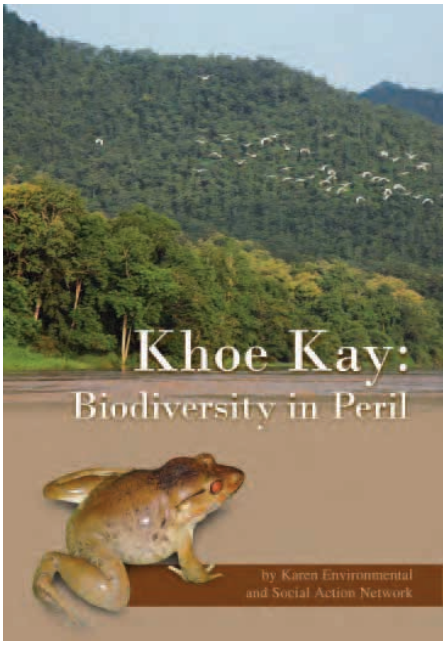
The Karen people call Thung Yai Naresuan *"Pay Thum Pun"* in Karen language, which means a hiding place for Karen people. The term was originally used during battles between historically antagonistic kings of Siam, Burma and Mon land, according to an interview for this research with a Karen man named Saw Chen Poe. Language, customs, and land-use practices are common to both sides of the national boundary. Karen people have been living and farming the hills and valleys of this stretch which links Burma to Thailand for centuries. The fact that the border area is so important to military planners was unknown to the Karen before the civil war.

Due to ongoing civil war since Burmese independence, the situation has changed dramatically, with many implications for biodiversity. Today the forest straddles a Burmese war zone and a (nominal) Thai wildlife sanctuary. On the Burma side, villagers must always be prepared to flee from fighting between Karen and Burma Armies, often living as Internally Displaced People (IDP), but the eastern part inside Thailand seems to be the place of Karen people's dreams: a land of refuge from conflict, where they can enjoy their traditional culture.

This study illuminates Megatha Forest, a biologically lush area virtually unknown to science. At least 60 animal species were documented, including no less than 22 species listed in the International Union of Conserving Nature (IUCN) Red List.[1] Megafauna like wild elephant, tiger, tapir, and guar are known to exist in the study site. The mixed deciduous forests are still rich, with meter-wide iron-wood *(Pterocarpus macrocarpus)* and red wood *(Xylia xylocarpa)* trees. The most common giant tree found in the semi-evergreen forest are Dipterocarp *(Dipterocarpus costatus)* tree species. The forest is easily compared to Thung Yai Naresuan Wildlife Sanctuary because they are biologically contiguous.

The indigenous wisdom of the Karen on the Burma side of the border remains strong, which is remarkable given the rapid decline of indigenous knowledge across the border in the consumption-preoccupied society of Thailand. The pharmacopeia known to the grassroots researchers participating in this study is precious, but dwindling with each new generation (KESAN 2007).

This report is part of an ongoing effort to document the remaining biological richness of Karen State. In 2008, KESAN published "Khoe Kay: Biodiversity in Peril" (2008) which included comprehensive surveys that identified over 400 plant and animal species in one part of Karen State on the Salween River. Other current research is aimed at surveying and researching Hoolock Gibbons to quantify their conservation status in Kaser Doo Forest in northeastern Karen State. Here, the focus is on one remote southern corner of Karen State, Megatha Forest, and the research is mainly on the current status of wild elephants.



[1] Searchable database is at www.iucnredlist.org.

The significance of this report is the documentation of a wild elephant population in a war zone. The insecurity of the area acts as an effective deterrent to outside attention such as academic study and scrutiny by environmental NGOs. While this situation makes KESAN's work infinitely more difficult, it does not stop the organization from doing field work in the area. One of the objectives of this report is to alert biodiversity scientists, naturalists and other interested parties to pay attention to both the rich biodiversity of the Megatha Forest area, and to the imminent threats it faces. It is hoped that this snapshot of the natural world of the Megatha Forest wildlife sanctuary will encourage others to become involved in research and conservation activities in Karen State.

KESAN believes that the Megatha Forest's biodiversity is closely related to both Karen culture and food security. This connection leads to KESAN's goal to maintain Karen culture and local biodiversity through traditional agricultural practices like rotational farming and community forests. The use of these practices leads to better farm production, and also conserves biodiversity more effectively. In addition, Karen culture and livelihoods cannot wait for democracy and regime change in Burma. Action must be taken now.

This conclusion led directly to the current Megatha Wildlife Sanctuary study, in that biodiversity (like Karen culture) cannot wait for international actors to bring about change. The local people must do all they can to conserve their forests and biodiversity or they will be lost to logging, dams and other industrial extraction. KESAN's goal for this report is to show that the indigenous people's struggle to save their forest using traditional knowledge is the same as their struggle for daily survival. This includes efforts to document the environmental destruction in Karen State, and to find alternative forest uses to reduce and reverse the environmental damage. It must also include efforts to persuade international conservationists to focus more on conflict zones.

The many threats to wild elephants and the biodiversity of the study area are discussed briefly in this paper, but not comprehensively. Three major threats are discussed, in order of their imminence: 1) military action by the Burma Army in Karen State; 2) natural resource exploitation by various stakeholders; 3) illegal poaching of wildlife by all parties in Burma. The first threat is also a major impediment to the study of biodiversity, and the reason why this area is so little known to wildlife scientists and others.

KESAN's Biodiversity Program

started with reports of massive forest destruction in Karen State. When Thailand banned logging in 1989, many Northern Thai timber companies turned to Burma to log the rich forests there, which the cash-starved Burmese military government was more than willing to sell. Many of these concessions, granted by the Myanmar Timber Enterprise (MTE), were in conflict zones along the Thai border, so the companies also had to negotiate with local authorities such as the Karen National Union (KNU), or after 1994, the rival Democratic Karen Buddhist Army (DKBA). Logging moved deeper into Karen State following the 1994 fall of the KNU headquarters at Manerplaw.

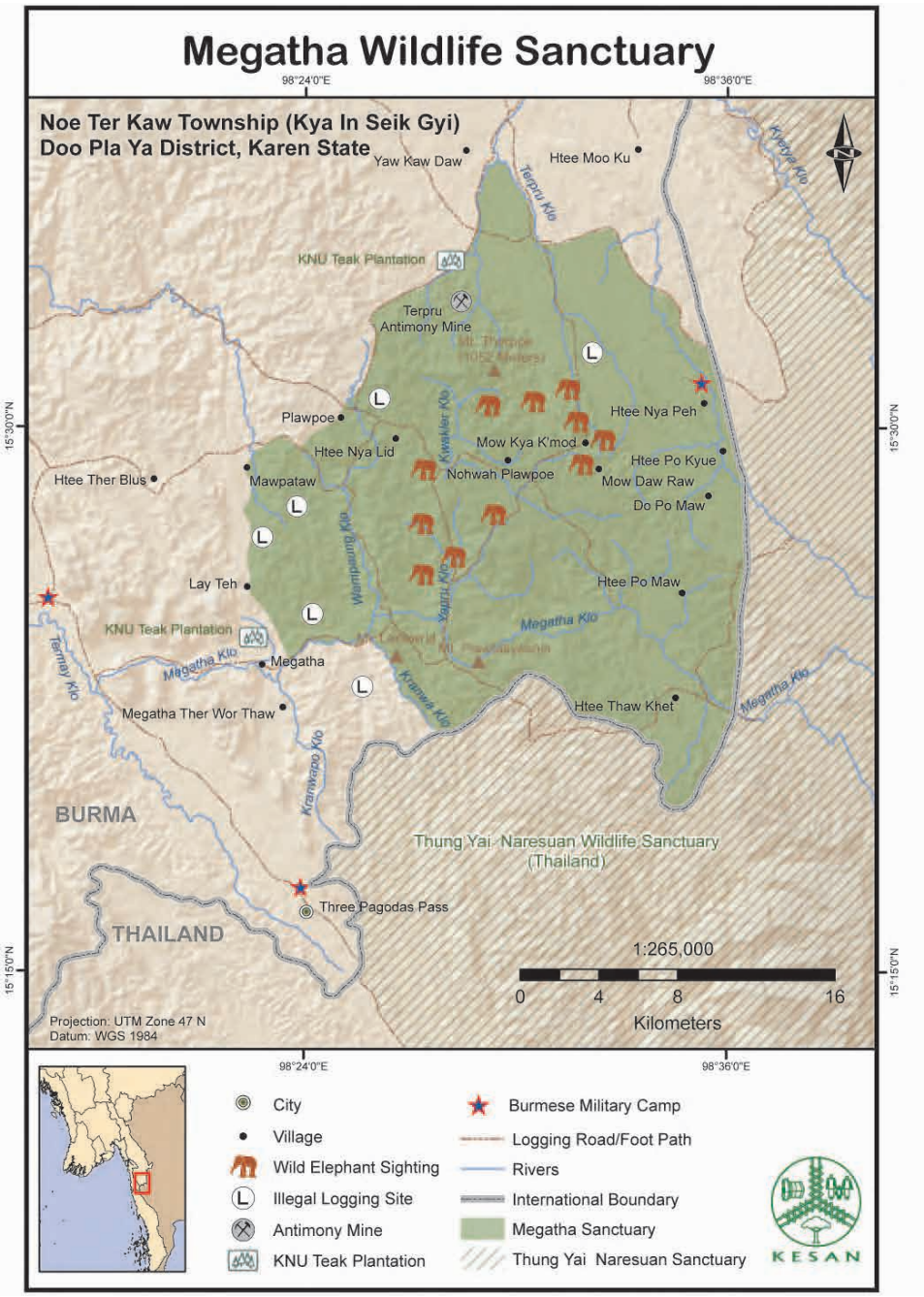
The required multiple authorizations led loggers to ever harsher forest practices, and the resulting logging left many areas in a highly degraded state. KESAN's first report on biodiversity, "Destruction and Degradation of the Burmese Frontier Forests" (2004) recorded the impacts of some of this logging, and found that the loss of forests was caused by massive commercial logging, as well as the needs of local people to sustain their livelihoods.

Much of the logging in Burma is done by outsiders. The local people are well aware of the problems caused by forest loss, but there are no easy answers. The fighting in Karen State (including Megatha Wildlife Sanctuary) makes the local people's situation highly insecure. But, as one villager noted, "if they [the leaders] wait until Burma gets democracy and the military government changes, the forests will be gone and there will be no forest for the coming generations. In our forest, we need to stop logging and take the wood that is just enough for our household needs. We need to protect our forest from fire, so more trees can grow up and more animals will come back to the forest."

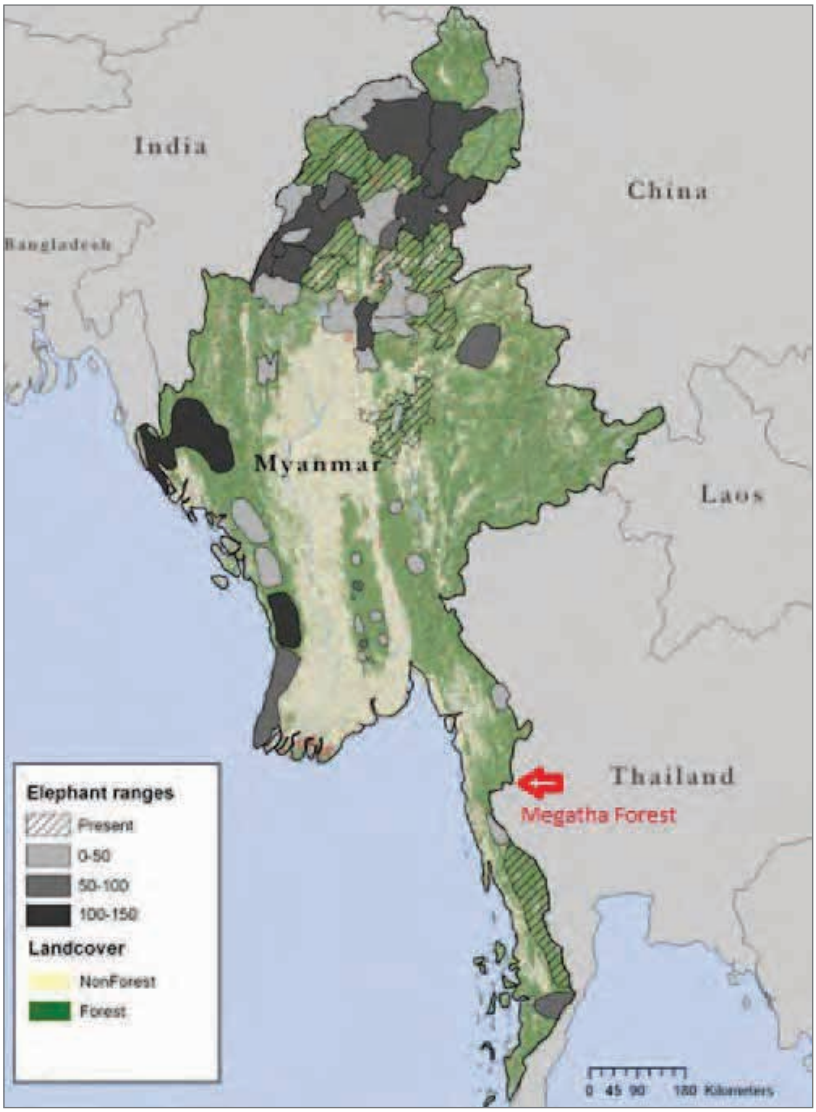
These sentiments led KESAN to adopt several small-scale projects aimed at using and preserving traditional agricultural practices to undertake forest conservation. KESAN also issued a report called "Diversity Degraded" (2005) (the Karen language version included a focus on rotational agricultural practices). These studies found that IDPs cannot pursue their traditional farming practices, and examined the impacts of this on food production, seed collection and use, and livelihoods. The lead author of this report returned to his home village to record what plants were used in traditional rotational agriculture areas, and compared that to the farming situation after Karen villagers were forced to relocate by the military. The variety of crops was greatly reduced by conflict, with only main crops like rice, beans, sesame and cucumbers remaining for farmers' use. Further, the loss of crop diversity led to an increase in insect infestations, increasing the impacts to livelihoods. As a result of these findings, KESAN began a series of projects to encourage local people to save their seeds and keep the widest possible number of crops in production to maintain ecological balance and food security.

A Brief History of Megatha Wildlife Sanctuary

The Megatha Wildlife Sanctuary is a forested area which was proposed for designation as a wildlife sanctuary in 1982 by a KNU forest officer named P' Doh Saw Tha Pyu. The total area is about 156 km2.



Megatha Forest Map



Megatha in Burma with Elephant range, after Begley (2006)

The Megatha Wildlife Sanctuary was finally established in 1989 by the KNU while P' Doh Saw Tha Pyu was the head of Dooplaya District Forest Department. Among local villages in the area, Megatha village is located in Kya Aye Township, Dooplaya District, and T' Pru Village is located at the northern part of the forest boundary. An SPDC army camp is at the northeastern boundary, while an antimony mining site is at the northwestern border. The western boundary is marked by a car road from Oscar which leads to DKBA (Democratic Karen Buddhist Army) and KPF (Karen Peace Force) camps in the Megatha area, and then to the border with Kwee Ko Wildlife Sanctuary at Per Klern.

Sign for Megatha Forest in Karen and Burmese Languages – No Hunting Allowed

From Megatha village in the southwestern part of the forest, we can also find Htee Lay Pa village at the south eastern part of the boundary. The eastern boundary of this forest is the border with western Thailand, opposite the Wildlife Sanctuary named Thung Yai Naresuan (Thai) or Paythum Pum (Karen), in Sangklaburi province, western Thailand. The forest altitudes vary from 400 m to 1052 m at Mt. Thou Po, the highest mountain in this wildlife sanctuary. There are two small grasslands in the middle of the forest called Loo Wah Plaw and T'Pru Kee Plaw. Big primary forests surround these two grassland areas. There are 14 streams found in this forest, and the largest one is Megatha Stream. This forest is an important watershed for the people who live in the whole township because they depend on these streams for water supply, including farming and household use.

Grassy Meadow in Megatha Forest

A. Why did the KNU Forest Department declare Megatha Forest a Wildlife Sanctuary?

Before 1989 the Megatha Forest was not a wildlife Sanctuary – it had become a haven for poachers. There were frequent wild elephant capture activities in this forest. Most of the poachers lacked knowledge to properly capture and train elephants, so many died during capture and training because of improper care. The captured elephant mortality rate exceeded 80 percent. Also, poaching for ivory and meats for trading to Thailand was a major problem. Moreover, large numbers of species were killed for meat, horns, skins, fur, feathers, gallbladders, and even the chicks and calves were often taken by poachers. Many Karen leaders could not condone this destruction, so P' Doh Saw Tha Pyu proposed that the Megatha Forest become a protected wildlife sanctuary in 1982. The proposal was approved by the KNU Forest Department in 1989 and this forest has since been recognized as wildlife sanctuary under KNU rule.

Gaur Killed by Poacher

Kaser Doo Wildlife Sanctuary Provides an Excellent Example of KNU Forest Department Forest Conservation

In 1992, a Survey Team from the Regional Community Forestry Training Center (RECOFTC) in Thailand was the first group to engage in research in one of the Karen State's established Wildlife Sanctuaries, called Kaser Doo Mountain. The RECOFTC team determined that the Karen State establishment of 11 wildlife sanctuaries in KNU Controlled areas in 1982 was one of the Department of Forestry's most impressive achievements. Kaser Doo Wildlife Sanctuary covers 460 square kilometers (42,000 hectares) of forest, and is located about 20 kilometers west of Thailand's largest national park, Kaeng Khrachan.

The WWF includes the Kaser Doo Wildlife Sanctuary as as part of one of the world's 136 most threatened terrestrial ecosystems. This is because RECOFTC and KNU reported that the Kaser Doo Wildlife Sanctuary nurtures a variety of habitats, ranging from ridges and valleys that contain mineral springs to meadows and truly virgin forests that remain untouched by human hands. The report mentions that the Karen People were willing to participate in an environmental education meeting conducted by RECOFTC. The research team suggested that Burma is very biologically diverse, and intact habitats are found in the areas inhabited by ethnic minorities. (Latimer, 1992; See also Fong, 2009).

II.
The Megatha Forest Ecosystem

The Megatha Forest study area is a complex forest comprised of land sheer with limestone mountains, caves, waterfalls and small scattered forest-farming communities in the Kayah-Karen montane rainforest (World Wildlife Fund 2001). "Much of the region consists of hills of Paleozoic limestone that have been dissected by chemical weathering. The overhanging cliffs, sinkholes, and caverns characteristic of tropical karst landscapes are all present in this ecoregion." About 70 percent of Megatha Forest still remains intact and has never been cut down by loggers or farmers.

The fauna and flora of Megatha includes an unusual mix of species primarily associated with the Indo-Burma hot spot identified by

Karst Limestone Outcrop in Megatha Forest

Conservation International (2007). Most species are either characteristic of the WWF ecoregions or Tenasserim/Southern Thailand semi-evergreen forest. The Thai Western Forest Complex (WEFCOM) is comparable to the Megatha Wildlife Sanctuary because both are located between Dawna Range and Tenasserim Range of Burma, with similar climate and geography.

A. Megafauna in the Megatha Area

There are some large mammals still living in this area, such as wild elephant *(Elephas maximus)*, gaur *(Bos gaurus*), Malayan tapir *(Tapirus indicus)*, tiger *(Panthera tigris)*, sambar *(Cervus unicolor)*, Malayan sun bear *(Helarctos malayanus)*, stump-tailed macaque *(Macaca arctoides)*, southern serow *(Naemorhedus sumatraensis)*, dhole *(Cuon alpinus)*, Asiatic black bear *(Ursus thibetanus)*, Assamese macaque *(Macaca assamensis)*, and clouded leopard *(Pardofelis nebulosa)*. The KESAN team confirmed this information in interviews with the villagers before starting field research.

B. Megaflora

Forest types vary based on the altitude, with higher elevations likely to be greener and more lush. Some parts of the forests are mixed-deciduous, while the other areas are semi-evergreen forest. There are many kinds of big trees, with *Dipterocarpus sp.*, Tung tree *(Aleurites fordii)*, *Xylia xylocarpa*, *Pterocarpus macrocarpus*, and *Ficus sp.* being the most common megaflora. The trunks of these trees are at least one meter in diameter, and emergent trees are up to 40 meters high. There are also many other bamboo, rattan and palm species in this area. In addition, there are some meadows and small wetlands within this forest. We will discuss forest types further in the results section.

Dipterocarpus costatus in Megatha Forest

C. Description of Villages near Megatha Forest

The villages located around the Megatha Forest are ethnic Karen communities. Some villages are made up of IDPs who were forced to flee civil war between the Karen National Liberation Army (KNLA) and the Burmese Army. The most common religious practices in these areas are Buddhism, Christianity and Animism. People lived in this area here peacefully for many centuries. However, after the British colonial period, civil war came and destroyed the peaceful land.

Some people came from other areas before the civil war, but most were already settled here. The majority of people depend on wet-rice farming but a few still use dry-rice farming. Recently, some local people started working for logging or mining companies and some started rubber plantations. However, the KNU soon plans to ban logging completely, making the area more vulnerable to SPDC to attacks. Local people said that "if the KNU doesn't allow logging in the forest areas the Government Army will attack them."

Before British colonial times, food was plentiful for farmers in all ethnic communities in this area. But after the arrival of civil war, farm lands became battle fields. Many farmers escaped and now live in very hard conditions in large forest areas, where their agriculture is more destructive, their diet is greatly simplified and they are vulnerable to malaria and other diseases.

These people dream for peace to come to Burma as soon as possible so that they can return to their lowland areas and have access to less destructive farming practices. It is possible to say that deforestation is the result of civil war and militarization in the area.

The Megatha Forest Landscape

The KNU Forest Department and Karen State Forest history

The Karen Revolution started on 31 January 1949. The Kawthoolei (Karen) State set up its administration and governing systems around 14 June 1949. The ruling strategies and plans had been established to enforce the law and regulations as a form of Government. Soon after, the Karen Forest Department was established, with Saw Sain Tin as the first Chairman of the Department. The head of the Forest Department has changed from time to time, and the current Forest Department Chairman is Saw Eie Htoe. The Forest Department is divided into three branches: (1) administration (2) timber revenue and tax, and (3) survey, wildlife, and forest conservation. Its jurisdiction is divided into seven districts that administer reserved forests within each district. The KNU assigns each of Kawthoolei's "conservators" at the district level, at the headquarters level, and are finally directed by a department minister. Indeed, the protection of Kawthoolei's forests is so vital that a Minister of Forests had already been established by 1950. (KNU Forest Policy 2009).

Using the well trained Karen who worked under the British colonial forest service in the Karen State Forest Department was crucial for KNU forest conservation. During the 1980s Karen State recognized a total of 13 Wildlife Sanctuaries including two established under British rule (see Appendix 1). Many other Forest Reserves in several categories have been proposed and dedicated by KNU.* As early as 1972 the Karen Forest Act and forest regulations were adopted, and the Forest Department's management methods and work plans were laid down. (Bryant 1997). Since then, the KNU Department of Forestry devised a list of endangered species to protect them from illegal hunting and poaching, see Appendix 2. The forest laws and regulations adopted by KNU change from time to time, due to new conditions and priorities. The latest Karen Forest Policy focuses more on local people, and forest department participatory management was made the law of the land in April 2009.

There are three main purposes for the Karen to establish an active Forest Department. First, the forest serves as a place of refuge, in that the forest is the traditional home of the Karen. Second, the forest provides a livelihood for all Karen. In this regard the importance of the forest for sustaining a Karen way of life is as great to the KNU as it has traditionally been to individual Karen farmers. Third, many Karen people use the forest for fuel, building homes, tools, and for farming. Non-timber uses of the forest by Karen people include using the roots and edible leaves of many species for medicinal purposes, as well as hunting forest game for food. (Bryant, 1997).

* Categories include Community Forest, Herbal Forest, and Community Religious Sites.

III.
Wild Elephants in Burma: Dwindling Populations and Threats

Many experts agree that Burma has the second largest population of wild Asian Elephants after India. A review by Begley (2006) notes that in 2004 the IUCN's Asian Elephant Specialist Group estimated Burma's wild elephant population as being 4,000 - 5,300. Begley also indicates that another meeting in 2004 organized by the Smithsonian Institution and attended by Burmese and global experts, estimated the population could be as low as 1,130. Begley believes that this lower figure "appears to be unreasonably pessimistic, [but] it is [still] widely agreed that Burma's wild elephant population is in decline, and that as elsewhere in Asia, urgent action is required if wild elephants are to survive into the next century."

The most severe threats to Burma's wild elephant population are probably habitat loss from logging and illegal elephant capture. Begley (2006) provides information about the great reduction of wild elephant habitat in Burma. He details that from 1990 to 2005 Burma lost 17.84 percent of its total forest area. This forest loss was entirely caused by logging. Currently only 7 percent of the remaining Burma forest is listed as protected areas, and even these are not safe from chainsaws. The two main causes of deforestation were conversion to agriculture and the timber industry.

Logging is a major issue throughout Burma, occurring continuously in the past, present and into the future. The Burmese government officially reports that it exported 18,000 m^3 directly to China and 27,000 m^3 through Rangoon port each year in early 2000s, but Chinese official figures show that during the period of 2001-2004, 800,000 m^3 to one million m^3 were imported annually from Burma.

(Begley 2006, citing Global Witness 2005). However, Begley only addressed logging in Kachin State.

Interviews for this report found that there continue to be rampant logging activities happening in Karen State, Tenassarim Division and Pago Division which have been approved by MTE. While the KESAN team did not see evidence of current logging in Megatha Forest, the impacts of past logging continue to be evident. Today, losing the pristine forest in Burma is the most significant issue for many people, but SPDC authorities do not appear to worry about this serious loss.

Furthermore, the other threats to wild elephants are elephant capture, poaching and conflicts with humans on a daily basis. The capture of elephants for use in the timber trade is possibly the biggest direct threat to the survival of wild elephants in Burma. Begley (2006) reports that the ban on wild elephant capture took affect under 1994 legislation. Unfortunately the ban has never been enforced. He further notes that wild elephant capture activities have been happening on a small scale all over Burma, in places where the wild elephant populations may still be rich. One of Begley's interviewees said he worked legally under the MTE to capture wild elephants and many government-employed people like him conducted elephant capture elsewhere in Burma. There is no doubt that allowing the legal capture of wild elephants in Burma's forests results in illegal capturing at the same time.

A young street elephant begging from tourists in Thailand. Many of these street elephants come from Burma.

According to Begley (2006), "[h]istorically, large numbers of elephants in Burma were caught and trained for work in the logging industry. But today most of the captured elephants are sold to Thailand and trained to perform for tourist attractions or act as beggars in the streets of big cities." Traffic (2008) reports that "some 250 live Asian Elephants [were] exported from Myanmar to neighbouring countries in the last ten years; this is mostly to supply the demand of tourist locations in neighbouring Thailand." The illegal capture of small calves to meet Thailand's demand for tourist attractions will continue to be a major problem for elephants in Burma.

Poaching for ivory is illegal in Burma but the government cannot stop it, so it continues to occur in many areas in Burma. Traffic (2008) investigated "14 markets in Myanmar and three border markets in Thailand and China, and found some 9000 pieces of ivory and 16 whole tusks for sale, representing the ivory of an estimated 116 bulls." This not only indicates a major impact on wild elephant populations, but also represents a serious reduction in the population of healthy, breeding tusker males.

Moreover, the conflict between wild elephants and humans is now increasing because of the large scale destruction of forest areas for market crops. This conflict usually occurs when the elephants migrate or raid the crops of farmers, resulting in the loss of human lives and sometimes the loss of wild elephant lives too. These kinds of threats continue to affect the wild elephant populations in Burma to the present day. (Begley 2006).

IV.
Objectives, Research Team, Scope and Methods

A. The Objectives of this Project

1. To collect information about elephants in the Megatha Forest area, in order to prove that the area is important as ecological habitat for biodiversity. This includes contributing good information to convince KNU to write an effective forest policy that conserves elephants.

2. To use the collected information for advocacy campaigns that enable international communities to focus on saving wild elephants in Karen State, Burma as well as throughout South East Asia.

3. To increase people's participation with regard to conservation, forest management and decision making among the Forest Department staff and local villagers.

4. To increase understanding of the causes of threats to elephants and other species in the Megatha Forest in order to reduce threats using better management.

B. Research Team

KESAN staff members and other staff from the Dooplaya Forest Department made up the primary researchers. A five person KESAN team worked on this research in the field: Saw Wee Eh Htoo, research coordination, Saw Soe Doh Htoo, research assistance, as well as Saw Hsa Eh Klern, Saw August Moon and Saw Blaw Htoo. From Dooplaya Forest Department were Saw Kaw K' Paw Moo, Saw Dah, Saw Eh, Saw Tun Nen, Saw Paw Lah Hey, Saw Taung Thoe Loe, and Saw Eh Pee. The local villagers include Saw Chen Poe, Saw Browny and Saw Hsa Thaw. The entire research team has experience in both Karen and Western methods of biological classification and study. Further, university and NGO experts provided significant help in identifying species

Survey Team

C. Scope of the Study

i. Temporal Scope

The KESAN research team spent two years doing field work, with two field trips per year and an average of 7 days per field trip. The total time spent doing field work over three years was therefore about 42 days. The semiannual field trips happened normally in May and November. Most the field activities aimed to find individual elephants and evidence of elephant presence in the Megatha Forest area.

ii. Geographical Scope

The study includes field work in the Megatha Forest itself, as well as interviews with villagers living near the forest, KNU Forest Department Staff from Dooplaya District, and respected Karen elders from the area with knowledge of historical facts.

D. Methods

i. Data Collection

The KESAN research team organized and implemented a multifaceted research and data collection plan, involving both primary and secondary data collection. Our methods included the following:

1. General elephant surveys through personal observation that used data forms, GPS and cameras to record wild elephant information, as well as threats to the whole ecosystem.

2. Wild elephant surveys in known elephant sites such as salt lick areas, sleeping sites, drinking and mud bathing areas, and eating places.

3. Interviews with local and indigenous forest guides and village leaders during and after forest walks.

4. Interviews with the local people about the threats to wild elephant and other animals related to poaching, capturing, trading, trading routes, deforestation, human conflicts, and forest fires, as well as tools used to capture and kill the animals.

5. Workshops and focus groups between researchers and local people to exchange knowledge about wildlife, biodiversity and participation in cooperative field surveys.

The Survey Team engaged in these activities as follows.

a. Forest Walks

After arriving in the field survey areas we set up camp for sleeping and dining areas. Field surveys took place from 8:00 AM to 3:00 PM each day. Under the primary data collection process, we sub-divided our data into two categories, direct sighting and indirect sighting.

For direct sighting we recorded the elephant numbers, sexes, animal's sizes, colors, foot print sizes, stool sizes and notable marks. We also recorded the food they ate and behavior before and after seeing people. Dates/times, location, and forest types were recorded using these prepared forms with only one person per team to record the data for continuity.

Indirect data collection is based mainly on the evidence of presence, in which we recorded foot print sizes, feces sizes, sleeping sites, and vocalizations, including the date and time of recording. We also used GPS and digital cameras to mark the place of the event for both direct and indirect data collection.

One method considered for the primary data collection is the Lincoln-Petersen Capture-Recapture method (Seber 1982). This method estimates the total population from the ratio of observed specimens and re-observed specimens. However, the survey team felt that this method was not necessary because the elephants of Megatha occur in distinct easily identified groups, and the total population is low enough to observe the entirety.

There were a total of seven forest surveys conducted in this research. Two of the surveys involved two groups of observers, and the other five surveys took place with one group. Most surveyors took part in multiple surveys to ensure consistent data collection and recording. The survey teams varied from 5 to 7 members in the seven survey trips.

In addition to wild elephant data, surveyors also recorded any evidence of hunting (hunters, gunshots, pitfall traps, and snares). They also collected evidence of other primates or rare animal species beside elephants. Birds and other animals were observed and recorded while traveling in the forest on field survey days.

b. Interviews

We selected a great diversity of local residents and hunters in the Megatha Forest communities for interviews. We interviewed them to obtain information about their livelihoods, and asked specifically about natural resource management with an emphasis on forest use. This helped us to understand the situation and local status of wild elephants, as well as the threats they face. We interviewed a total of six villagers from six different villages. Further, we interviewed the Forest Department officers about their role in managing this forest. We also talked to Saw Eie Htoe, Chairman of Karen Forest Department, to get information to use in this report.

Both structured and semi-structured methods were used to conduct these interviews. The interviews focused mostly on the wild elephant, but other mammals, birds, reptiles and amphibians were also discussed. The interviews took at least 40 minutes per person. The questions were designed to obtain data about each species such as: their population; their local status in terms of the past, present, and future; their ecological behavior and ecological niche; their breeding

season; and the types of threats, both direct and indirect, that each species faces. Questions were also asked about wildlife trade, conflicts and habitat loss, and possible dates were identified. Other questions concerned the use of materials employed to kill or capture the animals and what trade routes were used. In the interview we also tried to obtain general information about wild elephants in all of Karen State.

Secondary Interviewees: Regarding Elephants and Biodiversity in Megatha Forest

Saw Htoo Ra –	KNU Forest Officer, Dooplaya District Head of Wildlife Conservation
Saw K Paw –	from Karen State, lives in Kachanaburi, saw cross-border elephant trade
Saw Chen Poe –	former poacher, now local elephant conservationist
Saw Browny –	former poacher, now local elephant conservationist
Saw Thay Wor Do –	KNU Forest Officer, Dooplaya District Forest Head (deceased)
Saw Shwe Maw –	KNU District Leader

c. Group Discussions

Group discussions were generally conducted with the villagers, forest officials who participated in this survey and KESAN staff. These discussions occurred with each group after each field trip to make sure that the species numbers and types that were recorded in the survey each day were correct.

d. Data Treatment

We used the same data collection forms for the entire primary data collection process. We used a semi-structured interview method and interviewed the local experts from time to time to ensure all the gathered information was reliable. After each survey and interview we grouped our data and discussed whether it was overlapping or different from previous results. Finally, we put all the recorded data into good order.[2]

[2] This research work relied on previous KESAN biodiversity studies. Some KESAN team members participated in field work in the Khoe Kay area on the Salween River, resulting in the report "Khoe Kay: Biodiversity in Peril" in 2008.

E. Determining the Size and Other Characteristics of Elephants

We used local methods to estimate the height of the elephants' heart. According to local knowledge, one circumference of the elephant's front foot print is equal to the height of an elephant's heart.[3] Another estimate of elephant size is that one circumference of the elephant front foot print multiplied by 2 is equal to the height of the elephant.[4] We use both these methods to estimate the height of elephants by measuring the foot print sizes.

Elephant Information Sign at Dusit Zoo

Detail of Elephant Information Explaining Size Estimate From Footprint Size

We also observed the sleeping sites, where we could see the individual elephant's sleeping place and observe the sizes of the stools. Normally, each elephant produced a pile of stool each sleeping night. Elephants do not sleep in a group, but prefer isolation. Only small calves will sleep with their mother, but the stool sizes are obviously different, allowing the team to count both.

In addition, we identified the male bulls by comparing the sizes of the front footprint and the hind footprint; the bull elephant has a larger front print than the hind print. Also, the male bull usually prefers to live alone. Of course, telling the difference between tusker and non-tusker elephants is rather easy. The tusker elephant always leaves tusk prints at the sleeping sites because they use their tusks when they stand, lie down and to drive away insects. We also used tusk prints to estimate the height of elephants for both seen and unseen individuals. Therefore, the several methods we used to estimate the height of elephants reinforce each other.

[3] According to local villager Saw Chen Poe (2010).
[4] According to Dusit Zoo staff who talked to Ms. Pimjai Klaisri of Mahidol University, Bangkok (2010).

V. Results

A. Pre-Survey Interviews

Before we went to the field for surveys, we interviewed a number of people, including villagers and forest officers, who had seen wild elephants in this forest. Interviews with villagers from Yaw Kaw Daw village included Saw Chen Poe, while interviews in Megatha Village were with Saw Browny and other experts and experienced local hunters.

We received much information about the elephant population in the area and the threats they face. Estimated number and types of elephants are based on interviews as of April 20, 2008. The villagers estimate that there are at least three groups of elephants. The first group includes seven elephants, the second group five elephants, and the third group has three elephants. The local people noted that these are all the resident groups. Therefore the interviewees estimated that there were only about 15 elephants in total living in this forest.

However, they also said they saw some elephant groups that are not normally found in the area. One person encountered a group of 13 elephants which he had never seen before in the Megatha forest. This observer believed that the elephant

group might come from Thailand's Western Forest Complex. Moreover, he added that one tusker bull elephant visited the area at least one or two times per year. He also believes this tusker elephant comes from Thailand.

B. Observations of Elephants in Megatha Forest

i. Direct Observations

- On the first trip survey, the Kaw Kaw K' Paw Moo team in the northern part of Megatha forest saw two elephants, a mother and calf, on April 24, 2008 at 9:00 AM.
- The Saw August Noon Team saw two elephants and photographed them. They are believed to be a calf and mother, observed on March 11, 2009 at 1:30 PM in the Yaw Prute area.
- Kaw Kaw K' Paw Moo saw 7 individuals (6 females with one non-tusker male, with a height estimated above 9 feet) on May 13, 2010 at 10:30 AM.

Elephant in Megatha Forest

ii. Indirect Observations

- The first field survey by Saw Wee Team in the southern part of Megatha forest saw evidence of two elephants, including footprints, vocalizations, and stools on April 23, 2008 at 10:00 PM. They believe that this represented a group of two including mother and calf.
- The first survey by the Saw Blaw Htoo Team also recorded evidence of an elephant, believed to be a young adult bull tusker elephant, but the team recorded only feces, foot prints, and a sleeping site, on April 28, 2008 at 3:00 PM.
- The Saw Klu Group saw two mature elephant tracks on March 12, 2009 at 9:20 AM, but there was no evidence to determine other specifics.
- The Saw Klu team saw three elephant tracks, believed to be one mother, one calf and one male, on March 24, 2009 at 11:49 AM.
- The Saw Blaw Htoo team saw evidence of one elephant on November 19, 2009, believed to be a small bull elephant, about ten kilometers from T'Pru Mountain in the western part of the Maw Kyat K Mot salt lick area. (19/11/2009)
- The Saw Blaw Htoo team saw evidence believed to represent five elephants, because of the sleeping sites, foot print and feces. The evidence indicates that all the elephants were adult, including one bull elephant estimated at 9.4 feet. The observation occurred on November 20, 2009 at 8:00 AM.

Table 1 Direct Observations of Elephants

Date	Team	Number recorded	Description	Location
24/4/2008 9:00 AM	Kaw k' Paw moo	2	One mother and one small Calf	Big Plaw Poe
11/3/2009 1:30 PM	Saw August Noon	2	One mother and one big calf	Yaw Prute / See Law Plaw
13/5/2010 10:30 AM	Kaw k' Paw moo	7	Six females and one non-tusker male	Plaw Po area
Total		**11**		

Table 2 Indirect Observations of Elephants

Date	Team	Number recorded	Description	Location
23/4/2008 10:00 AM	Saw Wee	2	One mother and one calf	Yaw Prute
23/4/2008 3:30 PM	Saw Blaw Htoo	1	One single bull	Western Plaw Poe
28/4/2008 3:00 PM	Saw Blaw Htoo	1	Young adult tusker bull	Kwa Klern

Date	Team	Number recorded	Description	Location
12/3/2009 9:20 AM	Saw Klu	2	Two adults	Yaw Prute
24/3/2009 11:49 AM	Saw Klu	3	Believed to be one male, one female and one calf	Yaw Prute Kee
19/11/2009 5:00 PM	Saw Blaw Htoo	1	Believed to be one bull	Ta Pru mountain
21/11/2009 8:00 AM	Saw Blaw Htoo	5	One bull and four females	Maw Kya Ker Mot
Total		**14**		

Table 3 Estimates of Total Elephant Population

Location of elephant found/evidence	Estimates	
	Minimum	Maximum
Plaw Poe	4	5
Yaw Prute	4	6
Maw Kya K' Mot	5	5
T'Pru Mountain	1	1
Kwa Klern	1	1
Total	**15**	**18**

C. Wild Elephant Population and Density Estimates

Based on these observations, we conclude that we have recorded 11 wild elephants with visual observations, and another 14 based on the physical evidence of presence of sleeping sites, feces, and footprints. We could not tell the exact number of the wild elephant population in this forest but we can roughly determine that the population in this forest is between 15 -18 individuals.

The elephant population is not very large so the surveyors are challenged to estimate the population only by seeing them and recording the evidence. We can calculate the density of elephants by dividing the total number of elephants recorded by the land total area surveyed. We estimate that there are 15 elephants within a total area of 156 km^2. Therefore the density of elephants in the area is about 0.1 per

km^2. However, the actual area occupied by elephants in Megatha Forest is highly uncertain, so this is only a rough estimate.

According to interviews with local people, the elephant population in Dooplaya District could be as high as 100 individuals in the three wildlife sanctuaries. However, there have been no field studies to confirm this estimate.

i. Comparison of Megatha Forest Elephant Density with Other Areas

Other research examining elephant densities allow comparison to the results found for Megatha Forest. For example, Parker et al. (2009) found that a "high" elephant density of 3 individuals/km^2 had a significant impact on grasslands in South Africa.

Alfred et al. (2010) calculated elephant densities for 12 forest reserves in Sabah, Borneo by counting dung piles along half-kilometer transects, and estimating their decay rates. They found densities ranging from 0.12 – 3.69 individuals/km^2, but most measurements were greater than 1.0 per km^2. They also found that "[e]lephant density was highest in ranges where habitat has been removed and elephants are concentrated in remaining forest areas." They do not, however, account for hunting, capture, or poaching, although they briefly mention the impact of human conflicts on elephant populations.

Since most of these results are higher than 1 elephant/km^2 it is likely that the elephant density in Megatha Forest, 0.1/km^2, is quite low and needs to be bolstered by increased conservation efforts.

VI.
Notes on Observations of Wild Elephants in Megatha Forest

A. Different Kinds of Elephants

Elephants may be different from one herd to another, but similarities can be identified among groups of wild Asian elephants. Local people within Karen State have identified two different subgroups of elephant, each with their own different behavior and body shape. The herds are identified as long-tailed or short-tailed. Long-tailed elephants have a broom of hair at the end of their tail, while short-tailed elephants lack the broom.

Within these groups, there can be tusker and non-tusker bull elephants. Today the majority of wild bull elephants in Karen State are non-tusker elephants. The only tusker elephants remaining in the forest are young and their tusks are very small, so are not appropriate for ivory poaching. Even though many non-tusker bull elephants still exist in the forest, the tusker bull elephants seem to be absent in most of Karen State.

i. The Short-tailed Elephants

The short-tailed elephant groups are rarely tame because they are shy and display aggressive behavior. One Karen named Saw Do who tried to tame elephants

claimed that a captured short-tailed elephant is likely to commit suicide by fasting or stepping on his or her trunk. These elephants are highly dangerous and might attack when approached by humans.

ii. The Long-tailed Elephants

The majority of elephants in Karen State are long tailed elephants. However, surveys of this elephant are limited because of the ongoing civil war in the area. This kind of elephant is easy to tame and it will likely attempt to flee when a person approaches it. The herd is mostly dominated by females, while bull males are normally isolated from the herd except during the breeding times.

iii. Tusker and Non-tusker Elephants and Behavior During Musthe

The sizes of male elephants are generally similar; the only difference is the presence or absence of tusks. The majority of male elephants in Megatha forest are non-tusker specimens. The behavior of elephants from different groups is similar, especially during musthe. Many people believe the mature male elephant goes through musthe annually but wild elephant poachers will say said that it depends on the energy of the elephants. Musthe occurs twice per year sometimes because if they can find sufficient food sources, elephants will gain full energy for musthe. When musthe commences, the bull elephant acts more aggressively than usual. Swollen glands and red eyes are signs that an elephant will come to musthe within another few days. The herd will try to abandon that specific bull and leave it alone.

B. The Difficulties in Approaching a Wild Elephant

It is not easy to approach wild elephants in the forest, because they are shy and sometimes aggressive. The sight of the elephant is not very good but the other senses are very good. Elephants normally eat woody vines, bamboo, rattan and barks. Elephant shyness might vary from one group to one another.

This elephant survey showed that most elephants in the risk areas (salt lick, water holes) check their surroundings using their senses from time to time. One observed female elephant raised her trunk into the air to sense any kind of close danger. If there are at least two elephants eating in the same area you might hear only one elephant pulling up bamboo, rattans, or woody vines. Generally, two or three elephants will pull up edible vegetation at the same time and chew the food for about 30-60 seconds, quietly but always in an alert position. The sound of the elephant's ear as it pushes away insects or provides a cooling breeze can be heard more than one hundred meters away. The female elephant always puts her calf in front of her when escaping from danger.

Salt Lick Used by Elephants in Megatha Forest

C. Changes in Behavior Due to Humans

The impacts of human society have changed elephant's natural behaviors. Elephants never follow their previous routes used decades ago because they fear stepping on landmines. Before humans developed their noisy society, elephants used to be noisy and live together, but now they prefer isolation. When you try to drive them away they will make a wall with their bodies and behave as though they will attack you.

In addition, elephants have learned to have less fear of humans and fire than before. Many local residents say that elephants never raided farms in the last decade, but now elephants try to raid farms in some areas. Many people say that elephants do not fear human presence anymore, and some say tame elephants that do not fear humans might have been released into the forest. However, other villagers say that wild elephants raid farms because they face danger from humans in the deep forest, so they run to escape from poaching and capturing. Some villagers also say the elephants that raid farms might come from Thailand, because they are not familiar with those kinds of elephant even though they have lived in the area for 50 years.

VII.
Threats to Elephants in Megatha Forest

A. Historic Threats

i. Capture of Wild Elephants

Historically wild elephant capture occurred frequently in the Megatha Forest before the Wildlife Sanctuary was declared. According to Saw Chen Poe, capture was done by two groups of people, from Yawgadaw and T' Pru villages near Megatha Forest. The Yawgadaw group captured more than 8 elephants over about 2 years. The T' Pru group captured about 5 wild elephants at a different time over 3 years. Both groups used pitfalls to capture wild elephants, but

Elephant Pitfall Trap

this method is very dangerous for all kinds of large animals.

The mortality rate for this method of capturing elephants was about 80%. The Yawgadaw group captured a total of 8 Elephants and only one survived, while the T' Pru group saw only one elephant survive out of 5 captured. The rest of the elephants died during capture, training camp or after the training. For example, one wild elephant died by falling into the pitfall because the pitfall used to capture the Elephant was not properly filled in after the capture activities. Today there are still many old pitfalls in this forest that continue to endanger wildlife.

ii. Poaching in the Past

According to local people like Saw Chen Poe, in the last decade, poachers killed more than a dozen elephants in this forest. The dead were mostly males with tusks (tusker elephants) but there were also some non-tuskers and females. Some elephants were injured and died in the forest after being shot by poachers. For example there was a giant bull non-tusker elephant which normally raided farms, destroying houses and farming huts. Many villagers tried to kill him, but finally the elephant disappeared and nobody saw it again. It may have been shot and later died from its injuries.

iii. Past Effects of War

Civil war has caused severe damage to the wild elephant population in this forest. Many wild elephants and other species were killed or maimed by landmines during the war involving Burma Army Light Infantry Batallion 77 and the Karen National Liberation Army, who fought in this wildlife sanctuary from 1997-99. One hunter estimated there were more than 20 elephants killed by landmines during this three year period of war. The actual number of casualties is not known because no one dared to investigate this incident.

Tiger Killed by Landmine

SPDC Landmine disabled in Karen State, photo by Karen Human Rights Group, khrg.org.

Before the outbreak of war in 1996 local people observed up to one hundred wild elephants in Megatha Forest, but now only a few remain in this area. The loss of elephants is mainly due to landmines planted by the Burma Army and KNLA to defend their territories. There have been similar incidents in other ethnic states that suffer from war with the Burma Army.

iv. Indirect Threats in the Past

Logging in the Megatha forest by Chinese-Thai logger Saya Hum cut down many big trees in this forest around 1989, before the war broke out between the Burma Army and Karen Army. After the war, piles of logs were left behind in the forest, and a forest fire consumed most of these wasting logs. Even today in the Megatha forest, you will see an old logging road and giant decomposed logs left behind. The giant logs are mainly from Dipterocarp tree species. The loss of mature Dipterocarp forests leaves elephants reliant on less productive habitat.

Past Logging in Megatha Forest

Furthermore, forest fire occurs almost every year, and the main cause of fire is poachers and travelers. The annual forest fires affect some of the forest, and can increase threats related to wild elephant habitat loss and food destruction. Moreover many SPDC officials blame civilians for forest destruction and poaching. They say that local people are forced to become IDPs due to war. Without farms,

many people must hunt for their own food, and sell the meat to buy other food for daily survival, because their food and property has been destroyed by the war. Related impacts from heavy weapons and machines in the surrounding area are another factor that could affect the behavior of observed species, and this specific information will be discussed further in the results section.

B. Current Threats to Megatha Elephants

i. Wild Elephant Capture

Wild elephant capture in this forest has been happening continually for many decades. This Megatha Forest wild elephant survey started in May 2008, but illegal wild elephant capture seems to happen continuously. One day the KESAN team found a group of people who were about to start wild elephant capture activities. The group was using rope to try to capture a wild elephant, which provides more stealth than using a pitfall. However, the KESAN survey team encountered the poachers before they could conduct any activities. The team escorted them to the district forestry office. The forest officers did not take any action against them but warned them not to try elephant capture again, and if the forest officers found them poaching elephants in Megatha Forest again they would be punished based on KNU law.

Similarly, in Kwen Ko (Malawyit) Wildlife Sanctuary, a forest ranger mentioned that illegal elephant capture was being done by a group who used intoxication (tranquillizers) to overcome the elephant and the mortality rate was about 90%. One of the interviewees, who wanted to remain anonymous, said that at least 20 wild elephants were captured in this forest by people who came from a large city in Myanmar, but only one elephant survived, and he was not sure whether the animal is still alive today.

ii. Poaching

The poaching in this area is done by many different parties, including local villagers, migrant hunters, local militia and Burmese military units. Most poachers are from different areas and different ethnic backgrounds and tend to be unaware of wildlife laws, so it is difficult to enforce the existing local laws. The pro-junta militia groups are also active in the area but they have no known laws on the wildlife protection. These people may not be following the wildlife protection laws and regulations that were adopted by either the SPDC or the KNU.

During the surveys, the team saw many poachers who were always from pro-junta militia groups. They used war weapons to hunt wild animals in this forest. The

team simply persuaded them not to continue poaching. SPDC soldiers have been poaching in this area as well. In 2009 a Burma Army Battalion stationed at Htee Ler Baw shot and killed two wild gaur, as well as injuring others, witnessed by villagers. This poaching was conducted by powerful military people, so to them it is only a little thing that the KNU forest officials could do nothing about. Furthermore, another team saw dead gaur during the survey, but no local people could identify who killed it. The survey team believes it to be either the Burma Army or Pro-Junta militia group. There are likely to be many more such occurrences. The signboard for the Megatha Wildlife Sanctuary, written in Karen and Burmese languages, announced the establishment of the wildlife sanctuary, so there is no good reason for the Burma Army not to know that this forest is a wildlife sanctuary. Also, the KNU forest officers claimed that they seized more than 30 hunting guns from villagers and mining laborers in mining areas close to Megatha forest.

Leopard and Burmese Python, Poached in Megatha Forest

From the interviews, the survey team learned that in Karen State, it is certain that elephant poaching for ivory, meat, and 'medicinal' parts occurred frequently in the past, especially in areas close to the Thai-Burma border. However details of these events are not discoverable because such secrets could lead to significant punishment under poaching laws enforced by KNU or the SPDC.

The survey team interviewed one KNU forestry official in Tenessarim Division, who mentioned that there must have been heavy poaching for ivory in the area for many decades in the past because there are no recent observations of big bull tusker elephants in the area. There are still many non-tusker bull elephants, but large bull tusker elephants are not found. Today, there are many little young tusker elephants, but without proper care the future of these adolescent elephants is still at risk.

Illegal hunters mostly sell their ivory to Thailand. These kinds of poachers come both from Burma and Thailand, and it is becoming more difficult for the KNU to enforce the existing laws because it is more difficult to identify and locate culprits. Illegal elephant capture occurs in areas of Karen State where the wild elephant population still exists, such as the Kwen Ko (Malawyit) Wildlife Sanctuary, Wow Raw Kee Wildlife Sanctuary, and Megatha Wildlife Sanctuary. Similar poaching may occur in other areas in Karen State.

iii. Elephant Smuggling to Thailand

The KESAN team interviewed a local person named Thera Po in Thailand's Kanchanaburi Province who had evidence of the elephant trade into Thailand. He said that within a period of 8 years he saw a total of 13 elephant calves from Burma smuggled into Thailand, usually going to Sukhothai, Lampang, Ayutthaya or Chiang Mai. There are probably more events like this, because he did not observe the smuggling closely, he only encountered it by accident. Moreover, there are many routes to smuggle elephants into Thailand, so the number annually will be much higher than the official estimate. He also mentioned that the elephant capture using the pit fall method has approximately an 80% mortality rate, because the trapped wild elephant often dies of injury or hunger before being discovered. He added that using ropes to capture an elephants is easier and more successful, but he said that the risk of mortality rate is still about 60%. This is because when the poachers captured a wild elephant illegally they had very little knowledge about how to look after the elephant in training camp properly, resulting in a high mortality rate.

iv. Current Indirect Threats

Logging and mining activities, if allowed to happen around Megatha Forest wild sanctuary, are a significant threat to wild elephant habitat. Any commercial activity in a protected area encourages the workers to sneak into the sanctuary and steal down logs or fell standing trees illegally. The forest department only allows the loggers to remove the dead trees, but when KESAN's Megatha survey team went into the wild life sanctuary they discovered that many trees had been felled or girdled and left for future collection. This illegal logging may be done by many small companies which hire local people. In addition, about 200 acres of the wildlife sanctuary have been destroyed by antimony mining at the present time. This forest encroachment is considered illegal by the local forestry department but direct permission came from the SPDC, so there is nothing the KNU can do about it. The mining has been taking place since the British colonial period with no indication of ending. Both mining and logging activities have been permitted by the SPDC so it is very difficult for the KNU Forest officers to stop these activities without further alienating the already hostile and violent Burmese Army.

Recently Girdled Tree in Megatha Forest

Antimony Mine on the Edge of Megatha Forest

VIII.
Biodiversity in Megatha Forest

A. Animal Diversity

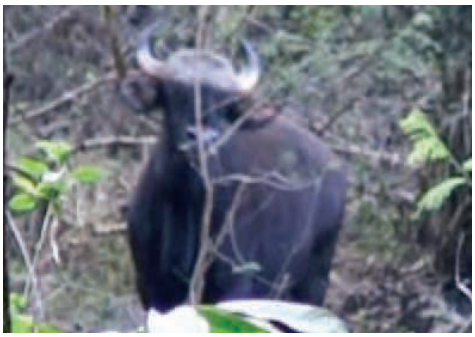
The Megatha area's forests and streams provide ample habitat for a wide variety of animal species, and over millions of years, several endemic species may have evolved. Appendix 3 indicates the breadth of animal diversity. From this Appendix, it can be seen that several types of species, such as deer, birds and reptiles, have a multiplicity of niches available. Unfortunately, encroachment by humans has forced several animal species toward endangerment and extinction.

i. Mammals

Appendix 3 provides a list of the mammals encountered during the survey or reported to occur in the survey area by local people. We interviewed four villagers from four different villages. A total of 27 mammal species were recorded during this survey.

Six mammal species listed as Endangered by IUCN are confirmed for the site: elephant, White-handed gibbon, Phayre's langur, tiger, Sunda pangolin, and Malayan Asian tapir. One further Endangered species, dhole, is recorded from interviews.

Seven IUCN Vulnerable mammal species were confirmed: Stump-tailed macaque, Slow loris, Himalayan black bear, sambar, Southern serow, Clouded leopard, and gaur. Three more Vulnerable mammals were recorded through interviews, the Malayan sun bear, binturong and Slow loris. Two Near-threatened mammals were seen or recorded in interviews, the Black Giant squirrel and the leopard.

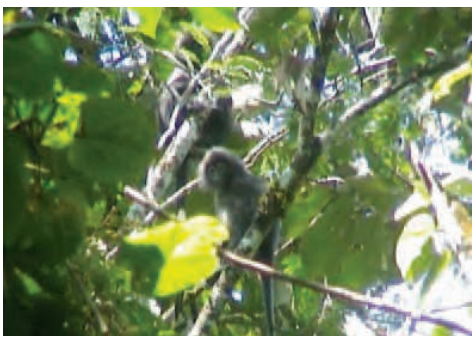


Gaur

Black Giant Squirrel

Fea's Muntjac

White Handed Gibbon,



Phayre's Langur

Sunda Pangolin

ii. Birds

There were many birds encountered during the research, including direct sighting during field surveys and mentioned in interviews. There were about 22 bird species sighted, including the Great hornbill, Brown hornbill, and Asian green broadbill, all listed by the IUCN as Near Threatened. The remaining identified bird species are considered to be of least concern. There are many other bird species noted from the interviews, but because there has been no proper description many of the species could not be properly identified and therefore they are not listed in the table.

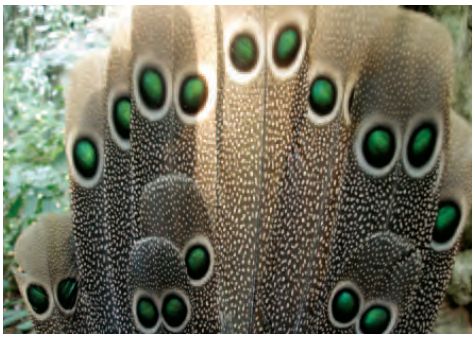
Green Broadbill Nest

Banded Kingfisher

Immature Oriental Pied Hornbill

Brown Hornbill

Eastern Grass Owl



Grey Peacock Pheasant Tailfeathers

iii. Reptiles

The Elongated tortoise, listed as endangered by IUCN, was sighted during the survey,. One other giant tortoise was also directly observed, the Southeast Asian soft-shell tortoise, listed as Vulnerable by IUCN. Two species of turtle were observed during field surveys: The Malayan soft-shelled turtle, considered to be of least concern, and Black terrapin, listed as Vulnerable. Clouded and Water Monitor Lizards and the Blue-crested lizard are all common throughout the area.

Clouded Monitor Lizard

Blue Crested Lizard

Malayan Soft-shelled Turtle

Black Terrapin

iv. Amphibians

There were many frog species encountered during the surveys but only five of them could be identified. One that could be specified is Blyth's river frog, listed by the IUCN as Near Threatened. Other observed species include Large-headed frog, Poisonous rock frog, *Leptobrachium chapaense and Amolops marmoratus*, all listed as Least Concern by IUCN.

Blyth's River Frog

B. Forest types in Megatha Fores

In the Megatha Forest, the canopy generally has not less than 4 layers, and emergent trees can measure up to 40 meters in height. Part of the forest is mixed-deciduous, while other areas are comprised of semi-evergreen forest, especially in the higher elevations. Floral diversity ranges from giant trees to flowers, rattans, bamboo, musa, woody vines and hundreds of others. The forest also includes small areas of grassland, steep gorges and hanging cliffs. The many ecological niches vary from forest, marshes, caves, to wetlands and streams that host a wide spectrum of diverse species. The largest emergent trees include Dipterocarps, Tung trees, *Xylia xylocarpa, Pterocarpus macrocarpus,* and *Ficus sp.* The forest maintains its richness by diversifying into three common types, known as the Tropical semi-evergreen forest, mixed-deciduous forest and bamboo dominant forest.

1. Tropical Semi-evergreen Forest

This is the most productive common forest type in the area. This kind of forest is very fertile and can maintain high levels of moisture. These semi-evergreen forests are mainly seen at higher elevation head streams and are also found in so-called gallery forests, in riparian areas along streambeds and rivers.

This forest type is home to giant, emergent trees like *Ficus sp.* and Dipterocarpus costatus, which can reach heights of 40 meters and provide habitat for honey bees. The species composition, including many palms and rattans, is extremely rich, especially in the moister areas. According to Devi and Yadava (2006), who studied the tropical semi-evergreen forest of Manipur, northeast India, "[a] total of 123 species belonging to 48 families were recorded.... In the present study the diversity index of shrubs and herbs were found to be higher than the tree species."

The Megatha Forest includes more layers and the most diversity of plants of the three forest types. The trees and vegetation mostly do not shed leaves at the same time so the canopy maintains its color and looks green year round. Besides giant trees there are a variety of plant species including weeds, grass, shrub, musa, and woody vines.

2. Mixed-deciduous Forest

The mixed-deciduous forest occurs more often at lower elevations. Most occurrences are at the edge or close to the boundary between protected and cultivated areas. In the Megatha Forest, a mixed-deciduous character similar to Thung Yai Naresuan forest of Thailand was observed. The dominant canopy trees in these areas are *Xylia xylocarpa, Albizia lebbeck, Pterocarpus macrocarpus,*

Bambax anceps and *Lagerstroemia venusta*. The emergent trees are *Ficus* ssp. and *Dipterocarpus*. Most plants shed leaves during the dry winter and summer and remain green in the rainy season.

3. Bamboo-dominated Forest

The bamboo-dominated forest is dependent on species adaptation. Giant bamboo species are not seen frequently in the bamboo dominant forest at lower elevation. Giant bamboo species are occasionally present in the moist and thick forest areas which are predominately close to streams. Smaller bamboo species grow in drier locations and the forest behaves like the mixed-deciduous forest type. This kind of forest lacks diversity of ground level plants, with the ground layer dominated mostly by ginger species which dry up in winter and summer. The dominant bamboo species in the lower elevation bamboo forest is *Gigantochloa atter* and the dominant bamboo species at higher elevations are *Dendrocalamus* spp and *Bambusa tulda* (Karen Language: Blaw Bamboo). At higher elevations the bamboo species are shorter and smaller.

C. Biodiversity Impacts of Civil War and the SPDC

Civil war causes biodiversity degradation in many ways and one of them is to force villagers into illegal poaching for quick cash. Some poachers told the survey team that they engaged in poaching only when their villages, properties and domestic animals were destroyed by the Burma Army, to replace their needs for daily survival. When the villagers face food loss and property destruction through war they kill wild animals and trade them into Thailand or exchange them for food. Therefore, war is not only a problem for humans, but also causes animals to suffer along with people. Therefore peace in Burma is the most critical need for both the people of Burma and its biodiversity.

Since KESAN's Megatha Forest field surveys began in 2008, there has been no war in this forest, so the wild animal and elephant population has been increasing noticeably within a few years. There was no evidence of elephant presence in this forest from 1997 to 2005 due to the ongoing war. However, these animals are now somehow coming back to their original range. In the past, civil war occurred in most of the wildlife sanctuaries in Karen State, and this resulted in frequent land mine placement in the forest. Moreover, heavy weapons use by all parties in Megatha Forest causes many more problems for wild animals.

The incredible sound intensity of war weapons scares wild animals and pushes them away from their original inhabited areas. Moreover, land mines are a problem for all big animals, not only wild elephants but also tigers, gaurs, deer and bears,

as they sometimes get killed by land mines. In September 2009, a tiger was killed by a land mine in Malawyit Wildlife Sanctuary because war still occurs in that area. An interview with one Karen soldier said that surviving elephants are still often injured by land mines and some die in Malawyit Wildlife Sanctuary. That conflict continues today.

Political conflict between the KNU and SPDC means there is also conflict in recognition of laws and enforcement. The KNU established 11 wildlife sanctuaries within its territories that were not recognized by the SPDC government. The establishment of Kaser Doo Wildlife sanctuary by KNU was not acknowledged by the SPDC Government, and in fact SPDC claimed it as evidence of a separatist movement. On the other hand, the SPDC established a wildlife sanctuary called the 'Myinmoletkat Nature Reserve' which one might say was a lawful act, but the KNU refused to recognize the proclamation. Both occupy the same area but the sanctuaries were proposed by two different groups with different names.

In reality logging and mining activities have been taking place in 'Myinmoletkat Nature Reserve' area as authorized by the Burma Army. Moreover, the government authorized a gas pipeline to go through Myinmoletkat Nature Reserve. People are confused that the government allowed logging, mining and gas pipelines in wildlife sanctuaries and other protected areas.

This unregulated industrial extraction is not only a problem in Karen State and Tennaserim Division, but also all over Burma. In Kachin State, the Burma Army allows all kinds of environmentally destructive activities in its protected forests. Logging, mining, rubber plantations and hydro-power dams frequently occur legally in protected forests. For example, the government itself established the Hukaung Valley Tiger Reserve in Kachin State and claimed it as the biggest tiger reserve in the world. Soon after establishment, the government started granting logging, agricultural and mining concessions in the protected forest. As a result of these activities there is less trust toward the government. According to Zao Noam (2007),

"Re-zoning for conservation provides an apparently legitimate reason for the state to relocate populations, to control and patrol previously inaccessible areas of contested territory, and to claim/state military ownership of natural resources.

In this way, abuses against ethnic people may continue under the guise of conservation enforcement. The creation of the Myinmoletkat Biosphere Reserve in Karen State in the 1990s provides one example of this phenomenon. Reserve creation was facilitated by WCS and the Smithsonian Institute, and pushed through by a Thai/Burmese oil consortium as appeasement to the international community for the disastrous Yadana/Yetagon gas pipelines that were being developed, and which would run through the proposed reserve to Thailand. The creation of the reserve reportedly led to violent oppression of Karen communities living in the area.

Within a few months of signing the Memorandum of Understanding to establish the reserve, the Burmese army launched one of its biggest and most successful military offensives to secure territory away from the Karen National Union (KNU) for inclusion in the proposed reserve. In addition, the new reserve overlapped and disrupted a Community Conserved Area already established by the Karen, known as Kaser Doo."

The SPDC should respect the wildlife sanctuaries established by the KNU because both should have mutual respect for conservation, and SPDC could provide a good example by agreeing with KNU conservation rules. If SPDC continues to ignore the KNU's rules, the villagers will copy their bad example.

IX.
Discussion

This study presents findings to increase understanding of the wild elephant situation in the Megatha Forest, and more generally, the Karen State. The survey team has attempted to be as comprehensive as possible, and it is hoped that these efforts have also produced some vigor in the results. However, because this is a preliminary study, and the researchers have limited resources and knowledge, there are some gaps in the results of the study. These gaps suggest opportunities for further research in the future. This section first discusses the strengths and weaknesses of this study, with proposals for further research. It then relates some of the potential impacts to biodiversity from poaching, wildlife trade, deforestation, militarization and mining. Some basic findings by the research team are addressed, and finally, recommendations based on these findings are presented.

A. Strengths of this Research

The KESAN Research team initially took part in spent seven field trips in total at the Megatha forest in three years, living with local people while they observed and cataloged the area's wild elephants and biodiversity. They returned several times for shorter periods. This time and effort provided depth to the study, while proving to the local people that the research team was committed to producing a report

that would provide a significant contribution to both the knowledge of the area and efforts to conserve the biodiversity. Perhaps the most significant strength of this study is that the research team has knowledge and experience from university training, as well as local knowledge of species identification methods. The team leader is a Karen man who grew up in the Karen State, spending his childhood in the forest with his elders. He also received formal education at Mahidol University in Bangkok, where he learned modern scientific species identification. In addition, as a native Karen speaker, he was able to speak freely with the local people, and convert the locals' indigenous knowledge to a western framework. The other team members were also Karen, and so able to communicate freely with local people. Furthermore, the local people were happy to share their significant indigenous knowledge about species and were enthusiastic about the study.

For some species, local knowledge and university training were insufficient to provide proper identification, so the team tried to seek help from experts. We used many species guide books to identify the species, including John Parr's Guide to the Large Mammals of Thailand (2003), Mammals of Myanmar, Reptiles of Southeast Asia, and the Herpetofauna of Myanmar web pages (California Academy of Sciences, 2010). We also used the IUCN Redlist Search Page (www.iucnredlist.org) and CITES Appendices (http://www.cites.org/eng/app/appendices.shtml) to identify the conservation status of species. We sought help from many experts to proofread our report and received many useful comments that we hope will help our readers to understand the findings.

B. Challenges Faced by the Research Team

The most significant limits to this study were the lack of resources to undertake a complete survey of species. We also lacked opportunities to use large academic libraries. The team has no access to a university library to seek references, and mostly depends on internet searches, especially Google. However, in defense of this study, it must be noted that KESAN is a small community based organization on the Thai-Burma border and Megatha Forest is a remote area with significant barriers to biological study, not least of which is the ongoing conflict in eastern Burma. As a result of these limits, the unexplored area remains large, both in Megatha and Karen State. Finally, while Megatha biodiversity was compared to Thailand's Thaung Yai Naresuan Wildlife Sanctuary, which is dominated by similar forest types, there are some significant differences, such as development impacts that should be explored

C. Opportunities and Suggestions for Future Research

This study is important because it is the first close look at the biodiversity of Karen state and perhaps the first in-depth survey of wild elephant populations in the area. However, given KESAN's time and resource constraints, it is incomplete in several ways. Suggestions for follow-up research are as follows.

Academics and NGOs with substantial resources can and should undertake a more intensive study of aquatic, amphibian, reptile, mammal and plant biodiversity before any of these species are lost to habitat destruction or illegal trade. Moreover, wild elephants in Karen State, especially the young small tusker elephants, are now at great risk from poaching. To protect these elephant from harm the international community should join hands with local people in the area to preserve the existing populations and see them grow. Future research could include the following.

1. A Status Review of the elephant populations in the whole of Karen State.

2. Frogs and other amphibians, insects and reptiles all remain elusive, and surveys during all seasons would be helpful in filling the gaps.

3. The ecological function and value of many trees has not been studied.

4. Many plants are used by locals for medicine, and should be studied in the laboratory for their medicinal value.

5. Efforts must be made to reduce the impact of hunting and poaching on endangered wildlife. This pressure comes mostly from outside of Megatha Forest. Increased enforcement, both locally and cross-border, is needed to address this problem. This is especially crucial because the pristine state of Megatha Forest and the whole of Karen State are unique in Southeast Asia.

Although Megatha Forest is not known by many scientists, it still maintains good species diversity. The local people use all their effort and cultural knowledge that has been passed down by their ancestors to manage and look after this forest. The place poses a risk to outsiders due to the militarization and civil war. Although outside researchers cannot easily explore the area personally, they can through indirect observation aided by local people, and thus help the ecosystem in the area to remain intact. Also, the KNU's Forest Department staff is always willing to cooperate with anyone who tries to preserve this forest. They welcome any relevant capacity building program for staff to manage the forest more effectively, and they are looking for training that could educate them to manage their wildlife sanctuaries successfully. Contact KESAN for more information.

X.
Conservation Recommendations for Megatha Forest

There are several important efforts that should be undertaken to protect the biodiversity of Megatha Forest.

Do not seek war. Violent human conflict harms biodiversity in many ways and the impacts are felt for a long time. While the conflict is occurring, badly aimed armaments can kill wildlife, and the use of heavy arms and movements of military units can harass animals and force them out of their natural habitat. After conflict, remaining landmines and other ordnance kill and maim wildlife for decades afterwards.

Do not allow logging and mining. Industrial extraction of wood and minerals directly destroys the habitat of flora and fauna, reducing rich jungles to denuded wastelands. Further, slash left by logging increases fire danger, and runoff from mining pollutes streams and poisons fish, wildlife and domestic water use.

Do not allow rubber plantations that will result in forest encroachment. In the past decade there have been significant efforts to boost production of rubber and other agricultural goods by the SPDC to benefit the families and friends of the junta's generals. These efforts include encroachment into protected lands, including wildlife preserves and national parks, as well as areas established by local people. These plantations undermine local and national conservation efforts and destroy the biodiversity that local people depend upon for their livelihoods.

Recent Logging near Megatha Forest

Strict Enforcement of Poaching Laws. Poaching of wildlife for export to neighboring countries remains a huge problem in Burma, especially on the border with Thailand where smuggling is easy. Local KNU forest officials must continue their efforts to stop poaching, and the national governments of Burma and Thailand need to take their responsibility to prevent poaching and wildlife trafficking more seriously. Only then will the tide of biodiversity loss be slowed, halted, and eventually reversed.

XI.
The KESAN Survey Team's Megatha Forest Conservation Campaign

In addition to gathering all the research results, the survey team conducted other activities with the villagers focused on saving the Megatha Forest. The team organized meetings for villagers and local leaders for a participatory group discussion, with guest speakers sharing information about effective wildlife management by local people. The team also shared the Megatha Forest survey video and photos of wildlife in the forest. Wildlife campaign materials including leaflets, tee-shirts and Wildlife Video CDs were distributed to villagers before and after each meeting. There were a total of 228 people attending these meetings, including 75 women and 153 men from 12 different villages around Megatha Forest. The meeting resulted in the formation of local Megatha Forest caretakers' committees. These committees are responsible for raising awareness among the villagers around Megatha Forest about threats to wildlife and their habitat, as well as documenting the threats to Megatha Forest and its wildlife in the future.

KESAN's Campaign Team in Action

XII.
Conclusion

This report details the findings from the first wild elephant survey in the Megatha Forest of Southeastern Karen State of Burma, which was conducted jointly by a KESAN Team and local villagers. The area is located immediately west of the Thai Western Forest Complex forest, specifically Thung Yai Naresuan Wildlife Sanctuary. The forest is predominantly tropical semi-evergreen with some mix-deciduous forest, and lies within the known range of the wild elephants.

The study estimates the density of wild elephant populations from seven field trips and interviews with local forest officials and villagers. Three of the field studies took place in the southern part of the forest, and three other trips studied the middle part of the forest. The forests between the survey areas are contiguous. The estimated average density is the total number of wild elephants found divided by the total area of land in km^2. This estimated density is 0.1 elephants per km^2 using the same measurement units that are used to estimate relative population growth.

The forest habitats studied by KESAN are good for wild elephants and other wildlife, except in some places around the edges of the forest where they have been degraded by logging and antimony mining. There is no clear future threat apart from civil war, so if there is peace in the area, wildlife populations will rise in the future. Interviews with local people point out that the elephant population in Dooplaya District of Karen State may be up to one hundred individuals, with most of this occupying the Malawyit Wildlife Sanctuary.

In addition, the survey team recorded 27 species of mammal, including 17 confirmed records of species listed as Endangered, Vulnerable, or Near Threatened on IUCN's Redlist and/or the CITES Appendices, and 23 species of bird including three Near Threatened species. Reptiles and amphibians were also recorded.

Based on interviews, local people do not hunt wild elephants today, though they do hunt other wildlife. Although local people have a tradition of hunting, it is not believed to be a major threat to wildlife as they do not hunt for commercial trade. However, outsiders come to Karen State Wildlife Sanctuaries to hunt endangered species. They poach and capture wild elephants as well as other high-value species, including some bird species such as hornbills. Though hunting by outsiders is difficult to confirm, it must be considered a real threat until proven otherwise.

The wild elephant population is believed to be self-sustaining in this area, and some important mammal and bird species are also found there. To conserve the current wild elephant population and other globally and nationally important species, hunting by local and outsiders should be strictly regulated. Also, awareness raising and high-profile wildlife campaigns using signboards, posters and booklets in local languages are important. Since this area is one of the last remaining semi evergreen forests that is not degraded, and includes watersheds of fourteen important streams, efforts should be made to curb any activities that would damage either the forest's extent or quality.

Karen State forests close to the Thai border area are more degraded because of logging that took place in the area decades ago. However, deeper in Karen State, especially in the northern and southern parts there are still many pristine indigenous forests that have never been cut down or logged. Most of these intact forests are listed as KNU wildlife sanctuaries but there are also many community conserved forests that still remain intact and undisturbed. The KNU established 11 wildlife sanctuaries, but the SPDC does not acknowledge these protected areas, and may consider the designation to be an unlawful act. Despite political conflict, some of the wildlife sanctuaries are well managed and the forests are still untouched by humans.

Many might not be impressed when hearing about the KNU's establishment of wildlife sanctuaries. However in those forests there are many kinds of big animals which are listed in the IUCN Red list as Critically Endangered, Endangered, Vulnerable, or Near Threatened. It would be a mistake to underestimate the effectiveness of forest management under KNU rule, because they still have the largest assortment of Endangered Species in Southeast Asia, while most other countries in the region (including Thailand) have destroyed their forests and extirpated many species. Moreover, there will be many endemic species in this forest but the absence of active biodiversity scientists in the region makes the future of these species dim.

Finally, this first survey of Megatha Forest is unique and valuable because it combines Western technical identification methods with local peoples' long term knowledge of their environment. The results indicate that the Megatha Forest remains relatively intact and highly diverse, but the area faces severe imminent threats from militarization and poaching. These threats will impact not only biodiversity, but also the people who depend on a healthy, functioning ecosystem for their livelihoods.

Because the Karen are included in that group, KESAN continues to study the biodiversity of Karen State, and maintains a significant cache of additional data and pictures. Further study is encouraged, and KESAN will do all it can to assist outside researchers to move beyond this study. Of course, the ongoing conflict creates difficulties, but KESAN is willing and able to provide assistance to researchers, such as collaboration with local people who understand the risks and avoid them on a daily basis. Alternatively, KESAN can assist by providing training, capacity building and field work to local people who can then undertake the necessary work and share the results. Please contact KESAN if you are interested in furthering the understanding of the Megatha Forest and Karen State's forest as a whole.

Karen State still has many intact forest areas. The existing forest rules practiced by the KNU Forest Department may be one of the factors that make Karen State rich with virgin forests and biodiversity. Also, local leaders and Karen villagers are the main groups who have significant knowledge about sustainable forest management. The local villagers in many areas of at Karen State have the capacity and power to persuade Karen leaders to follow their ancestor's rules on nature.

The Karen people have their own laws and regulations concerning nature (i.e. Social Taboos) that were established by their patriarchs from generation to generation. These kinds of rules have been practiced both in Karen communities and by the KNU leadership. These ecologically friendly rules followed by all Karen people. The local Karen research team cannot wait until democracy comes to Burma, because the team believes that the arrival of democracy might be too late to save the remaining wildlife in many Karen Forests. All concerned readers are warmly welcome to help the Karen forest to remain free from harm.

References

Alfred, R. A.H. Ahmad, J. Payne, C. William and L. Ambu. 2010. Density and Population Estimation of the Bornean Elephants (Elephas maximus borneensis) in Sabah. OnLine Journal of Biological Sciences 10 (2): 92-102.

BBC. 2009. Leaf Deer Takes a Bow. Available online at http://news.bbc.co.uk/2/hi/science/nature/382900.stm, last accessed September 25, 2010.

Begley, C. 2006. A Report on the Elephant Situation in Burma. Available online at http://www.eleaid.com/files/A%20Report%20on%20the%20Elephant%20Situation%20in%20Burma.pdf. Last accessed September 24, 2010.

Bryant, R. 1997. Kawthoolei and Teak: Karen Forest Management on the Thai-Burmese Border. Watershed Vol.3 No.1 July - October 1997. Available online at http://www.mekonginfo.org/mrc_en/doclib.nsf/0/105248AF011EF089C7256604001603D2/$FILE/FULLTEXT.html. Last accessed September 24, 2010.

Buergin, R. 2010. Local change and cultural identity in a global heritage Pwo Karen communities in the Thung Yai Naresuan Wildlife Sanctuary, a World Heritage Site in Western Thailand, in the context of national modernization and global environmental discourses. Available online at http://www.sefut.uni-freiburg.de/buergineng.htm. Last accessed September 25, 2010.

California Academy of Sciences. 2010. Herpetofauna of Myanmar web pages. Available online at http://researcharchive.calacademy.org/research/Herpetology/myanmar/project.html. Last accessed October 27, 2010.

Clarke, J.E. 1999. Poverty Reduction & Environmental Management in Remote Greater Mekong Subregion (GMS) Watersheds, Project (Phase I) Biodiversity And Protected Areas Myanmar. Available online at http://www.mekonginfo.org/mrc_en/doclib.nsf/0/47D9DC5470467F44C725682C001A4A55/$FILE/FULLTEXT.html. Last accessed September 24, 2010.

Conservation International. 2007. Indo-Burma Hotspot. Available online at http://www.biodiversityhotspots.org/xp/hotspots/indo_burma/Pages/default.aspx, last accessed September 25, 2010.

Cox, M.J., P.P. Van Dijk, J. Nabhitabhata, and K. Thirakhupt. 1998. Snakes and other Reptiles of Thailand and Southeast Asia. Asia Books.

Devi, L.S., and P.S. Yadava. 2006. Floristic diversity assessment and vegetation analysis of tropical semievergreen forest of Manipur, north east India. Tropical Ecology 47(1): 89-98.

Fong, J. 2009. Revolution as Development: The Karen Self-Determination Struggle Against Ethnocracy (1949 - 2004). Universal-Publishers.

Global Witness. 2005. A Choice for China: Ending the Destruction of Burma's Frontier Forests. Available at http://www.globalwitness.org/sites/default/files/library/a_choice_for_china_low_res.pdf. Last accessed November 16, 2010.

Karen National Union. 2009. Forest Policy. Available online at http://karennationalunion.net/index.php/burma/departments/forestry. Last accessed September 24, 2010.

KESAN. 2004. Destruction and Degradation of the Burmese Frontier Forests. Available online at http://www.kesan.asia/Resources/logging.pdf, last accessed September 26, 2010.

KESAN. 2005. Diversity Degraded. Both English and Karen Language Versions available at http://www.kesan.asia/Report.html. Last accessed October 7, 2010.

KESAN. 2007. Karen Traditional Medicine Handbook. Karen and Burmese Language Versions available at http://www.kesan.asia/tradition_medicine_handbook.html. Last accessed November 19, 2010.

KESAN. 2008. Khoe Kay: Biodiversity in Peril. Available online at http://www.kesan.asia/Report.html. Last accessed September 25, 2010.

Latimer, W., N. Bhumpakkaphan, and C. Fehr. 1992. "Report and Proposal for Kaserdoh Wildlife Sanctuary." Regional Community Forestry Training Center (RECOFTC), Bangkok, Thailand.

Olson, D. and E. Dinerstein, 1997. The global 200: A Representation Approach to Conserving the Earth's Distinctive Ecoregions. World Wildlife Fund, Washington, D.C., USA.

Parker, D.M., R.T.F. Bernard and J. Adendorf. 2009. Do elephants influence the organisation and function of a South African grassland? The Rangeland Journal 31(4) 395–403. doi:10.1071/RJ08039.

Parr, J. W. K. 2003. A Guide to the Large Mammals of Thailand. Sarakadee Press. Bangkok, Thailand.

Robson, C. 2004. Birds of Thailand. Asia Books, Singapore.

Seber,G.A.F. 1982. The estimation of animal abundance related parameters. 2d ed. Griffin,London.

Traffic. 2008. Elephant and Ivory Trade in Myanmar. Available online at http://www.traffic.org/species-reports/traffic_species_mammals50.pdf. Last accessed November 16, 2010.

Tu, S. 1998. Large Mammals of Myanmar. Innwa Publishing House, Yangon.

United Nations Environment Programme World Conservation Monitoring Centre. 2005. Thungyai - Huai Kha Khaeng Wildlife Sanctuaries, Thailand. Available online at http://www.unep-wcmc.org/sites/wh/pdf/Thungyai-%20HKK.pdf. Last accessed September 25, 2010.

Wildlife Conservation Society, 2010. http://www.wcs.org/where-we-work/asia/thailand.aspx. Last accessed September 25, 2010.

World Wildlife Fund, 2001. Kayah-Karen montane rain forests. Available online at http://www.worldwildlife.org/wildworld/profiles/terrestrial/im/im0119_full.html. Last accessed September 25, 2010.

Zao Noam. 2007. Eco-authoritarian conservation and ethnic conflict in Burma. Available online at http://burmadigest.wordpress.com/2007/09/15/eco-authoritarian-conservation-and-ethnic-conflict-in-burma/. Last accessed October 6, 2010.

APPENDICES

Appendix 1 - List of KNU Wildlife Sanctuaries

Name	District	Area in SqKm	Year established
Thuplay Wildlife Sanctuary	Kler Lwe Htu	160 Km	1982
Kaser Doo Wildlife Sanctuary	Bled Tavoy	640	1992
Kahilu Wildlife Sanctuary	Mu Traw	162	1928 (British)
Lay Khaw Lu Wildlife Sanctuary	Mu Traw	150	1980's
Dawn Gwe Wildlife Sanctury	Mu Traw	150	1980's
Kwee Ko (Malayit) Wildlife Sancturies	Dooplaya	139	1936 (British)
Megatha Wildlife Sanctuary	Dooplaya	156	1980's
Waw Raw Kee Wildlife Sanctury	Dooplaya	150	1980's
Ta Eun Kee Wildlife Sanctuary	Pa-an	150	1980's
Mae Ta Way Wildlife Sanctuary	Pa-an	150	1980's
T' Moe Por Lay Wildlife Sanctuary	Pa-an	150	1980's
Ba Oo Kyi Wildlife Sanctuary	Pa-an	50	2005
T'Rwen Klo Wildlife Sanctuary	Doo Tha Htu	150	1980's

Appendix 2 - Species Protected under Law by the KNU Forest Department

100% Protected - No Hunting Allowed Ever
Wild Elephant
Rhinoceros
Tiger
Tapir
Banteng
Wild Water Buffalo
Gaur
Green peafowl, Peacock
Burmese peacock pheasant
Gibbon
Great hornbill
Big-headed Turtles
Pangolin
Karen language: *Da kee kaw* (Relative of gaur but big front leg print and small hind leg print).

Female wild animals which are never to be hunted
Sambar
Hog Deer
Eld's Deer
Northern Serow
Long-tailed Goral

Males Protected based on breeding seasons
Jun 15 to 15 Oct No hunting allowed for Male Sambar or Hog Deer.
May 1 to November 30 - No hunting allowed for Male Eld's Deer.

March 1 to August 31 No hunting allowed for Male and Female
Rabbit
Jungle Fowl
Quail
Pheasant
Partridge

Appendix 3 Tables of Species Observed in Megatha Forest

Mammals				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
1	Asian Elephant *(Elephas mosimus)*	Rare	Endangered, CITES Appendix I	Visual
2	Gaur *(Bos gaurus)*	Common	Vulnerable, CITES Appendix I	Visual
3	Southern Serow *(Capricornsis sumatraensis)*	Common	Vulnerable, CITES Appendix I	Visual
4	Fea's Muntjac *(Muntiacus Feae)*	Common	Data Deficient	Visual
5	Northern Red Muntjac *(Muntiacus vaginalis)*	Common	Least Concern	Visual
6	Sambar *(Rusa unicolor)*	Common	Vulnerable	Visual
7	White handed gibbon *(Hylobates Lar)*	Common	Endangered, CITES Appendix I	Visual
8	Phayre's Langur *(Trachypithecus phayrei)*	Common	Endangered	Visual
9	Stump-Tailed Macaque *(Macaca Arctoides)*	Common	Vulnerable, CITES Appendix II	Visual
10	Rhesus Macaque *(Macaca mulatta)*	Common	Least Concern	Visual
11	Assamese Macaque *(Macaca assamensis)*	Rare	Least Concern	Interview
12	Slow loris *(Nycticebus coucang)*	Rare	Vulnerable, CITES Appendix I	Interview
13	Common Palm Civet *(Paradoxurus hermaphroditus)*	Common	Least Concern	Visual
14	Black giant Squirrel *(Ratufa bicolor)*	Common	Near Threatened, CITES Appendix II	Visual
15	Pallas's Squirel *(Callosciurus erythraeus)*	Common	Common	Visual
16	Malayan Tapir *(Tapirus indicus)*	Rare	Endangered, CITES Appendix I	Visual
17	Tiger *(Panthera tigris)*	Rare	Endangered, CITES Appendix I	Visual, dead

Mammals				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
18	Leopard *(Panthera pardus)*	Common	Near Threatened, CITES Appendix I	Visual, dead
19	Clouded Leopard *(Neofelis nebulosa)*	Rare	Vulnerable, CITES Appendix I	Interview
20	Dhole *(Cuon alpinus)*	Common	Endangered, CITES Appendix II	Interview
21	Himalayan Black Bear *(Ursus thibetanus)*	Common	Vulnerable, CITES Appendix I	Visual
22	Malayan Sun Bear *(Helarctos malayanus)*	Common	Vulnerable, CITES Appendix I	Interview
23	Sunda Pangolin *(Manis javanica)*	Rare	Endangered, CITES Appendix II, Zero Export Quota	Visual
24	Malayan Porcupine *(Hystrix brachyura)*	Common	Least Concern	Visual, Vocalization
25	Brush-tailed Porcupine *(Atherurus macrourus)*	Common	Least Concern	Visual, Vocalization
26	Eurasian wild pig *(Sus scrofa)*	Common	Least Concern	Visual
27	Large Bamboo Rat *(Rhizomys sumatrensis)*	Common	Least Concern	Visual

Birds				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
1	Great Hornbill *(Buceros bicornis)*	Common	Near Threatened, CITES Appendix I	Visual
2	Brown Hornbill *(Anorrhinus tickelli)*	Common	Near Threatened, CITES Appendix II	Visual
3	Oriental Pied Hornbill *(Anthracoceros albirostris)*	Common	Least Concern, CITES Appendix II	Visual
4	Grey Peacock pheasant *(Polyplectron bicalcaratum)*	Common	Least Concern	Visual
5	Silver pheasant *(Lophura nycthemera)*	Common	Least Concern	Visual
6	Red Junglefowl *(Gallus gallus)*	Common	Least Concern	Visual

Birds				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
7	Asian Green Broadbill *(Calyptomena viridis)*	Common	Near Threatened	Visual
8	Asian Fairy Bluebird *(Irena puella)*	Common	Least Concern	Visual
9	Black-naped Oriole *(Oriolus Chinensis)*	Common	Least Concern	Visual
10	Banded Kingfisher *(Lacedo pulchella)*	Common	Least Concern	Visual
11	Bar-backed partridge *(Arborophila brunneopectus)*	Common	Least Concern	Vocalization
12	Mountain imperial pigeon *(Ducula badia)*	Common	Least Concern	Visual
13	Emerald Dove *(Chalcophaps indica)*	Common	Least Concern	Visual
14	Oriental Bay-owl *(Phodilus badius)*	Common	Least Concern	Visual
15	Eastern Grass Owl *(Tyto longimembris)*	Rare	Least Concern	Visual
16	Scarlet Minivet *(Pericrocotus flammeus)*	Common	Least Concern	Visual
17	Blue Whistling-thrush *(Myophonus caeruleus)*	Common	Least Concern	Visual
18	White-browed Scimitar-babbler *(Pomatorhinus schisticeps)*	Common outside Megatha	Least Concern	Visual
19	Orange-breasted Trogon *(Harpactes oreskios)*	Common	Least Concern	Visual
20	Blue-eared Kingfisher *(Alcedo meninting)*	Rare visitor	Least Concern	Visual
21	White-throated Kingfisher *(Halcyon smyrnensis)*	Common	Least Concern	Visual
22	Hill Myna *(Gracula religiosa)*	Common	Least Concern	Visual
23	Red-bearded Bee-eater: *(Nyctyornis amictus)*	Common	Least Concern	Visual

Reptiles				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
1	Water Monitor Lizard *(Varanus salvator)*	Common	Least Concern	Visual
2	Clouded Monitor lizard *(Varanus bengalensis nebulosus)*	Common	Data Deficient	Visual
3	Blue crested lizard *(Calotes mystaceus)*	Common	Data Deficient	Visual
4	Elongate Tortoise *(Indotestudo elongata)*	Rare	Endangered	Interviews
5	Burmese Mountain Tortoise *(Manouria emys)*	Rare	Endangered	Visual
6	Malayan soft-shell turtle *(Dogania subplana)*	Rare	Least Concern	Visual
7	Asiatic Softshell Turtle *(Amyda cartilaginea)*	Rare	Vulnerable	Visual
8	Black Terrapin *(Siebenrockiella crassicollis)*	Rare	Vulnerable	Visual

Amphibians				
	Species	**Local status**	**IUCN Redlist and CITES Status**	**Evidence of presence**
1	Large-headed Frog *(Limnonectes kuhlii)*	Common	Least Concern	Visual
2	Poisonous Rock Frog *(Rana hosii)*	Common	Least Concern	Visual
3	*Leptobrachium chapaense*	Common	Least Concern	Visual
4	*Amolops marmoratus*	Common	Least Concern	Visual
5	Blyth's River Frog *(Limnonectes blythii)*	Common	Neat Threatened	Visual

Megatha Forest Orchid, Phaius tankervilliae

In Memory of Saw Thay War Do

Saw Thay War Do, also known as Kwe Nay Htoo Pa, was born on July 15, 1944 at Saw Ee Der village, Plakoh Village Tract, Luthaw Township, Mutraw District, Karen State, Burma. He died on April 24, 2010 at the age of 66. His mother's name was Naw Blis Mu and his father's name was Saw Tha Ain. He was the second of the nine children. He married Naw Wah Mu and had 3 sons. He studied in the village until he graduated from 7th standard. After that, he moved to study in Taungoo City until he graduated from 10th standard. He then worked with the Burma Government Forest Department at township level for 12 years.

He returned to his village when his father asked him to come back to help his people in Karen State. He worked as a teacher of Math and English at Ler Mu Plaw Middle School in 1985-1986. He joined the Karen National Union (KNU) Forest Department in May 1987, working at the Central Office in Mar Ner Plaw. He helped with forest management trainings, covering topics such as forest plantations, forest conservation, logging production, training of the trainers, and implementing forest plantation activities.

Six years later, the Dooplaya District Forest Department needed an assistant, so the KNU forest department appointed him to go to Dooplaya District in December 1993. In 1994 he became the office manager at Dooplaya District Forest Department. In 2000 he was promoted to become the District Forest Department leader and became a member of the Dooplaya District Executive Committee, remaining in those posts until the day he passed away.

One leader of Dooplaya District named Saw Lah K'paw expressed his opinion about Saw Thay War Do at his funeral. Saw Lah K'paw said that Saw Thay War Do was an important Dooplaya District leader who had conducted many important activities for the Forest Department, especially regarding improved knowledge about logging, reforestation and wildlife sanctuaries management .

In 2008 Saw Thay War Do invited the central KNU Forest Department and KESAN to go to Megatha Forest to observe the wildlife situation. In April of that year, he organized training and invited KESAN to share their experience with wildlife conservation and wildlife surveys. After the training Saw Thay War Do's staff and the KESAN team went to survey wild elephants in the Megatha Forest. Moreover, in October 2009 they engaged in a forest protection campaign in Megatha village and the Lerpu mine area.

KESAN appreciates the lifelong efforts of Saw Thay War Do in protecting the forests while providing essential resources to the Karen people, and sharing his wisdom with new generations. He will be greatly missed.

Megatha Forest Waterfall

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