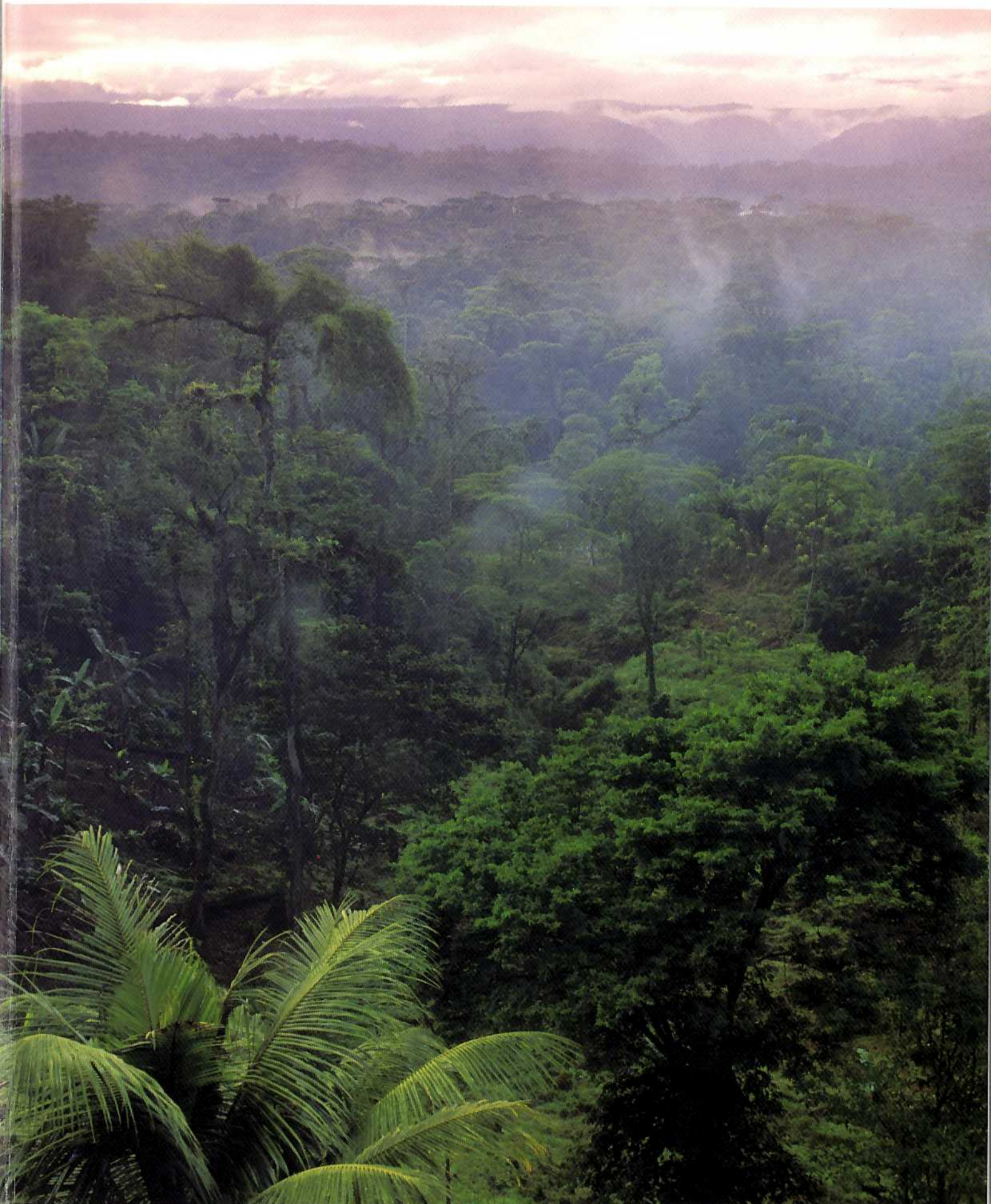


Nagao Natural Environment Foundation

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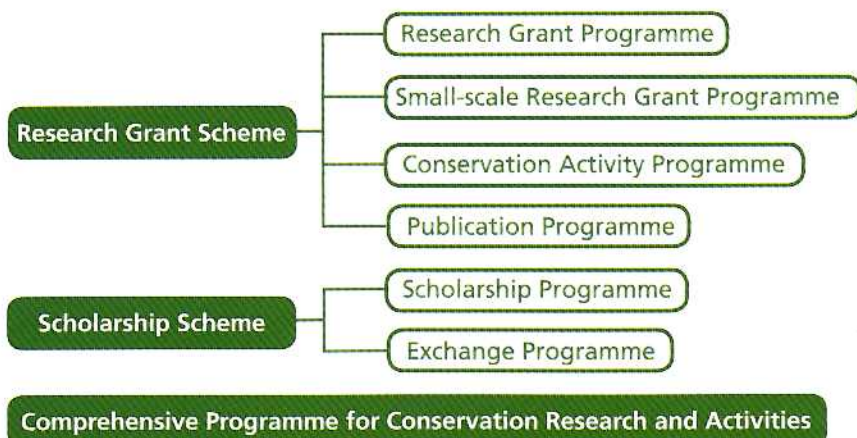
Nagao Natural Environment Foundation

Founded in 1989, the Nagao Natural Environment Foundation (NEF) is a non-governmental organisation dedicated to promoting nature conservation in developing countries. The NEF pursues its objectives through two main schemes: **Research Grant Scheme** and **Scholarship Scheme**.

The **Research Grant Scheme** provides financial support to creative and committed local scientists and other concerned people, allowing them to undertake research and related activities within the scope of nature conservation in their respective countries.

The **Scholarship Scheme** provides financial support to local university students who intend to study courses relevant to nature conservation in their respective countries, so as to work in this field in the future.

Under the new **Comprehensive Programme for Conservation Research and Activities**, NEF has started its support for researchers and conservationists working in the Mekong – Chao Phraya region.



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FEATURES

NEF Connections

Pioneer in Conservation

The twists and turns followed by Professor Dr. Vo Quy on his path to nature conservation

Professor Dr. Vo Quy is the founder of the Centre for Natural Resources and Environmental Studies (CRES) of the National University of Hanoi, Vietnam. He was born in a small village in Ha Tinh Province of central Vietnam in 1929 and has devoted his life to nature conservation of the country.

Prof. Dr. Quy has published 14 books and more than 100 papers. In 1975 and 1981, respectively, he published a two-volume book entitled *"The Birds of Vietnam"*—the first zoological book written by a Vietnamese national. The book describes 774 species of birds found in Vietnam, including a new species of pheasant discovered by Prof. Dr. Quy himself. He has received a number of awards, including the World Wildlife Foundation Gold Medal in 1988, the UNEP Global Honour Roll in 1992, and the Blue Planet Prize in 2003, for his outstanding contribution to education and research in the field of nature conservation.

NEF interviewed Prof. Dr. Quy about the past, present, and future of nature conservation in Vietnam. He emphasised the importance of environmental education at all levels.



NEF: What's the significance of conservation in Vietnam?

Quy: Vietnam is located along the southeast margin of the Indochina peninsula. Three quarters of the country is covered with mountains and hills. The land has a great diversity of natural ecosystems and consequently high biodiversity. We see enormous potential in the supply of agriculture, aquaculture, forestry, and ecotourism.

The current population of the country is about 84 million, of which about 80% live in rural areas. This means that their livelihood largely depends on rich natural

resources from forests, wetlands, and the sea. However, the population is growing very rapidly and is expected to reach 100 million in the next 20 or 30 years. This could pose a critical threat to the ecosystems in that, as the population grows, more natural resources will decrease.

We already know that it is not easy to develop Vietnam's fragile tropical environment. The natural environment of Vietnam can deteriorate very easily. For example, erosion occurs very fast when we cut trees, while reforestation is not easy. As a result, biodiversity is decreasing. Our forests

that cover three quarters of the country may quickly disappear, if we don't develop the country in a sustainable manner.

The degradation of environmental quality directly affects the Vietnamese people. After three or four years of deforestation, erosion has washed away everything and the topsoil has decreased. People cannot develop agriculture in such areas and must move elsewhere. Moreover, we know that the number of floods has increased and we have draughts more often. That's why we need to be concerned about our natural environment.

We have great biodiversity in Vietnam with many species of flora and fauna. Their essential habitats are now being degraded. This has caused a loss in biodiversity. That is why we need conservation. We must make more efforts to conserve not only individual species but also the entire ecosystem.

Over the past two decades, the people of Vietnam have benefited from many changes—the transition from a centralised planned economy to a market-oriented economy, the liberation of agricultural and industrial production, as well as development of services and opening of the country for foreign investment, accelerated economic growth. But at the same time, Vietnam is being confronted with a number of very real trade-offs in its development objectives. In short, we are facing a critical problem in balancing economic growth and environmental degradation. In order to minimise the potential negative effects, we must take action now to protect our natural resources and the environment, because their loss is an irreversible process. Without a healthy environment and a sound basis for agriculture, we cannot have a healthy economy. Sustainable development and conservation must work hand in hand, or as we say in Vietnamese, 'work with two legs that are harmony and agreement.'

NEF: How has Vietnam been involved in nature conservation?

Quy: The Vietnamese government has worked on developing a strategy for sustainable development in the country. The National Conservation Strategy was prepared in 1985, and since then the National Action Plan for the Environment and Sustainable Development has been developed and partly implemented through various activities relating to environmental legislation, management, education, and research. It is called 'Vietnam Agenda 21.' The strategy provides planning for economic development, social development, and the conservation of nature. We must have all of these elements together.

However, the real difficulty is implementation. In theory, you can use the forests while conserving them, but in practice, it is very difficult to pursue sustainable development. There are many things we can and must do in order to facilitate nature conservation. Perhaps now people are more focused on economic development, but they are also learning the importance of conservation. That's

the challenge we are now facing in our country.

NEF: What do you see as a solution to balancing economic growth and conservation?

Quy: One of the most important things in pursuing sustainable development is environmental education at different levels. Education is of course important for children and students, but we also have to provide learning opportunities to people at higher positions, like policy makers. As a scientist, I must contribute certain things. When the government organises meetings on the environment, I am one of the members that attends and talks to politicians, like Ministers, Vice Ministers, and the heads of the provinces. It takes time to achieve a consensus but I hope that in the near future all of them gain a better understanding.

For promoting public awareness, we have environmental education through the mass media. I have participated in a TV programme for eight years. I talked to the public about nature, the environment, and conservation. That's why a lot of people know me.

NEF: You have devoted your life to conservation education in Vietnam. Could you tell us about how you first began your involvement in conservation education?

Quy: Of course, university education is important in promoting conservation and this is what I have been involved in for almost the past 50 years. We have to train a young generation of scientists. The University of Hanoi started working on this 40 years ago in 1956 here in this building. It used to be called the University of Indo-China during the period of French colonisation. Now, we provide training for young scientists working in the field of conservation and for the rational utilisation of natural resources.

I started teaching biology at the university in 1956. After 1975, The University of Hanoi sent many scientists and professors to reinforce universities in the South of Vietnam, such as Can Tho, Ho Chi Minh City, and Hue Universities. The University of Hanoi then became the centre for higher education in Vietnam and produced lecturers and professors for those other universities.

Especially in nature conservation, the University of Hanoi has played a critical role. After the war with the United States, we realised the importance of conservation for our country. I started conducting investigation of nature in many parts of the country in 1956, during the middle of the war. I even tried to visit the southern part of Vietnam some time, but it was too dangerous then, and I could not stay there.

During the war, in 1974, I followed the Ho Chi Minh Trail for three months to central Vietnam to make research on the effects of the herbicides (Agent Orange/dioxin) sprayed by US army. I had to return to Hanoi, because I suffered terrible kidney pain and had to undergo surgery. After my operation, in 1976, I continued working in southern Vietnam, and then realised the extent to which the war



had destroyed our natural environment. In particular, herbicides destroyed two million hectares of dense forest of our country and I decided to work on restoring the land destroyed by the war.

Another problem in conservation at that time was agriculture. People needed to develop agriculture immediately to grow food, so they cut down many trees to expand their agricultural fields. Forests continued to decrease. The greater the destruction of forests, the more frequent the occurrence of floods and draughts. We really had to take measures to prevent further degradation.

Before the war we only trained biologists but not conservationists. After visiting different parts of the country, I strongly believed that we needed to train young scientists for the conservation of nature. In 1980, I was asked by the government to develop a program for the conservation of nature as a university curriculum for the University of Hanoi. This resulted in the establishment of the Centre for Natural Resources and Environment (CRES).



My colleagues and I have also organised postgraduate training courses on ecology, natural resource management, and sustainable development. The first course was offered at CRES in 1987 for people from many different regions of our country. The participants were conservation practitioners,

like those working in national parks, protected areas, provincial departments of science and technology, provincial environments, and other universities in the country. Those trainees now work in their hometowns and some of them have organised environmental centres at universities. Each university of our country now has a centre of conservation and sustainable development to teach students about sustainable development and conservation.

Furthermore, three years ago, at the University of Hanoi, we started a new, unique programme for masters and doctoral study in sustainable development and the environment. The course is called 'Ecological Approach to Natural Resource Management and Sustainable Development.'

NEF: NEF has supported conservation education in Vietnam over the last decade.

Quy: CRES has trained more than 600 scientists and many of them are now the leaders of environmental departments, national parks, and universities. Over the past decade, with 24 new scholarships offered to postgraduate students every year, NEF has supported us by producing

quality scientists who work on conservation in the field. We can say that students involved in NEF fellowship have better quality and study harder. In fact, many of them now have doctoral degrees.

Nagao's support gives Vietnamese students better opportunities. Many students like fieldwork, though it is often difficult for them to afford it. Nagao's scholarship programme allows the students to go into the field and gain experience.

Nagao's financial support has even changed the attitude of students. Students tended not to choose fieldwork for their study, because they believed there was no benefit in it. Staying in Hanoi is easy for students but working in the field takes a lot of energy, time, and money. But now, they spend much more time in the field with the support from NEF. Also, students used to think that they couldn't make money by studying biodiversity and conservation, and would do better studying other subjects. After Nagao started supporting our students, however, they first learned that they could complete their studies with the scholarship. Thus, it offers a good incentive for students to study conservation. Secondly, they now know that conservation jobs may receive funding. I hope that in the near future, all people will consider conservation important, and that more jobs will become available for new graduates.

NEF: What do you see as the future of conservation in Vietnam?

Quy: I believe that, in the future, the conservation of nature in my country will be better. Some 30 or 40 years ago when I talked about the conservation of nature, many people didn't agree with me. What's conservation? We must exploit nature as soon as possible because we need economic growth! Why do we have to conserve nature? These were the common perceptions.

When leaders in high positions supported me, things gradually changed. For example, when I explained to the General Secretary of the Party about the importance of conservation, he understood the role of scientists and allowed me to cooperate with the West. Thanks to his understanding, I was able to receive information from Western organisations, like IUCN, WWF, and UNEP. Before that, we were only allowed to collaborate with China and Russia, and had access to very limited information.

The General Secretary of the Party understood that scientists could do something. And now, everyone understands sustainable development and conservation for our future. That's the first step. Now things are much easier than when I first started. At that time, I always had to look for support. If people at the top understand the importance of sustainability, then we can proceed to the second step. Now we have a national plan and try to follow Agenda 21. Implementation is always tough but I am optimistic because I have good opportunities to work with good people.

Putting the Science into Practice



NEF scholar Mr. Truong Quang Tam works on forest reforestation

Mr. Truong Quang Tam is a forester at the Institute of Tropical Biology of the Vietnam Academy of Science and Technology. NEF supported two of his research projects: "Distribution of Dipterocarp forest and its human impacts on the Binh Chau – Phuoc Buu Nature Reserve and the neighbouring" in 1996 and "Biodiversity study for the coastal area and of the southern part of Central Vietnam" in 1997. Mr. Tam told NEF how his research has contributed to conservation and his role in nature conservation as a scientist.

NEF: Could you tell us about your research that NEF supported?

Tam: My projects specifically looked at Dipterocarp lowland forests that are found in sandy areas along the coast in the southern part of Vietnam. The forest separates the coastal sandy area from the inland environment. The area of this kind of forest has recently decreased and the one area remaining in the Binh Chau – Phuoc Buu area, which covers about 10,000 ha, is considered quite important.

With the first research grant from NEF in 1996, I studied the structure of the Dipterocarp forest. My study also recorded the distribution of Germain peacock pheasant in the Binh Chau – Phuoc Buu area. Local people already knew this bird species was living in that area but it was new to us as scientists. In the second NEF funded study in 1997, I applied my study of Binh – Chau to a larger area.

NEF: How would you describe your contribution to nature conservation through these studies?

Tam: In my second NEF funded study, I saw a very high demand for some plant species in Binh Chau. The mountains also provide medicinal plants for Ho Chi Minh City. People come to the mountains and collect plants to be used for medicinal purposes. If people continue collecting plants without control, no medicines will be available in the future. My study gathered basic biological and ecological data to develop a conservation policy for the area, and so that we could use this data to set up measures to protect the plants. I reported the findings to the provincial government because I believe that taking action for conservation is necessary.

I also used the results from my study of Binh Chau, when a British gas company asked me to help their reforestation efforts in 2003. I actually persuaded them to contribute to nature conservation by using local species. The company built a pipeline from offshore to the mainland for gas extraction. The problem was that their pipeline destroyed natural vegetation on land. BP has realised for the necessity to recover the natural vegetation, I recommended them to

work on reforestation to restore the forest, by using the model obtained from Binh Chau Phuoc Buu nature reserve. My knowledge from the study was helpful in developing a plan for reforestation. I collected tree species in reference to my study so the reforested area would have a similar composition of species as that of the original forest. We hired members of an ethnic minority living there to help the reforestation efforts. We obtained the seeds from local species in the Binh Chau Phuoc Buu Nature Reserve, then established a nursery for indigenous trees.

NEF: What research project are you currently working on?

Tam: My research interest now focuses on conservation in the Mekong delta in southern Vietnam. This is an example of conflicts between development and conservation. Limestone is found in many areas of northern Vietnam, but Kien Giang is the only area where we find exposed limestone in the Mekong delta of Vietnam.

The interesting thing about Kien Giang is that the area is like an island. The karst is like an isolated hills surrounded by mangroves. Due to this isolation from other limestone areas, the biodiversity of this area is known to be high and endemic. This is particularly true for land snails and the cave fauna. We have also found the silvered langur. These leaf monkeys only live in this limestone area and probably represent a new subspecies recorded for Vietnam.

Despite its high biodiversity, this area has not yet well known. Vietnam has a high demand for cement, exploiting limestone for cement may help the local people in their economic development. It is tough to answer such questions as, 'How can people survive only in nature without having jobs?' But I say, 'Well, if you destroy the nature now, you can receive money by selling natural resources for 20 years but eventually you will lose the biodiversity and the future generation will not be able to benefit them.' It is my job to explain why we have to do conservation works to other people. I try to persuade people. It's not easy but that's my duty to the country that I must fulfil.



1 Outlines of the new projects in 2006



In 2006, NEF funded 23 projects in 9 countries, including 16 new projects and 7 continued projects (as of December 2006). Outlines of the newly approved projects are shown in the following pages.

(1) Research Grant

The population status, harvesting, and the trade of blue tree fern (*Cyathea contaminans* (WALL.) COPEL) in Indonesia



Nunu Anugrah

Staff of the Directorate of Biodiversity Conservation, Directorate General of PHKA, Ministry of Forestry, Indonesia
700,000 Japanese yen

Cyathea contaminans is a species of tree fern belonging to the family Cyatheaceae that is generally found in mountain forests. However, this species is typically found in open areas at medium to high elevation (200 to 1600 meters asl) (Holttum, 1963), although Chin (1997) reported that this species could exist at an elevation of up to 1700 meters asl. Such areas are often surrounded by abundant forest or open forest, especially near rivers (Holttum, 1963). The common names of *Cyathea contaminans* in Indonesia are *pakis arjuno*, *pakis galar*, and *pakis oleng* in Javanese, or *paku tihang*, *paku pohon*, *paku papan*, and *atau paku tihang bodas* in Sundanese (Sastrapradja et al., 1979).

People in local communities have utilised *Cyathea contaminans* since a long time ago, since this species has both commercial and noncommercial value. The major use of its tree trunk is as a material for creating artwork, such as statues, decorative poles in luxurious homes or hotels, and flower vases. Around Mount Patuha in West Java, the trunks of this species is used for making celebratory canons (Holttum, 1963). The trunks also can be an excellent media for cultivating orchids (Holttum, 1963; Sastrapradja et al., 1979). Moreover, it has been reported that the smooth hairs found on the stalk bases were used as traditional medicine on Java Island (Sastrapradja et al., 1979).

International communities have paid attention to the use, particularly the trade and sustainability of Cyatheaceae since 1975 when all genus of *Cyathea* were listed in Appendix II CITES (Annotation #1). While the species listed were revised in 2000, as a control mechanism for the utilisation of wild fauna and flora species listed and not listed in the appendix of CITES, the Directorate General of Forest Protection and Nature Conservation determines the annual harvest quota of species, as the CITES Management Authority of Indonesia.

The harvesting of *Cyathea contaminans* has been based on a quota system. However, determining annual quotas especially for *Cyathea* sp remains a difficult task to complete due to the lack of data on the biological status of this species. To date, data and information concerning the distribution of this species, estimated population, and

structure of population in the wild have not been clearly established. Therefore, this project intends to investigate the population status of *Cyathea Contaminans* in Indonesia, and gather information on its trade, such as harvesting, market prices, and market routes.

OBJECTIVES

1. To assess the population status of *Cyathea contaminans* in the wild in certain regions where annual quotas of fauna and flora utilisation are regulated. These regions are the provinces of South Sulawesi, West Sumatra, North Sumatra, Jambi, Lampung, and Central Kalimantan;
2. To investigate the methods employed by local people for harvesting *Cyathea contaminans* and the harvest yield;
3. To collect data on domestic and international trade, including information on varieties of products, market prices, and market routes; and
4. To profile companies and exporters of *Cyathea contaminans*, including their profit-sharing systems.

METHODOLOGY

Locations

The following lists the locations where research activities are to be conducted.

1. Field research is to be conducted in the following provinces:
 - South Sulawesi;
 - West Sumatra;
 - North Sumatra;
 - Jambi;
 - Lampung; and
 - West Sulawesi.
2. The locations of Industry are as follows:
 - PT. Pratama Sido Abadi at Cibinong-Bogor, West Java province
 - PT. Intinusa Sari Flora at Tangerang, Banten province
 - UD. Surya Perkasa at Bogor, West Java province
 - PT. Bumi Perkasa Makmur at Tangerang, Banten province
 - PT. Bumi Makmur at Semarang, Central Java province
 - UD. Asano at Medan, North Sumatra province
 - CV. Elindo Prima at Puncak Bogor, West Java province



- CV. Merpati at Malang, East Java province
- PT. Hakiki Organik Farm at Medan, North Sumatra province

Methods and Data Analysis

1. Survey of Population in the wild

A survey of population will be conducted mainly to determine the general status and condition of *Cyathea contaminans* in several regions of Indonesia, namely the provinces of South Sulawesi, West Sulawesi, North Sumatra, Jambi, and Lampung. The survey will be conducted using line transects at several purposive sites. Data will be collected on habitat characteristics, estimated population, patterns of population distribution, and structure of population.

2. Assessment of the Harvesting of *Cyathea contaminans*

This assessment will be made to determine in detail the methods employed by local people to harvest *Cyathea contaminans* in several regions of Indonesia. My main focus is on traditional knowledge regarding the harvest of the species, such as people's ability to identify species,

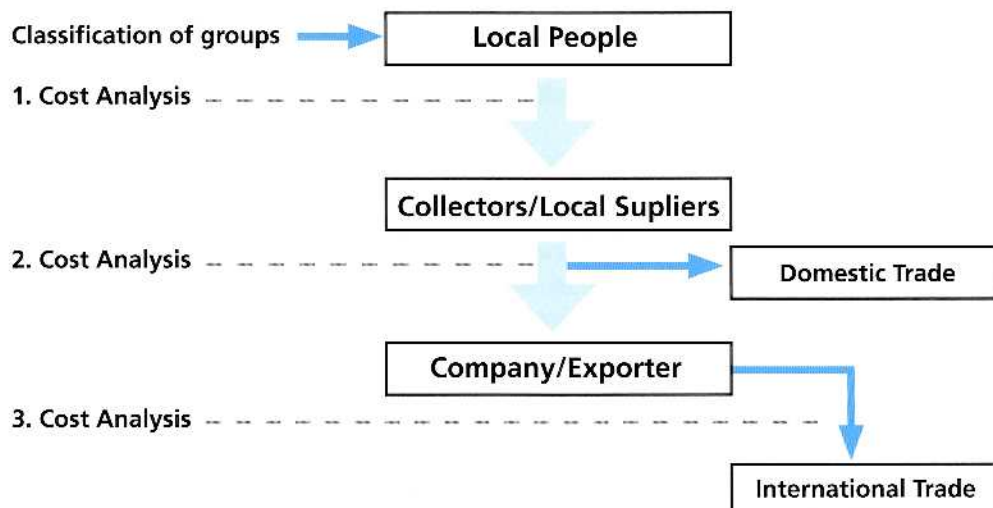
the harvesting tools or technology used in harvesting, and processing techniques.

3. Analysis of the Trade of *Cyathea Contaminans*

The aspects to be analysed include domestic and international trade, locations of trade, market prices (export and domestic prices), and market routes. Data will be collected at such institutions or organisations as Ditjen PHKA (as the CITES Management Authority), LIPI (as the Scientific Authority), Customs, companies/exporters, WCMC, and middlemen (local people, collectors, and local suppliers).

4. Analysis of companies or exporters of *Cyathea contaminans* trade

The objectives of profiling the companies or exporters of *Cyathea contaminans* are to investigate the legal aspects of trade, organisational structure, progress of reporting, processing techniques, industry and production capacity, and employees. Moreover, a variety of *Cyathea* products that are produced by each company will also be identified and measured in units of weight (kg).



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Avifauna diversity and conservation in the Kangean Islands



Research Grant

Mohammad Irham

Division of Zoology, Museum Zoologicum Bogoriense, Research Centre for Biology, Indonesian Institute for Sciences (LIPI), Indonesia
650,000 Japanese yen

Introduction

The Kangean Islands are a group of small islands situated between 115°11'-116°16'E and 6°30'-7°12'S. The islands are located at approximately 120 km east of Madura and 120 km north of Bali. The archipelago consists of some 30 islands, of which the largest is Kangean Island with an area of 48,700 ha. Kangean Island is generally mountainous along the central ridge, attenuating to flat lowlands in the north and south. The southern part is a lowland area while the central and northern parts are covered by tropical submontane forest along the hilly ridges of the central mountains. The mangrove forests are mainly found in the southern part. Climatically, the Kangean Islands are characterised by a tropical monsoon forest (de longh *et al.* 1982, Silvius and Taufik 1989). Two islands—Kangean and Saobi—are protected as a nature reserve under the decree of SK. GB. No.83, Stbl No.469, and decree No.GB Stbl 392, respectively.

The fauna of the Kangean Islands generally resembles that of Javan animals. However, special attention must be paid to the avian community of the islands. Ornithological records from the Kangean Islands by Dr. A.G. Vorderman and Mr. Ernst Prillwitz (Hartert, 1902) can be traced back to 1892. A total of 78 species were noted from those expeditions. In 1954, a new subspecies of Golden-backed woodpecker *Chryocolaptes lucidus kangeanensis* was described from the islands (Hoogerwerf, 1963). Recent records show that 26 species of birds occur at the site (Silvius *et al.* 1987).

Based on previous studies, Kangean birds comprise both Oriental and Wallacean forms besides certain species indigenous to the islands. For example, there are two subspecies of woodpeckers that are typical Oriental forms, and a population of the mound-building Megapode, typical of the Wallacean form (Hoogerwerf 1956, Beudels *et al.* 1981). Because some species related to Javan birds are present, the islands are considered the easternmost range of Javan birds, as it is for terrestrial carnivores such as the

leopard, *Panthera pardus* (Hartert 1902, Vordermann 1893, de longh *et al.* 1982).

Aims

This research is intended to study and conserve avian diversity on the Kangean Islands. My focus is on avian diversity in relation to different types of habitats and the disturbances caused by humans.

Methods

Research on the birds of the Kangean Islands will be conducted from 2007 to 2008. The first-year survey will focus on Kangean Island. The second-year survey will be conducted on the surrounding islands of Saobi, Sapeken, and Sepanjang. Data on the birds will be obtained by using mist netting and observations. Surveys will be conducted at least twice a year during different seasons.

Mist nets will be installed in each possible type of vegetation, and all birds caught will be identified, photographed, measured, and ringed, with blood samples taken. Conspicuous and unidentified birds will be collected for further examination at the museum. Bird songs will be also recorded. All samples and specimens will be deposited at Museum Zoologicum Bogoriense (MZB) Cibinong. DNA and sound analysis will be investigated at MZB as well. Observations will be conducted using a combination of point counts and methods using transects (Bibby *et al.* 1998), covering all types of habitats from coastal areas to the interior of islands.

Expected Outcomes

By conducting this research, it is expected that the diversity of birds on the Kangean Islands will be completely documented. The taxonomic status of birds on those islands will thus be more clearly understood. Results of these studies will be published as scientific papers. A field guide on the birds of the Kangean Islands is also planned for publication.



Some Ecological Aspects of Sulawesi Crested Black Macaque (*Macaca nigra*) at Tangkoko-Batuangus Nature Reserve, North Sulawesi, Indonesia



Saroyo

Biology Study Program, Faculty of Mathematics and Science, Sam Ratulangi University, Indonesia
980,000 Japanese yen

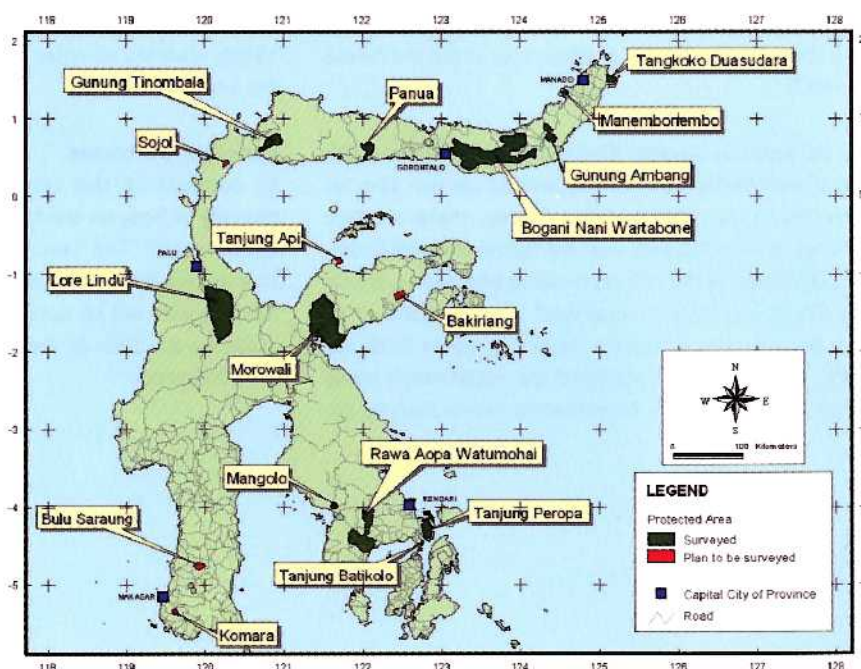
The Sulawesi crested black macaque (*Macaca nigra*) is one of several Sulawesi monkeys that are endemic to North Sulawesi. At present, *Macaca nigra* is distributed over a few isolated areas: the northern peninsula of the main island and two satellite islands—Manadotua and Talise (Lee and Kussoy, 1999). This species is categorised as an endangered species by IUCN and included in Appendix II by CITES (Soehartono and Mardiasuti, 2002). The Indonesian

government has legally protected the species under national law. However, given the current trend toward a loss of forests, Lee *et al.* (2002) suggested that the *Macaca nigra* might require revision to Critically Endangered status. There are two main reasons for the declining monkey population: the destruction of habitats and hunting for local consumption. The loss of habitat is widely acknowledged as the greatest single threat to the continued survival of virtually all primate species (Mittermeier and Cheney, 1987, as cited by Rosenbaum *et al.*, 1998). More than 67% of the productive wet lowland forest in Sulawesi was lost over a period of two decades (Whitten *et al.*, 1987). Due to the culture of a certain segment of the North Sulawesi population that consumes wildlife, hunting also becomes an important factor in the declining *Macaca nigra* population.

Taking appropriate conservation action requires an understanding of different biological aspects of the species, including their ecological and behaviour. However, there is still only limited ecological information on the current conditions of monkeys. I plan to conduct a three-year period of research on certain groups (both large and small) at the Tangkoko-Batuangus Nature Reserve beginning in



Education



2006. The purposes of the study are to:

1. Determine the size and structure of groups;
2. Determine the home range and length of daily travel in relation to adverse effects on the habitat, availability of food, and hierarchy of inter-group dominance; and
3. Analyse their habitat.

The expected outcomes are as follows:

1. Recommendations for management authority to control the group size and structure of the monkeys, and protect of their habitat through certain activities, such as controlling outbreaks of fire, managing ecotourism, zoning ecotourism areas for the harvesting of forest products by people, and enriching the habitat; and
2. Some scientific publications in national or international journals.



Monkey activity



Fire control



Sociality



Moving

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Study on moth diversity at Gunung Halimun National Park, West Java, Indonesia



Research Grant

Hari Sutrisno

Entomological Laboratory, Zoological Division, Research Centre for Biology, Indonesian Institute for Sciences (LIPI), Indonesia
987,500 Japanese yen

Introduction

It is estimated that the world fauna of Lepidoptera numbers over 160,000 species, with moths accounting for more than 90%. Compared with butterflies, however, our knowledge on moth fauna in Indonesia is still very limited and poorly documented. Research conducted on moths has primarily focused on the biological aspects of certain groups that have economic importance, such as agricultural pests (Prabaningrum and Sastrosiswojo, 1994; Schellhorn, 1995). This is partly because there are relatively few researchers who are able to study Indonesian moth fauna, and also because the Indonesian moth fauna has a high proportion of very small species (microlepidopteran).

Objectives

The primary objectives of this study are to acquire information on moth diversity and assess the composition of moth species in the tropical rainforest, especially at Gunung Halimun National Park, and to establish national references for moth collections in Indonesia.

Study site

Gunung Halimun, which means 'the misty mountain' in the local language, is home to the only remaining tropical rainforest in Java and covers about 113,357 ha. Given its high rainfall throughout the year (3,500 mm/year) and high elevation (500 to 1929 metres), this national park has characteristic vegetation that differs from that of other areas. There are more than 100 species of butterflies in this park, but there is no information available on moth diversity. Therefore, a study on moths in this national park is needed to explore their diversity and species composition.

Expected Output

Upon the completion of this study, we will publish certain papers as follows:

1. A list of species and the composition of moths at Gunung Halimun National Park; and
2. Scientific papers on any new species of moths from this national park, new records for any host plants of moths, and other information on biological aspects.



Gunung Halimun National Park

Photo by Masaaki Yoneda

Eco-based sustainable development of agarwood in Myanmar



Research Grant

Aung Than

Academy of Forestry Science, CC Member, FREDA, Myanmar
1,000,000 Japanese yen

The alluringly scented Agarwood has been widely used for religious, traditional, and cultural purposes by people of different religions, faiths, and customs for more than 2000 years. However, Agarwood in the wild (of genera *Aquilaria* and *Gyrinops* of family Thymelaeaceae) is becoming increasingly rare and endangered throughout the Asia-Pacific region due to unsustainable exploitation. CITES's Red Data Book listed *A. malaccensis* (locally called *Akyaw*) in Appendix II in 1995, but this has not discouraged the illegal exploitation of Agarwood. Myanmar is no exception.

The primary objective of this project is to promote greater awareness of non-timber forest products among the stakeholders of Agarwood use in order to encourage their participation in long-term conservation and sustainable development programs. We will conduct a preliminary investigation of the status of Agarwood tree species in the wild, their social and economic importance in local life, and the impact of exploitation on the survival and sustainability of natural Agarwood tree species.

This project consists of the following different research activities:

1. Preliminary Survey

Review literature and records on Agarwood:

Study available forest management data and records at administrative and forestry offices of eight states and divisions: Kachin, Sagaing, Shan, Magwe, and the most feasible districts/townships of the Tanintharyi and Rakhine Divisions, and Kayin and Kayah States.

Indigenous knowledge and socio-cultural-economic survey:

Interview local plant harvesters, gardeners, and traders about the distribution and production of Agarwood, its ecology, natural and artificial regeneration, and fungal infestation.

Field investigation and specimen collection: Conduct a field study on wild Agarwood distribution and natural-artificial regeneration. Investigate the harvesting and trade of Agarwood trees. Collect Agarwood specimens with detailed silvicultural, morphological, and ecological records.

2. Scientific Investigation

Field and laboratory investigation: Study the

regenerative behaviour of Agarwood tree species and conduct a pathological and entomological investigation of Agarwood infestation, both in-situ and ex-situ at least at two places: Kachin State and Sagaing or Tanintharyi Division.

Seek international collaboration and cooperation:

Contact potential NGOs and International NGOs for regional/international collaboration and cooperation in research and technical development of Agarwood in Myanmar.

3. Participatory groundwork

Community Forestry development: Identify villages with potential natural Agarwood tree resources, plantations, and knowledge regarding the three areas of study. Form interest groups with the permission of local authorities and encourage the pilot artificial regeneration of the Agarwood species.

Fieldwork: Collect Agarwood specimens for laboratory testing and conduct a feasibility study on Agarwood test planting and infestation.

Results Expected after two years

1. Preliminary data on the status of *Aquilaria*, such as distribution, growth, and exploitation, and other Agarwood-producing tree species will be compiled.
2. The potential areas of Agarwood genetic resources will be identified.
3. The local Agarwood-dependent socioeconomic situation at various sites will be investigated.
4. Techniques, skills, and knowledge for growing Agarwood within the context of local culture and tradition will be investigated through a participatory approach.
5. Community-based Agarwood test-planting and a study of fungal infestation of the trees in-situ and ex-situ will be initiated, possibly with the formation of Community Forestry User Groups in villages that express interest.
6. Suggestions will be made to the Ministry of Forestry (MoF) on protecting the *Aquilaria* species and launching a National Community-based Agarwood Conservation and Sustainable Development Scheme within the framework of the National NTFP Development Plan.
7. International acknowledgement with probable cooperation and collaboration will be achieved in starting a community-based Agarwood-industry and technological development program in Myanmar.



Habitat use, ecology, behaviour, and conservation of Germain's peacock pheasant (*Polyplectron germaini*) in Cat Tien National Park, Dong Nai Province, southern Vietnam



Research Grant

Vy Nguyen Tran

Institute of Tropical Biology, Vietnam

800,000 Japanese yen

Even though decades have passed since the war, limited resources have curtailed our knowledge of the distribution and status of many bird species of Vietnam, and the threats to those species. This is particularly true for the Galliformes, which are believed to be among the most threatened, due to the destruction of habitat and unsustainable hunting. Moreover, the range of these birds has been severely reduced and fragmented through commercial logging activities and the resettlement of human populations, which have increased the levels of hunting and disturbance of habitat. There is, therefore, an urgent need to survey all remaining blocks of forests within the presumed habitat range of these birds, as well as to measure the species' tolerance of various forms of habitat degradation and disturbance.

Forest Enterprise in Binh Phuoc Province (Nguyen Tran Vy *et al.*, 2000, 2002, 2003, 2004), Da Te Forest Enterprise (Nguyen Phuc Bao Hoa, 2003), and Tan Phu Forest Enterprise in Dong Nai Province (Nguyen Tran Vy, 2006) (Figure 1).

However, to date, there has been no detailed study focusing on the ecology, habitat use, and status of Germain's Peacock-Pheasant. The Status Survey and Conservation Action Plan 2000-2004 (IUCN, 2000) recommended that research be conducted on this species in other areas of Vietnam. This research should include the use of secondary and degraded habitats. The results of such research will encourage better management of protected areas containing populations of this species.

This study will collect information on Germain's Peacock Pheasant in Cat Tien National Park (Figure 2). A predictive map of this species in the park and surrounding areas will be produced. Information on the status of this species, such as abundance, distribution, habitat association, and potential threats to this species and other galliforme species will be collected. For example, information on the vulnerable Green Peafowl and Endangered Orange-necked Hill Partridge will also be collected, should the opportunity arise.

A brief, initial two-week survey will determine the sample area to be targeted by other more detailed surveys to be undertaken over six months during the dry season and for one month at the beginning of the dry season in the sample area. Surveys using point transects along forest tracks will be used to collect information on the species. At each encounter with the species during the surveys, GPS will be used to geo-reference the location of each record, and home range variables will be collected, including elevation, slope, type of forest, distance to the nearest water source, and litter layer depth. All data will be entered into ArcviewGIS, which will be used to analyse the relationship between the presence of the species and various geographical features. Based on this analysis, an interpolated habitat map will be established and a predicted potential habitat map for these species produced. Distance sampling (Bibby *et al.*, 1998) will be used to calculate various population parameters.



Photo 1 Germain's Peacock Pheasant (*Polyplectron Germaini*)

Southern Vietnam is an important area for many species of Galliformes, including the endangered Germain's Peacock-Pheasant, Orange-necked Hill-Partridge, and the vulnerable Green Peafowl. Germain's Peacock Pheasant is known to exist in the region from Binh Dinh Province (South Annam) to Cochinchina (Vietnamese Red Data Book, 2000), and from South Annam to Cochinchina (Robson, 2000). Recent surveys have found that the protected areas of Cat Tien and Bu Gia Map National Parks are particularly important for Galliformes species in general and Germain's Peacock Pheasant in particular. These surveys have shown that Germain's Peacock Pheasant is found in these protected areas and in other remain forests such as Loc Bac and Bao Lam Forest Enterprise in Lam Dong Province, Nghia Trung

The results of this study and project will be used as follows: A manuscript entitled "*Habitat Use, Ecology, Behaviour and Conservation of Germain's Peacock Pheasant*" will be submitted to an appropriate scientific peer-reviewed journal.

Expected output

1. The final report and its recommendations will be submitted to:
 - The Government of Vietnam to assist with their development of long-term action plans for species conservation and ecological studies;
 - Local governments, especially the authorities responsible for establishing protected areas, to develop suitable measures to protect these threatened species; and

- The World Pheasant Association, which is responsible for producing the IUCN Status Survey and Conservation Action Plans for all Galliformes.
2. Working with Ho Chi Minh City Television, a film will be made to introduce the species of Galliformes.
 3. Articles to disseminate information from this project will be prepared for newspapers in Ho Chi Minh City.
 4. Working with "I love Nature Club" in Ho Chi Minh City, the species of Galliformes and value of conservation will be publicised.

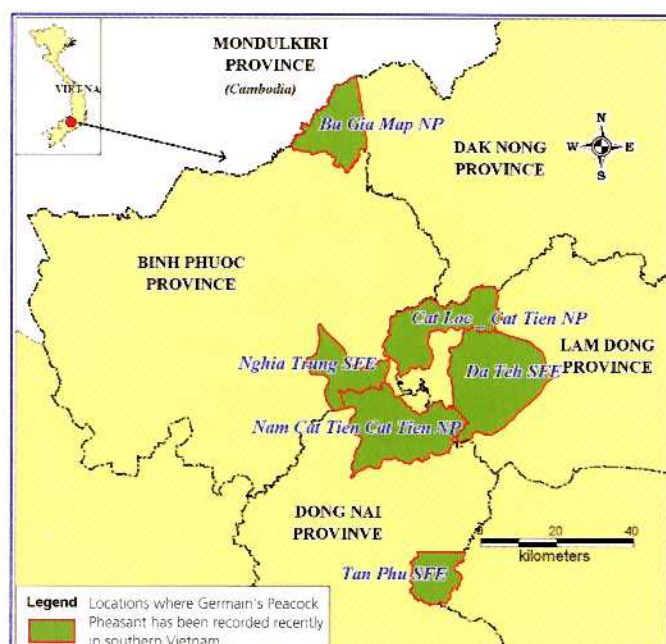


Figure 1: Locations where Germain's Peacock Pheasant has been recorded recently in southern Vietnam

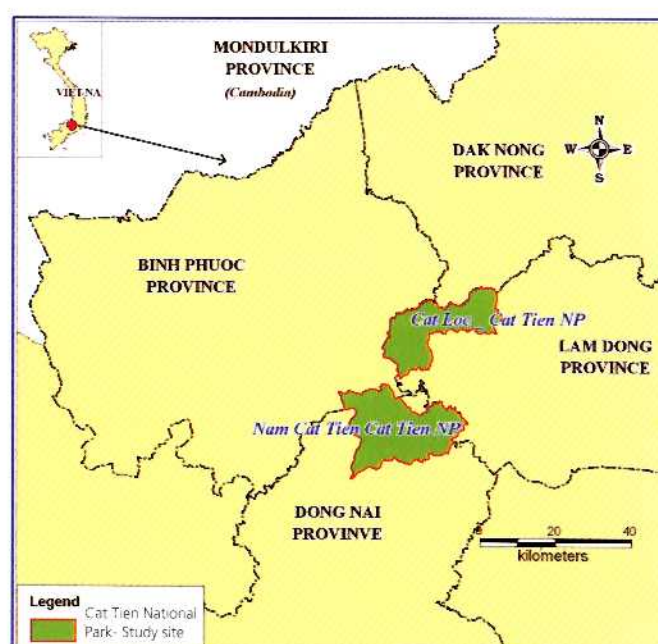


Figure 2: Cat Tien National Park in Dong Nai Province in southern Vietnam



(2) Small-scale Research Grant

Study on improving the soil environment through agroforestry using tree leaf mulch: tomato production at different water regimes under the rain-fed condition of Bangladesh



Tofayel Ahamed

Department of Agroforestry and Environment, Bangladesh Sheikh Mujibur Rahman Agricultural University, Bangladesh
300,000 Japanese yen

Farmers and other development workers often seek the highest yields as a goal of agricultural production without paying much attention to the sustainability of production itself and environmental conditions, such as soil stability. Unbalanced uses of chemical fertilisers and other agrochemicals degrade the inherent fertility of soil. As a result, natural soil ecosystems are degraded, and agro-ecosystems lose both integrity and health, and may even cause pollution.

The situation is much worse in Bangladesh, where most farming communities live under the poverty line and lack sufficient knowledge about agricultural techniques. For the past 20 years, the status of soil organic matter has been alarming in different agro-ecological regions of Bangladesh. About 60% of cropped land has organic matter less than the critical level of 1%, which indicates poor soil health. The sources of organic matter are cow dung, compost, crop residue, green manure, and other organic sources. Although the replenishment of organic matter is essential in order to revitalise soil for sustaining plant production, all these sources are either expensive (such as cow dung and compost) or too time-consuming to process (such as green manure).

Moreover, a long dry season (extending from November to April) in Bangladesh brings difficult times for farmers. When farmers use groundwater to irrigate crops for better production in the dry season, the water table is reduced and this often creates such hazards as arsenic contamination.

Agroforestry is a land use system whereby arable crops are cultivated and animals reared in connection with trees, which are pruned regularly to minimise the competition for natural resources among plant components. In agroforestry systems, trees are regularly pruned in order to minimise the competition between species for resources. The pruned materials from trees are added to green manure or mulched at planting and/or during the cropping period, so that the pruned tree leaves release nutrients into the soil

and improve the physical and chemical properties of soil; thus, ultimately improving the growth and development of associated crops.

In this study, we hypothesise that using tree leaves as mulch could conserve soil moisture by improving soil properties and reducing soil evaporation, which ultimately helps to save irrigation water and improve water use efficiency. We also hypothesise that different tree leaves such as fast decomposing and slow decomposing leaves perform differently. Certain available information contends that fast decomposing leaves can improve soil fertility, while slow decomposing leaves can conserve soil moisture. However, little information is available on how much moisture we can save by using both types of leaves in the dry season at different moisture regimes. In our experiments, we choose *Gliricidia sepium* as fast decomposing leaves and *Cassia siamea* as slow decomposing leaves.

Tomato (*Lycopersicon esculentum* Mill.) will be used as a test crop. This species is one of the most common and popular vegetables in Bangladesh. It is mainly grown in the dry season and needs much water to obtain the desired yield. The objectives of our research are to: (1) compare the tree leaves in improving soil fertility and conserving soil moisture; (2) investigate the effects of tree leaves on water use efficiency, yield, and the quality of tomatoes grown at different moisture regimes; and (3) identify an optimum irrigation level for tomato cultivation using tree leaves as mulch.

The findings of this study will help farmers, particularly subsistence farmers, to use irrigation water more judiciously. It is also believed that mulching has the potential to suppress weeds, which ultimately reduces the competition between the crop and weeds, and thus improve crop yield. Farmers would not need to use much inorganic fertilisers and other agrochemicals, and this will ultimately conserve the soil environment as well as agro-ecosystems.

Behaviour and ecology of Delacour's langur in Van Long Nature Reserve, Vietnam



Vinh Thanh Nguyen

Vietnam National University, Hanoi, Vietnam
300,000 Japanese yen

Delacour's langur, *Trachypithecus delacouri* (Osgood, 1932), belongs to the Colobinae, a subfamily characterised by many folivorous adaptations, especially in the digestive system structure (Oates and Davies, 1994). It is a species endemic to Vietnam and one of the 25 most endangered primate species in the world (Mittermeier *et al.*, 2005). One of the largest remaining populations of Delacour's langur lives in the Van Long Nature Reserve of northern Vietnam. This population is threatened by habitat loss, hunting pressure, and potential inbreeding due to genetic isolation (Nadler *et al.*, 2003). However, to date, there has yet to be any study conducted on the behaviour and ecology of Delacour's langur in the wild.

This study investigates the ecology and behaviour of Delacour's langur in the Van Long Nature Reserve, beginning in January 2006 and extending through December 2007. Our research team consists of four people, working in two groups. The methods of collecting data on behaviour are scan sampling and *ad libitum* techniques. Plant parts eaten by the langurs will be collected for identification. Botanical plots will be set up and monitored

to directly estimate the availability of food. Behavioural and ecological data will then be analysed statistically to establish the relationships between behavioural characteristics and ecological factors.

Interviews of local people and authorities will be conducted in order to determine their recognition of the importance of wildlife protection, the conflicts between local people, the benefits to local authorities, and conservation. We will take this opportunity to also share with them an understanding of the critical necessity for conserving the langur at Van Long. The results of this study will contribute to improved understanding of the ecology, behaviour, and conservation of one of the rarest primate species in the world. The study will also help raise the awareness of local people about the importance of protecting endemic and endangered species in Vietnam.

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Biodiversity of plant resources in homesteads: its meaning and change



Small-scale
Research Grant

Rashedur Rahman

Bangladesh Agricultural University, Bangladesh
200,000 Japanese yen

Bangladesh is located on the huge delta of the Ganges. Forests cover only 13% of the country's land mass and are unevenly distributed. Except for mangrove areas in the southern parts and hilly tribal areas near the border, there are very few forested areas. Under such environmental situation, homesteads play an important role as a habitat for perennial plants, since such locations are virtually the only places in the deltaic area free from inundation by floodwater. More than 120 species were reportedly observed in one village on the floodplain, thus suggesting a high diversity of plants in homesteads.

In homesteads, villagers understand the characteristics of various plants, including wild species, and have utilised different kinds of plants to meet the daily needs of their lives. However, due to recent expansion of the market economy, villagers have become more interested in the limited number of commercially valuable species. Slow growing or less commercially valuable indigenous species or varieties attract less attention. As a result, villagers are growing less of such plant species.

Concerning the social aspects of plants being grown in homesteads, women are the main caretakers of the plants. However, the male members of households do not usually pay much attention to the role of women. Combined with other factors, such as the restricted mobility of women, limited access to cash income, and other social and religious reasons, the status of women is considered low and this may affect plant diversity in homesteads.

My research intends to investigate the meanings of plant diversity in a selected homestead in Bangladesh.

Kazirshimla village in Mymensingh District was selected as a study site, because Bangladesh Agricultural University conducted research on farming in this area from 1986 to 1991, and consequently there is basic data available for examining the changes in the utilisation of homesteads.

The project will include the following research activities:

1. Listing all plants in the homesteads of selected households by direct observation and interviews:

I will record plant usage, management, and other information about plants, such as the perceptions among villagers regarding the plants, the origins of plant names, traditional uses, and the origin of any newly introduced plant. Since usage may differ from household to household and among different generations, additional information will be collected through interviews with other villagers.

2. Comparison with data from previous research (1986 to 1991):

The data collected in the field will be compared with data from the previous study conducted from 1986 to 1991. My focus is on the changes made over the past last 15 to 20 years regarding certain management issues, such as the utilisation of space, species and the number of plants, and the management of plants and perceptions among villagers regarding plants. The reasons for changes and topics of interest among villagers will be also investigated. By considering other conditions, such as sources of other income, cash expenditures, and space limitations, possible ways of maintaining a diversity of plant resources will be explored.

(3) Publication Grant

Publication of 'Marine Fishes of Palawan'



Publication Grant

Benjamin J. Gonzales

Puerto Princesa Campus, Western Philippines University, Philippines
1,000,000 Japanese yen

Effective fishery resource management requires scientific information, including the accurate identification of fish species. This is particularly true in Palawan, given the highly diverse fish fauna of the province, which features a variety of marine habitats, such as coral reefs, estuaries, sandy beaches, mud flats, rocky shores, seagrass beds, and mangrove swamps. Although fishery represents an important source of livelihood and its proper management is considered urgent, no work has been done to extensively record the diversity of fish fauna found in the waters surrounding Palawan.

An illustrated book entitled 'Marine Fishes of Palawan' will be prepared as the last phase of the fish research project funded by NEF in 1998 and 2000. The previous phases of

this project involved the collection of specimens from the southern and northern parts of mainland Palawan. In the book, the fish specimens collected will be taxonomically arranged, with ample information provided for the identification of genera and species, such as descriptions of the diagnostic characteristics of, and keys to genera and species. Literature on which systematics or classification is based will also be indicated. Every photograph of the specimens will be provided with scientific names, common English names, Tagalog names, and local names. Notes on related biology and ecology will also be provided based on the author's observations, experience, and from related literature.



Siganus guttatus



Monacanthu chinensis



Publication of 'A Field Guide for Bird Banding Studies'



Publication Grant

Wilson Novarino

Biology Department, Faculty of Mathematics and Science, Andalas University, West Sumatra, Indonesia
850,000 Japanese yen

This project proposes the publication of a photographic book entitled, 'A Field Guide for Bird Banding Studies.' This book will be based on the results of fieldwork conducted in West Sumatra between 1997 and 2004, representing the last phase of a study supported by the Nagao Natural Environment Foundation.

The objectives of the book are to:

- Provide basic information, methodologies, and an identification guide on bird banding for young ornithologists;
- Provide updated information for enhancing the study of Indonesian birds and their conservation, especially in Sumatra; and
- Fill the gap in knowledge about bird life in Sumatra.

A total of 2,052 birds belonging to 25 families and 104 species were ringed and recaptured in the study area. Reports from the study recorded descriptions of the birds captured, such as measurements, moulting and brood patch, food, habitat, seasonality, and the characteristics of each population. Conservation and trade statuses will be referred to IUCN, Indonesian regulations and the CITES' appendix.

Some of the birds found were of colour other than that described in existing field guides. Thus, colour variations among individual birds within a species were recorded and will be presented in the proposed book using colour photos, all of which were taken in the field. The study also discovered some species as a new record for Sumatra.

The book will be written in Bahasa Indonesian with some annotations made in English. Plans have been made to print 2,000 copies. Expected readers of the book include:

- Members of the Indonesian Ornithological Society (more than 100 persons);
- Students of biology and forestry departments of universities in Sumatra and other parts of Java;
- Non-governmental organisations involved in nature conservation and the environment, and bird-watching clubs;
- National park offices and Balai Konservasi Sumber Daya Alam in Sumatra;
- Local people who attend environmental education

programmes; and

- Future researchers who will conduct bird banding in Indonesia

The book is organised as follows:

Chapter 1 INTRODUCTION

- a. History of ornithological studies in Sumatra
- b. Endemism
- c. Bird migration
- d. Bird banding

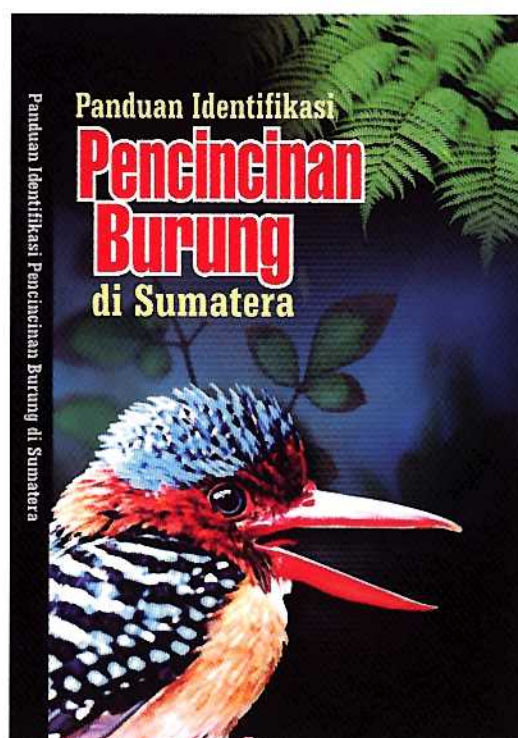
Chapter 2 HOW TO CONDUCT BIRD BANDING

- a. Ringing schemes
- b. Catching birds for ringing
- c. Keeping, handling, and releasing birds

Chapter 3 SPECIES ACCOUNT

(104 species from 25 families)

This chapter consists of the names of birds (scientific names in both Indonesian and English), photographs, description, measurements, guild, seasonality, moulting and breeding season in the study area, abundance, habitat, activities, distribution, and conservation status.



Publication of 'Biodiversity Conservation in Central Asia: On the example of Turkmenistan'



Eldar Rustamov

National Institute of deserts, plants and animals of the Turkmenistan
Ministry of Nature Protection, Turkmenistan
900,000 Japanese yen

'Biodiversity Conservation in Central Asia' will be published based on the results of the NEF-supported research project conducted from 2004 to 2005 for inventorying biodiversity in the south-western part of Central Asia. Covering a wide range of topics, this book includes sections that consider general principles of nature and biodiversity conservation with regard to specific regional peculiarities.

The book includes descriptions of modern biodiversity structure and status, explanations of the principles of flora and fauna conservation and sustainable use, and also outlines the national history and modern achievements in the protection of nature in Turkmenistan. It is stressed that the conservation of biodiversity requires the joint efforts of scientists, stakeholders, local communities and other collaborators. The role of animals in desert and mountain ecosystems and their relationship to humans is described based on both original investigations and available literary sources. The significant parts are dedicated to commercial fishery, the importance of mammals and birds as hunting species, and the relationship between amphibian and reptilian fauna and humans, particularly the value of poisonous snakes.

The book also discusses the role of strictly protected areas for biodiversity conservation and the importance of protecting unique and rare ecosystems, not only for Turkmenistan but also for the entire Central Asia region. The description of the strictly protected area includes its status, history, natural conditions, flora and fauna inventory, and specific works on rare and endangered species conservation.

A number of photographs taken in the field, graphs and maps are also included to help readers learn about conservation more effectively.

The book is organised as follows:

1. Introduction: Nature and biodiversity conservation
 - 1.1. General principles
 - 1.2. Nature conservation in Turkmenistan
 - 1.3. Fauna protection
 - 1.4. Towards the protection of rare and endangered species
 - 1.5. The general status of biodiversity in Turkmenistan
 - 1.6. Biodiversity conservation as a complex task
2. The values and functions of animals in nature and their relation to humans
 - 2.1. Animals in desert ecosystems
 - 2.2. Animals in mountain ecosystems
 - 2.3. The importance of animals to humans
 - 2.4. Game mammals and birds
 - 2.5. Amphibian and reptilian fauna in ecosystems and their importance to humans
 - 2.6. The utilization of poisonous snakes
 - 2.7. Commercial fishery
3. Strictly protected areas in Turkmenistan
 - 3.1. Main definitions and mission
 - 3.2. "Repetek" Biosphere Reserve
 - 3.3. "Khazar" State Reserve
 - 3.4. "Badkhyz" State Reserve
 - 3.5. "Siunt-Khasardag" State Reserve
 - 3.6. "Kopetdag" State Reserve
 - 3.7. "Kaplankyr" State Reserve
 - 3.8. "Amu-Deriy" State Reserve
 - 3.9. "Koitendag" State Reserve



(4) Conservation Activity Grant

Invasive alien species in the Philippines and their impacts on biodiversity: Status, challenges and directions



Conservation
Activity Grant

Rizalita Rosalejos-Edpalina

Protected Areas and Wildlife Bureau, Department of Environment and Natural Resources (DENR), Philippines
300,000 Japanese yen

The 'Conference-Workshop on Invasive Alien Species (IAS) in the Philippines and their Impact on Biodiversity: Status, Challenges and Directions' was held from July 26 to 28, 2006 in Manila. This conference was jointly organised by the Protected Areas and Wildlife Bureau (PAWB) and the World Fish Center (WFC), in collaboration and support from the following: Philippine Council for Aquatic and Marine Research and Development, DENR-Coastal and Marine Management Office, Bureau of Fisheries and Aquatic Resources, Conservation International-Philippines, Philippine Federation for Environmental Concerns, University of the Philippines, Center for Integrative and Development Studies, Institute of Biology – University of the Philippines – Diliman, College of Fisheries, Central Luzon State University (CHED-COE in Fisheries), Bureau of Plant Industry, Haribon Foundation for the Conservation of Natural Resources, Nagao Natural Environment Foundation, SunLife Financial, and San Miguel Corporation.

Scientists, policy makers, and other stakeholders attended the conference to discuss research, management, and policy associated with biological invasion both in the terrestrial and aquatic environments. This resulted in a large catalytic influence to pursue and implement actions to minimise or stop the intentional and unintentional introductions of alien species in the Philippines. In

particular, discussion focused on the state of said biological invasion in specific areas of jurisdiction, the general invasion processes and consequences, detection, and the management of these species. The multi-sectored, multi-disciplinary group of conference participants consisted of 135 representatives from academia, government, and non-governmental organisations. Visitors from Japan's Hokkaido University and China's Chinese Academy of Science also participated in the conference.

Workshop Outputs

1. A total of 25 papers and five posters were presented covering IAS status, research and policy, issues and concerns regarding terrestrial and aquatic ecosystems. The series of discussions identified major strategies, specific actions, lead agencies and stakeholders, and indicative implementation time frames. Over 40 concerns were discussed with the most urgent issues given priority for immediate action to be taken within the next three years. Lead agencies were identified or nominated to facilitate immediate action plans.
2. A consensus was reached on three key elements to be incorporated in the vision of a future IAS free Philippines: *biodiversity, sustainability, and collaborative management involving multi-stakeholders.*



Group picture

3. Participants agreed a unified declaration—the Marikina Resolution – for developing and strengthening partnerships for the management of invasive alien species. The declaration identified concrete efforts to be made in four major areas as follows:

(1) RESEARCH

- To promote and conduct research on endemic, native, introduced and/or invasive species; and
- To encourage the government to support these researches.

(2) INFORMATION and EDUCATION

- To launch public awareness campaigns regarding invasive alien species to educate the citizenry and policy makers, and encourage public support for their control and management;
- To share information that will promote the responsible farming, forestry, and aquaculture of invasive alien species, and work together to minimise the probable risks and costs of invasive alien species to the national economy as well as biodiversity; and
- To establish an information system to share IAS information and facilitate identification, early warning and coordination of prevention, mitigation and restoration measures.

(3) NETWORKING

- To strengthen institutional cooperation and establish information networks for the management of IAS; and
- To share expertise in order to build and strengthen national capacity to assess and address risks posed by, and to mitigate the impact of IAS.

(4) POLICY

- To develop strong and applicable biosafety guidelines for the responsible movement and release of live alien organisms into the country;
- To advocate the responsible implementation of these guidelines; and
- To develop an ideal national management strategy for the mitigation of impact, and collaboratively prepare a national policy and legal framework to address IAS based on this strategy.

4. The Philippines is in the process of finalising the IAS national framework to give impetus to increased collaborative efforts involving the government, private industry, academe, Local Government Units, local communities, and other interested stakeholders. This plan contains strategic recommendations for action including selected early actions for immediate implementation to address the most pressing risks, and long term elements of a national approach to manage risks from invasive species. Specifically, the following general recommendations of all stakeholders were put forward for consideration.

- Create technical working groups for the aquatic and terrestrial ecosystems composed of government agencies and the private sectors;
- Create IECs to educate the citizenry on:
 - The impact of IAS in the country
 - The different pathways of IAS entry (intentional and non-intentional)
- Improve risk assessment tools to prevent the entry of probable IAS;
- Continuously monitor ecosystems for alien species that have escaped into the wild (e.g. *Clarias gariepinus*) and strictly enforce laws to deal with those responsible for said introduction;
- Establish a national database of information on introduced species, accessible on the Web, linked to regional and global databases, and where public and private sectors can log in and view reports about the occurrence of alien species;
- Delineate the roles and functions of regulatory agencies, and promote closer ties with the law enforcement arm of the government;
- Increase multidisciplinary and multi-sectoral research on invasive alien species; and
- Keep ecosystems such as forests as untouched as much as possible, since alien species are more likely to establish and flourish in disturbed ecosystems.

As a final item, the participants discussed the importance of timely action about the anticipated impact of IAS introduction to the treeplanting project of the government. In particular, consensus was reached about taking a strong position favouring the use of indigenous species in the 'Green Highway' effort by DENR.



IAS workshop presidential table



Participants



National Conference on Insect Conservation in Tropical Landscape



Nur Hasanah

Center for Conservation and Insect Studies, Peduli Konservasi Alam (PEKA)
Indonesia Foundation, Indonesia
300,000 Japanese yen

From the simplest to most advanced insects, all play important roles in ecosystems and are useful for human activities. As pollinators, insects ensure the production of our food; as decomposers, insects help recycle nutrients across different compartments; as natural enemies, insects suppress many pest species and thus ensure crop productivity. However, insect conservation has not received much attention and is rarely mentioned by conservationists across the globe in discussions on conservation.

In order to promote insect conservation in Indonesia, the PEKA Indonesia Foundation plans to host the National Conference of Insect Conservation in Tropical Landscape in January 2007 at Bogor Agricultural University in collaboration with the university's Department of Plant Protection, the Indonesian Entomological Society, Insect Conservation Society (INSEKTA), Wacana (Wahana mahasiswa pascasarjana) Entomology-Fitopathology, and Himasita (Himpunan Mahasiswa Proteksi Tanaman) IPB.

The objectives of this conference are to:

1. Develop and formulate a concept or model of insect conservation efforts in Indonesia;

2. Train the next generation of young entomologists and conservationists regarding different topics of insect conservation and technology to prepare for future challenges posed by insect conservation; and
3. Raise public awareness about insect conservation.

Since PEKA is particularly keen to foster entomologists for future insect conservation in Indonesia, it welcomes those less than 40 years old, including students, government employees, and citizens who are interested in insects.

The conference consists of a variety of activities, including a plenary session, symposia, training courses, conference, insect photo festival, scientific poster competition, student activities, young scientist awards, student rendezvous and exhibition, and a book fair. Among these activities, NEF supports the plenary session and symposia. Six distinguished experts in entomology from both Indonesia and overseas are invited to speak at the plenary session, while eight topics concerning insect research and conservation will be discussed at the symposia (Table 1).

Table 1. Topics of Symposia at the National Conference of Insect Conservation in Tropical Landscape

Symposium 1	Land Use Changes and Insect Diversity in the Tropics
Symposium 2	Insect Systematics and Entomology Development in Indonesia
Symposium 3	Ecosystem Health and Biological Control
Symposium 4	The Use of Information Systems in Insect Study
Symposium 5	The Use of Insect Pollinators in Agriculture
Symposium 6	The Threat of Invasive Species in Agriculture Ecosystems
Symposium 7	Herbivorous Insects in Agroecosystems
Symposium 8	Physiology and Toxicology of Insects

Workshop on Sulawesi biodiversity and conservation curriculum for north Sulawesi high school teachers



Johanis Pelealu

Chairperson of Biology Study Program, Faculty of Mathematics and Natural Sciences, Sam Ratulangi University, Manado, North Sulawesi, Indonesia
300,000 Japanese yen

Background

Biodiversity loss is now a global issue. The rate of biodiversity destruction is not being followed by a greater awareness of conservation. However, in the world of academia, this issue has not been addressed by improving the curriculum regarding biodiversity and conservation. Most teaching communities lack the necessary awareness regarding biodiversity, which represents one of the most important social and academic issues of our day.

Sulawesi is one center of Wallacea Region Biogeography that has high biodiversity and certain species that are endemic to the island, particularly in North Sulawesi, such as the Sulawesi crested black macaque (*Macaca nigra*), Gorontalo macaque (*Macaca nigrescens*), and Talaud lorry (*Eos histrio*). In North Sulawesi, the main factors behind the threats to biodiversity are hunting for consumption and the destruction of habitat, such as for community housing and the use of land mainly for agriculture.

Unfortunately, the younger generation lacks an appreciation of this field. Therefore, education to raise awareness among the younger generation regarding Sulawesi biodiversity and conservation is very important. Biology teachers can serve as conservation agents to spread the message of conservation. At the high school level, specific topics relating to biodiversity should be introduced in the classroom, in conjunction with group projects involving field investigations, for which teachers should place importance.

For these reasons, we will conduct a workshop about Sulawesi biodiversity and offer a conservation curriculum for North Sulawesi high school teachers. This workshop could well prove to be a model for teaching biodiversity in high schools.

Objectives

1. To train North Sulawesi high school biology teachers about Sulawesi biodiversity and conservation; and
2. To construct a biology curriculum based on Sulawesi biodiversity and conservation for North Sulawesi high school.

Expected Outcomes

1. Providing a high school biology curriculum based on

biodiversity and conservation, and

2. Enhancing the abilities of biology teachers as conservation agents.

Methodology

a. Time and Locations

The Faculty of Mathematics and Science at Sam Ratulangi University will conduct the workshop in January 2006 as part of the Biology Study Program. The locations of the workshop are Manado, North Sulawesi, and Bogani Nani Wartabone National Park.

b. Topics

- Biodiversity of Sulawesi, Threats to Sulawesi Biodiversity, Conservation of Biodiversity, and Biodiversity and Conservation under Indonesian Law.
- Evaluation and Construction of a Biology Curriculum Based on Biodiversity and Conservation.

c. Methods

- Training and workshop on Sulawesi biodiversity, and conservation education provided by education and conservation experts.
- Evaluation and construct curriculum based on biodiversity and conservation.

Timetable

Day	Activities
1	Sulawesi Biodiversity, Threats to Biodiversity
2	Conservation of Biodiversity, Biodiversity and Conservation under Indonesian Law
3	Evaluation of Biology Curriculum in High Schools
4	Construction of a Biology Curriculum based on Biodiversity and Conservation
5	Field Trip to Bogani Nani Wartabone National Park

Participants

Trainees: 20 Teachers of North Sulawesi Biology High School.

Instructors: Officials of the North Sulawesi Education Department, Director of the Wildlife Conservation Society IP Sulawesi, officials of the Indonesian Forestry Department, and Dean of the Faculty of Mathematics and Science.



2 Progress of the projects in 2005



Progress reports for some projects funded
in 2005 are shown in the following pages.

(1) Research Grant

Conservation of gaur (*Bos gaurus*) and banteng (*Bos javanicus*) in Cat Tien National Park and Ea So Nature Reserve



Nguyen Manh Ha

Centre for Natural Resources and Environmental Studies (CRES), Vietnam National University, Hanoi, Vietnam

Vietnam is known as one of the most important countries for biodiversity conservation. Vietnam is home to many of the world's unique species, especially endemic species of the Indochina peninsula such as sao la (*Pseudoryx nghetinhensis*), giant muntjac (*Muntiacus vuquangensis*), Truong Son muntjac (*Muntiacus truongsonensis*), crested gibbon (*Nomascus* spp.), and douc langur (*Pygathrix* spp.). As with many globally threatened large mammals, the gaur (*Bos gaurus*) and banteng (*Bos javanicus*) are the most endangered ungulates in the country. Hunting and illegal wildlife trade are widely recorded in Vietnam. Consequently, the populations of most large mammals in Vietnam have reportedly been declining at several levels. Moreover, these activities have led two wild cattle species to the brink of extinction. Nevertheless, only a few studies have been conducted in Vietnam to assess the status and conservation measures for wild cattle. For example, Thach M.H. and Nguyen M.H. (2006), and Nguyen M.H et al. (2005) studied wild cattle in the provinces of Binh Phuoc and Dak Nong. Ling (2000) and Ben H. (2004) conducted



Camera trap survey in Ea So Nature Reserve



Research team in Ea So



two quick assessments of wild cattle in Cat Tien National Park. Le X.C. *et al.* (1997) conducted a large mammal survey in Dak Lak province, including the Ea So Nature Reserve. Subsequently, no further research or conservation action has been taken for these species.

This study was conducted in two important areas of wild cattle distribution—Cat Tien National Park and Ea So Nature Reserve—with critical financial support provided by the Nagao Natural Environment Foundation and the Centre for Natural Resources and Environmental Studies. Both protected areas are not only an important range for gaur and banteng, but also an important habitat for several other globally threatened animals. The main objectives of the study were to:

- Investigate the current status of gaur and banteng;
- Identify the local distribution of gaur and banteng in Cat Tien National Park and Ea So Nature Reserve;
- Identify the causes of threats posed to gaur and banteng;

- Increase scientific working capacity for local scientists in the conservation of global threatened species;
- Make recommendations for the conservation plans for gaur and banteng;
- Distribute the results to conservation organisations through ongoing activities in Cat Tien National Park and Ea So Nature Reserve in order to improve conservation management; and
- Develop a proposal for follow-up conservation activities.

The results from the first year of this study confirmed that both Cat Tien National Park and Ea So Nature Reserve were the most important areas for gaur and banteng in Vietnam. The study found that several herds of gaur and banteng existed in Ea So Nature Reserve while several herds of gaur were the only wild cattle remaining in Cat Tien National Park, where the banteng is already extinct. Therefore, Ea So Nature Reserve is one of the few areas in Vietnam where both gaur and banteng can still be found.



Wild cattle killed by hunter in Ea So



Gaur killed by snare trap in Cat Tien National Park

The results of this study revealed that hunting and snare trapping are the most serious threats to the survival of wild cattle. For example, at least 10 wild cattle were reportedly killed by hunting and trapping in the two protected areas during this study. Habitat destruction is the second most serious threat posed to the gaur and banteng. In

addition, fragmentation of the habitat and population pose significant threats to the survival of gaur and banteng in the near future. Most of the remaining populations of wild cattle have been recorded in very fragmented forests. Consequently, inbreeding could be a future problem for these isolated populations.



Field research in Cat Tien



A healthy gaur herd in Cat Tien



Land Snail Diversity on the Island of Java



Heryanto

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Background

Among the 171 species of land snails found on the satellite islands of Java (Jutting 1952), only 125 were found on the island of Java. Most of the land snails found were discovered in West Java (117 species), while fewer species were discovered in Central Java (45 species) and East Java (57 species). In West Java, the land snails were primarily found in the Mount Gede-Pangrango complex, which is home to about 95 species (Jutting 1948, 1950, and 1952). This finding was largely due to the research conducted by Museum Zoologicum Bogoriense in Bogor on land snails mainly in the Mount Gede-Pangrango area, while East and Central Java were somewhat overlooked, particularly for land snails.

However, Central and East Java are considered potential



Photo 1: *Elaphroconcha javacensis*

areas of having many species of land snails especially in karst areas, where there are abundant deposits of lime material for building their shells. The karst environment is the best place for land snails to live, especially microsnails (1 mm in size). Research on land snails in East and Central Java will be able to find many species of land snails that have yet to be discovered. Given its potentiality, this research was intended to discover land snails that have "yet to be found in Java" as mentioned by Jutting (1952). The probability of finding new species of land snails remains high, especially for microsnails.

Research Methods

Research was conducted by using free collection and purposive sampling methods. In free collection, land snails were opportunistically collected through visual searching

and by handpicking them from their prime habitat. The snails were collected from standing vegetation (on barks, on and behind leaves), fallen tree trunks (under the trunks and behind rotten barks), rocks, under leaf litter, and in streams.

In purposive sampling, plots of 1m² were established in each type of habitat, especially those consisting of leaf litter and debris. Visual searching and handpicking were employed in finding land snails in the plots. The snails found were collected and stored in glass bottles and preserved in 70% alcohol.

Results

A.Habitat

Six places were visited from June to August 2006: Pacitan, Mount Sumeru, and Tuban (East Java), Gunung Kidul (Yogyakarta), Gudawang, and Ciremay (West Java). Pacitan, Tuban, Gunung Kidul, and Gudawang are karst environments, whereas Mount Sumeru and Mount Ciremay are typical rain forests.

1. Limestone boulders

Boulders can be found anywhere in a karst environment such as between bushes, in the yards of homes, or on beaches. Sizes range from 49 cm to 300 cm in diameter, with a height from 40 cm to 400 cm. Snails in this kind of habitat were found in the holes and crevices of boulders.

2. Limestone walls

The walls were part of the limestone hills and could be the edges of a large gap. The dimensions were up to 400-cm high and as long as 2 km. The walls were



Photo 2: *Parmarion pupularis*

covered by many types of small vegetation that lowered the environmental temperature. The snails were found clinging to the limestone walls, and on vegetation stems and leaves.

3. Bushes

Fully-grown, healthy bushes were only found in the tropical rain forest. The dense bushes retain moisture and lower the temperature, and subsequently create an environment favourable for snail life. Snails could be found under the leaves, on the stems, and on the forest floor.

4. Rotten tree logs

Many large trees in the rain forest eventually fall down due to senescence. The rotten wood was the preferred food and home for many animals including snails. The pulpy wood inside retains moisture even though the outer bark is dry. Opening the rotten wood would expose the snails living inside. Frequently, only shells were found since the snails were trapped inside.

B. The snails

As many as 49 species of land snails were found. One species was assumed to be new species since Benthem Jutting (1950) had not described it. One species was considered a new record because Benthem Jutting (1952) described it as "not found yet" in Java. Photos of the samples are presented.

Photo 1: *Elaphroconcha javacensis*

This species lives under fallen leaves and low vegetation, and in rotten wood. The large shell size was up to 3 cm in width. The somewhat low, conical shell shape is more wide than high.

Photo 2: *Parmarion pupilaris*

Parmarion is a slug commonly found elsewhere in Java, ranging from the yards of homes to deep forest. This slug lives under leaf litter, potted plants, and rotten wood. It has a small shell concealed by its mantle. However, a small part of the shell remains exposed by a hole on the dorsal side.

Photo 3: *Parmarion* sp.

This slug is most probably a new species. Its mantle extends to the head region and covers the head as well as the antennas just like a hood. It lives under rotten leaf litter, fallen trees, and rock boulders.

Photo 4: *Amphidromus perversus perversus*

This snail is an arboreal snail since it lives attached to large and tall trees, far above the ground. This research found the snails on banana and coconut leaves at heights of 3 to 8 meters.

Photo 5: *Meghimatium striatum*

This slug is very distinctive with its five longitudinal bands of dark brown on a lighter background colour. One band is on its dorsal side, with two bands each on each side. The bands on the slug found form a reticulate pattern on its sides. It was found under moist, rotten wood.



Photo 3: *Parmarion* sp.



Photo 4: *Amphidromus perversus perversus*



Photo 5: *Meghimatium striatum*



Risky aquaculture in vulnerable mangrove ecosystems: environmental monitoring and suggested biological solutions for sustainable development



Research Grant

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Background and Objectives

Like other countries in Southeast Asia, Vietnam has witnessed a shrimp culture that has been developed in mangrove areas. In addition to high profits, this practice may also generate negative impacts on the environment of vulnerable mangrove ecosystems. Consequently, this environmental degradation leads to a reduction in shrimp rearing yield and even a loss of shrimp culture harvests. Among the affecting factors, pollution including chemical and antibiotic pollution poses a critical issue in the shrimp culture. In order to help reduce the risks in shrimp rearing



Shrimp ponds at the research site (Giao Thuy Dist., Nam Dinh Province)

in mangrove areas, a case study has been conducted at the Giao Lac Commune, Giao Thuy District, Nam Dinh Province with a focus on the following:

1. Assessing environmental pollution (using physio-chemical parameters and biological indicators) inside and outside extensive farming ponds in mangrove areas;
2. Assessing the level of bacterial resistance to antibiotics in samples collected from shrimp ponds in mangrove areas; and
3. Screening indigenous mangrove micro-organisms producing antibiotics and toxic metabolites against pathogenous micro-organisms (mainly white spot and luminous *Vibrio harveyi*) in order to produce probiotic preparations for bio-control of shrimp disease and for cleaning polluted water, and to study the possibility of raising algae, absorbing humus and waste in shrimp ponds for environmental cleaning.

Methods

To achieve the objectives above, the following methods were employed during the one-year period from September 2005 to September 2006:

1. Gathering and analysing relevant secondary data, information on geological, sedimentological, topological, hydrodynamic, tidal regime, oceanographic, biological, and ecological characteristics of shrimp ponds in mangrove areas, as well as in surrounding areas;
2. Sampling and analysing water samples (using analysed parameters of pH, temperature, DO, BOD, COD, conductivity, salinity, turbidity, NH_4 , NO_3 , NO_2);
3. Sampling and analysing phytoplankton samples in terms of composition and quantity; and
4. Isolating and screening indigenous mangrove micro-organisms to produce antibiotics and toxic metabolites against pathogenous micro-organisms.

Results and Discussion

There are two main types of shrimp ponds: extensive and intensive. The intensive shrimp ponds are characterised by small areas (some thousands of square meters), high-density stocking (25-35 shrimps/m²), and the use of industrial feed. Intensive ponds are about 1.2 to 1.5 meters deep. Conversely, extensive shrimp ponds are much larger (some up to more than ten hectares), with low-density stocking (5-10 shrimps/m²), and mainly use natural feed or locally produced feed.

The preliminary results revealed that the environment of shrimp ponds in mangrove areas and surrounding areas (canals) were impacted by the practice of shrimp rearing. The content of such nutrients as total nitrogen and total phosphate increased over the passage of farming time, and was higher in canals. It was noted that the level of pollution usually did not exceed permissible levels. In some particular cases, some parameter values such as for sulfate and nitrite failed to meet or even approach acceptable levels. In the farming ponds, the dark green, yellowish green, or brownish green water that showed signs of the presence of Chlorophyta and Bacillariophyta is considered good. The good quality of intensive ponds may suggest that the application of farming techniques might control the content of polluting nutrients.

The mangroves have contributed to regulating water temperature and pH. The pollution caused by effluents from shrimp ponds and the decomposition of litterfall and other sources contribute to the fact that the amount of nutrients was higher than that in other research areas (with total nitrogen of 0.5mg/l and total phosphate of 0.3mg/l). In general, it can be noted that a mangrove area becomes a place where the suspended solids from shrimp culture effluents accumulate.

Phytoplankton at the research site was fairly dense. Among the phytoplankton species found, Bacillariophyta was dominant (occupying 64.2%), with its distribution fully reflective of the general tendency of all phytoplankton. Therefore, Bacillariophyta has a profound influence on and is typical of all phytoplankton at the research site. In general, phytoplankton density varied with time and different sites. Environmental factors such as temperature, salinity, and nutrient salts might be of significance to phytoplankton growth, particularly in estuarine mangrove areas that are rich in nutrients.

The control effect against six pathogenic *Vibrio* species in brackish water shrimp was investigated in 448 bacterial strains, among which 67 strains (15.1%) were observed to exhibit antiviral activity against the *Vibrio* pathogens.

Among these 67 bacterial strains were 17 that strongly inhibited the growth of the test *Vibrio* species. However, out of these 17 bacterial strains, only four (encoded as V33(1), 47Lm6, 47Lm9, and 55Lm1) qualified for selection in probiotic production to control *Vibrio*-caused disease in brackish water shrimp. This is because these four bacteria strains could inhibit various *Vibrio* pathogens, whereas they did not inhibit one another. Furthermore, these bacteria were able to grow and suppress *Vibrio* in brackish water and increase the survival rate of shrimp *Vibrio* in vivo. Finally, these bacteria were found capable of producing enzymes that decompose starch and proteins, which can help eliminate feed waste in shrimp culture ponds. All four bacterial strains selected were found belonging to the genera *Bacillus*—a microbial group considered relatively safe to the environment. As a result, these bacterial strains offer high potential for application in producing probiotics for use in aquaculture.

Further investigations will be continued in the next phase. Environmental monitoring and appropriate actions would contribute to controlling and improving the environmental quality of shrimp ponds in coastal areas for sustainable development. It is also necessary to design orientations for the rational use of mangrove ecosystems, combined with aquaculture on an ecologically sustainable and environmentally-friendly basis.



Sampling in the field



Studying *Vibrio* inhibition ability of seed tiger shrimp (in vitro)



Research on an integrated fish culture system based on the recycling of resources to protect aquatic biodiversity and the environment



Research Grant

Thongkhoun KHONGLALIANG

Technical Section, Namxouang Aquaculture Development Center (NADC),
Department of Livestock and Fisheries, Ministry of Agriculture and
Forestry, Lao PDR

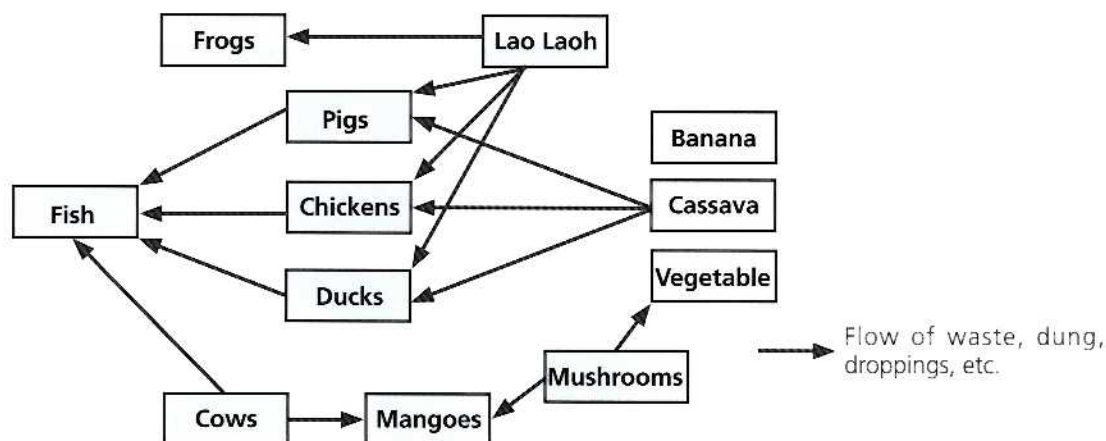
Background and Objective

Food security is the most important concern among people in rural areas of Lao PDR. Rural people hunt animals and collect various wild plants for their direct consumption and/or for obtaining small cash income to buy food. The pressure on aquatic resources is particularly strong, since fish, frogs, and aquatic insects are the main source of animal protein for these rural people.

To minimise the exploitation pressure and protect natural aquatic resources, it is necessary to provide rural people with an alternative way of producing sufficient food using

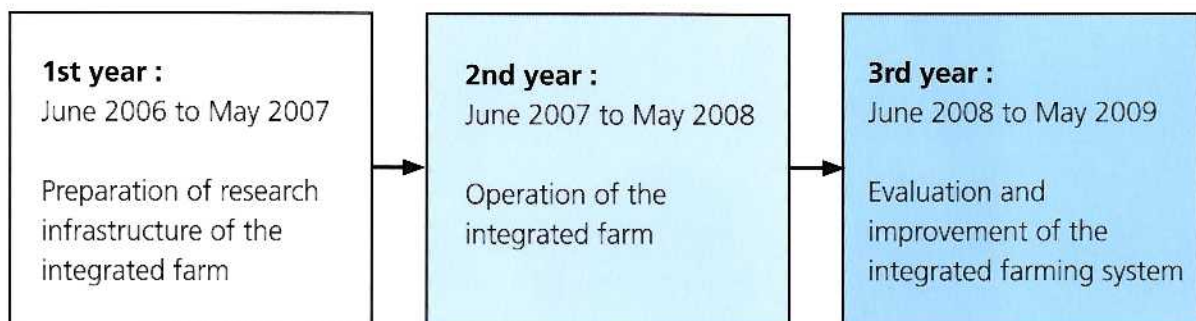
a low-input, low-risk, and environmentally-friendly method. The recycling of resources in the integrated fish culture is one of the promising ways to produce various kinds of food, including fish—the most important source of animal protein.

The present research is being conducted to establish an integrated production system of fish and other food items by recycling the by-products of various production activities as illustrated below. The system will be established on the premises of Namxouang Aquaculture Development Center (NADC).



Method

The present research is being conducted in the following three steps:





Cassava field



Frog breeding tanks

Progress (as of the end of September 2006)

1. Preparation of research infrastructure

- (1) Existing facilities before initiating research
Four fishponds, one chicken coop, one duck coop, one cattle barn, two worker's houses, and one warehouse.
- (2) Existing materials before initiating research
Eight cows and 15 young mango trees.
- (3) Work force
Two workers were employed. A farm management team was organised by the staff of NADC and the two workers.
- (4) Procurement of equipment
One hand tractor, one grass cutter, and one water pump were procured.
- (5) Construction
The farm management team constructed an electricity distribution system, frog breeding tanks, frog growing tanks, a pig house, a cassava field with a fence, and a banana and dragon fruits garden with a fence.
- (6) Facility improvement
The farm management team improved two existing fishponds by cleaning the bottom and sides of the ponds.

2. Farming activities

- (1) The farm management team has started preparatory farming activities using newly constructed or improved facilities to obtain basic data toward launching full-scale operation in the second year.
- (2) Fish fingerlings, 3,000 carp fingerlings, 3500 tilapia fingerlings, 2,000 Puntius fingerlings, and 1500 grass carp fingerlings were stocked in the improved fish



Pig house

ponds in July and August.

- (3) Two groups of young frogs were stocked in the newly constructed frog growing tanks in July. One group consists of 900 frogs with an average body weight of 4.0 grams; the other group consists of 249 frogs with an average body weight of 52.5 grams.
- (4) From June to August 2006, 200 cassava seedlings, 120 banana seedlings, 150 dragon fruits seedlings, and 50 pineapple seedlings were planted in two fields protected by fences.

3. Plan for the next six months

- (1) Three piglets will be purchased and raised in the pig house.
- (2) Mushroom culture will be started.
- (3) Presently, it is not possible to conduct chicken and duck culture due to bird flu. Therefore, some other animals, such as goats, will be added to the integrated farming system.
- (4) The making of compost will be attempted.



Frog growing tanks



Pond with duck coop



Indigenous forest management: A case study of sacred forest as common pool resource



Research Grant

Souksompong Prixar

Deputy Head of Research and Graduate Division, Faculty of Forestry,
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This study was intended to investigate the present situation of indigenous forest management in Pakkading District, Bolikhamxay Province, Lao PDR, through a comprehensive survey including interviews with villagers. This study also focused on local institution strengthening to manage natural resources in relation to people's belief in the spirit of the forest. The study objectives are set to examine forest management as a common pool resource system, focusing on such local institutions as the rights given to local people and their roles in management.

This study found that the successful forest management is fundamentally based on the institution strengthening to take care of the resources and this strongly affects the sustainability of those resources. The institution strengthening originates from the following factors:



Performance of the ritual function



Our survey team recording

(1) Punishment

People carefully use the resources within the sacred forest, because they fear the spirit of the forest who owns those resources. They carefully select things to take from the forest and know what they should do or not do, as well as when and where. People believe that any violation of such beliefs will cause bad things to befall them and their families as has occurred in the past. Thus, before and after they use, or permit outsiders to use the forest, they must perform a ritual function to remind themselves of the regulations they are obliged to follow.

The belief of local people has a conservation effect on the forest, which provides them with important natural resources. People believe that if they conduct wrong practices inside the sacred forest, regardless of who they are, it would adversely affect their lives.

(2) Simple traditional regulations

Regulations regarding the use of natural resources in the sacred forest are simple for everyone to understand as follows:

- Before collecting Non-Timber Forest Products (NTFPs) by felling trees and conducting any other activities inside the forest, a ritual must be performed to obtain permission from the spirit.
- Dragging or pulling anything from the forest and making loud noise are banned.
- During Buddhist religious days, no activities are permitted in the forest.



A team member creating a line

These regulations were developed because villagers believe that wrong activities regarding the use of natural resources of the forest will affect them negatively. When people recognised such things as being harmful to their lives, banning the activities above became common practice. An individual's choice of behaviour in any particular situation would depend on how the individual learns about, views, and weighs the benefits and costs of actions and their perceived linkage to outcomes. These regulations are expressed as traditional laws—the major source of working rules—particularly when compliance is actively monitored and sanctions for noncompliance are enforced.

(3) Equal rights

At the village level, the current use of natural resources within the village territory emanates from traditional practices that have been developed through spiritual beliefs, traditional rules, and intrinsic values of the community. The natural resources become a common pool resource when individual use is recognised by

the community, and with fair punishment given to perpetrators regardless to social family status. Social solidarity—which is the major problem concerning collective action in the village forest management system—develops through equality. The presence of social solidarity provides locally involved institutions that facilitate collective action, and this is an essential mechanism for implementing community-based resource management.

The spirit plays an important role in the conservation of natural resources. The equal punishment dealt to perpetrators leads to good governance of those resources. The villagers' belief in the spirit of the forest unites them into a strong social group. This model of forest management is very simple, but leads to the sustainability of natural resources in Laos. Although it is difficult to verify the effectiveness of the spirit, forest managers should take it into account when developing a forest management model.



A beehive in the sacred forest



Tree species in the sacred forest



Creek flows from the sacred forest



A guidebook on 'Taxonomy of Termites (Nasutitermitinae; Termitidae) in Kerinci Seblat National Park, Sumatra'



Research Grant

Syaukani

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Kuala University, Banda Aceh, Indonesia

Termites have been found to be the most important arthropod decomposers in the tropical forest ecosystem, representing more than 60% of all macro-invertebrates inhabiting the soil in lowland forests. The number of termite species, their biomass, and feeding groups have strong correlations with the soil quality of the forest floor. Hence their diversity (especially the soil-feeding group) provides an excellent, simple, and effective key indicator for understanding biodiversity in a forest. Due to their quick response to environmental changes, termites are considered a very important insect group for conservation programmes in the tropical forest.

As the largest subfamily among higher termites (family Termitidae), Nasutitermitinae include over 63 genera and 550 species, with all presently recognised feeding types. This subfamily probably originated in the Neotropical region during the Cretaceous period, and features a highly specialised morphology, with the greatest development of defensive nasutes. Nasutitermitinae play an important role in ecosystems, especially in tropical rain forests extending over various biogeographical realms. Their feeding menu is

extremely diverse, ranging from wood to organic remnants in soil, and also fungi, with species of the *Subulitermes*-branch in particular being humus and soil feeders. There is an abundance of species among Southeast Asian Nasutitermitinae, especially in the forests of Borneo, Sumatra, and Peninsular Malaysia.

The taxonomy of Nasutitermitinae in Southeast Asia remains sadly neglected and confused. In many published papers, neither the original authors nor any subsequent reviewers have given a satisfactory diagnosis or description for each taxon. Furthermore, their phylogenetic relationships are not yet well known. Among existing problems, the status of two ambiguous genera—*Nasutitermes* and *Bulbitermes*—require a quick solution. There are more than a few species waiting to be described.

This project was intended to: (1) produce a guidebook on the termites of the subfamily Nasutitermitinae from Kerinci Seblat National Park in Sumatra, where an identification guide at the species level with full-colour pictures is urgently needed to promote ecosystem surveys; (2) provide



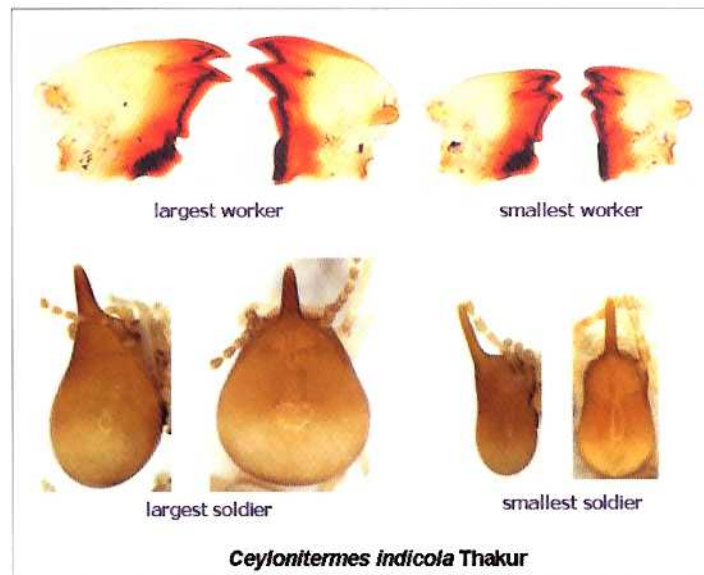
Hirtitermes sp. 1

a simple and effective key to the Nasutitermitine species that can be used not only by termitologists but also by naturalists in general; and (3) show the importance of worker mandible characteristics in termite identification and classification, especially at the genus level.

Kerinci Seblat National Park comprises an area of 1.5 million ha stretching over the four provinces of West Sumatra, Jambi, Bengkulu, and South Sumatra. Termites were collected using a standardised sampling protocol (belt transects and permanent plots) and by casual collection. Termite specimens were collected in the park from different habitats and at different elevations. Termites will be sorted into genera and species based on the morphological characteristics of the soldier (both the largest and smallest),

worker (both the largest and smallest), nesting, foraging biology, and biogeographical information. The Termites Research Group at the Natural History Museum in London will conduct a final identification check before the book is released.

The guidebook, an expected product of the present project, will prove helpful for entomologists and conservationists in terms of identification and data analysis, since it is concise yet contains many colour pictures and user-friendly keys to species and genera. With this guidebook, conservation work will be able to have accurate targets, be implemented quicker, and achieve more beneficial results for society.



Mandibles and heads of *Ceylonitermes indicola*



Nest of Nasutitermitinae



Developing collaborative management of national parks in Indonesia



Widada

Directorate General of Forest Protection and Nature Conservation, The Ministry of Forestry, Indonesia

Introduction

As of December 2005, the Government of Indonesia has established 50 management units of national parks covering an area of 16.4 million hectares. According to the Forestry Minister Decree No. P.19/Menhut-II/2004 dated October 19, 2004, Indonesian national parks should be managed through collaborative management with stakeholders at various levels.

This study was intended to initially identify the key factors in developing collaborative management (co-management) with stakeholders related to park management, and secondly to develop models of co-management for national parks in Indonesia.

The study focused on the following eight national parks (NP) in Indonesia: Gunung Halimun Salak, Gunung Gede Pangrango, Ujung Kulon, Meru Betiri, Bali Barat, Komodo, Rawa Aopa Watumowai, and Way Kambas. Phase 1 of the

study was conducted from January to September 2006, with data collected from the field and related institutions, such as (1) national park offices, (2) Directorate General of Forest Protection and Nature Conservation (DGFPNC) of the Ministry of Forestry, and (3) at the provincial, district, and sub-district level (Table 1).



Researchers accompanied by a local guide traveling by water (boat) in Rawa Aopa Watumowai NP



An important factor influencing the success of developing co-management is the existence of fair and sustainable economic benefits for local people. Success story of the development of community-based mangrove management in Rawa Aopa Watumowai NP



National Park management discussions (among Ujung Kulon NP staff, Gunung Halimun Salak NP staff, and JICA Experts) at the Room Meeting of Ujung Kulon NP

Table1. Characteristics and sources of data

Type of Data	Characteristics of Data	Sources
General conditions of NPs used for developing a co-management model	Primary and Secondary	NP Offices and DGFPNC
General conditions of villages surrounding NPs (that will affect and be affected by co-management)	Primary and Secondary	Provincial, District, and Sub-district Governments
Specific NP policy on co-management at Management Unit level	Primary and Secondary	NP Offices and DGFPNC
Existing co-management practices conducted by NPs (incl. planning, organising, actuating, and controlling)	Primary and Secondary	NP Offices and DGFPNC
Problems/constraints of NP co-management practices (internal and external problems)	Primary	NP Offices, Local Government, and Local Communities
Identification of NP stakeholders (positive, negative, and neutral stakeholders)	Primary	NP Offices, Local Government, and Local Communities
Local institutions that might play important roles in NP co-management	Primary	NP Offices, Local Government, and Local Communities

Identification of key factors to develop co-management

The main objective of developing co-management is to formulate a form of park management that accommodates the stakeholder interests in a fair and intelligent manner. This will increase the concerns, care, and awareness of stakeholders in terms of supporting the sustainability of biodiversity and ecosystems within the parks. Findings from the field identified the following important factors that influence the success of developing co-management:



Repeated forest fires motivate Way Kambas NP to develop 'Community based Nation Park Protection on Forest Fire Prevention'

1. The high commitment of park managers supported by adequate technical, managerial, interpersonal (human relations) capabilities of existing NP staff.
2. Convergent perceptions of relevant stakeholders (local people, local government, and NGOs) on the importance of NP management sustainability. For example, in some cases (Gunung Halimun-Salak, Ujung Kulon, Rawa Aopa Watumuhai), the shared perceptions among stakeholders resulted in the successful development of a model of community-based national park protection.
3. Fair and sustainable economic benefits for local people. Successful examples include the cultivation of medicinal plants in Meru Betiri and the development of community-based mangrove management in Rawa Aopa.
4. Integrated NP management planning. In general, while the parks successfully developed community empowerment programs especially for conservation-oriented farming, they failed to market the products due to a lack of marketing programs.
5. The strong commitment of stakeholders to the principles of co-management, such as mutual respect, honour, trust, and the sharing of benefits.



Captive breeding of *Leucopsar rothschildi* in Bali Barat NP is a prospective development with an approach of community-based captive breeding in order to improve the community's welfare

Stakeholders that influence park co-management

Stakeholders that influence the management of parks in Indonesia can be categorised into three levels: international, national, and local. International institutions and NGOs, such as UNESCO, IUCN, CI, TNC, WWF, JICA, Wetland International, the International Rhino Foundation, FFI, DFID, and ITTO, play important roles as donors in the development of co-management. They also have a strong influence on determining the scope and design of collaboration involving the planning and implementation stages.

National stakeholders involved in the development of co-management are NGOs (e.g. CI Indonesia, WWF Indonesia, FFI Indonesia, Yayasan Mitra Rhino, Telapak, BCI, RMI), universities (e.g. IPB, UI, UGM, Unila), research institutions (e.g. LIPI, Forda), and related private sectors (e.g. travel agencies). At the regional level, provincial and district governments also play an important role in developing co-management. Meanwhile, local level stakeholders are local people who live in the park, depend on the park's natural resources, and/or feel threatened by the existence of the park.

To develop models of co-management

Existing models of co-management can be grouped into four categories: 1) Nature tourism (ecotourism) management; 2) National park protection; 3) Local community empowerment; and 4) Conservation and environment education. However, these models of collaboration are generally considered not sustainable, since implementation is on a project basis, under time constraints (one to five years). As a result, when a project ends, national parks often discontinue the program and related activities due to budget constraints. Therefore, increasing the effectiveness of co-management development requires the following:

1. Strengthening the teams for national park management, such as initiator and facilitator, involved in the program and co-management activities;
2. Using the synergy and integrating the phases of the management process (planning, organizing, actuating, and controlling);
3. Supporting co-management by providing relevant equipment, data, information, and sufficient budgets; and
4. Clarifying a working mechanism and the roles of stakeholders in all co-management activities.



To prevent rampant encroachment, Gunung Halimun-Salak NP developed community-based ecotourism



Workshop on taxonomy assessment and identification priorities of Indonesia plant taxonomy towards 2010 target



Research Grant

Elizabeth A. Widjaja

Botany Division, Research Centre for Biology, Indonesian Institute of Sciences (LIPI), Indonesia

Introduction

Taxonomy is a used tool to identify, name, and enumerate the components of biological diversity. Consequently, taxonomy provides the basic knowledge underpinning biodiversity management and implementation of the CBD. Locating information about an organism is very difficult if no name for it is available, since the name is the unifying reference for all data. For that reason, it is necessary that Indonesia, which has the world's third largest area of biodiversity, to take into full account the importance of taxonomic capacities in achieving the goals of the convention, support taxonomic activities to attain the 2010 target, and provide all necessary support for the Taxonomic Centre of Research and Expertise. Indonesia has the largest herbarium (the Herbarium Bogoriense) in Southeast Asia and is also historically very important for the study of plant diversity in this region. However, there are some small herbaria scattered throughout Indonesia that actively collect and inventory the local plant diversity, such as the Manokwari Herbarium (MAN), University Palangkaraya Herbarium (CIMTROP), University Tadulako Herbarium (Herbarium Celebense), University Sam Ratulangi Herbarium (Herbarium Wallacea), University Andalas Herbarium (ANDA), and University of Brawidjaja (UNBRAW). Consequently, we need a network to access the information that is available in other herbaria within the country. By having a network and collaboration between the herbaria, an inventory of Indonesian flora will be obtained faster for enumeration, with endemic and endangered species also listed for assessment. This study is very important to support enumerating the quota of the international plant trade, domesticate the important species for trading, and reintroduce endangered species to the original locality.

On the other hand, Indonesia has an Indonesian Plant Taxonomy Association called PTI (Penggalang Taksonomi Tumbuhan Indonesia). Every two years, PTI hosts a congress and workshop for members of the association, so that they can exchange information and review the progress of research through scientific presentations made at the meeting. The Research Centre for Biology-LIPI that operates the Herbarium Bogoriense worked closely with PTI to

conduct a workshop last year (2005) in order to form a network between the herbaria in the country and organise a program of work on plant taxonomy in Indonesia. At the same time, the progress of research conducted by the PTI members was presented. For these reasons, in addition to the members of PTI, the heads of the herbaria were also invited to discuss the goals of taxonomy in Indonesia, strengthen the capabilities of taxonomists in Indonesia, exchange and collect information, and create a program of taxonomy work in Indonesia at the national, regional, and international levels. After the meeting, a directory of herbaria in Indonesia was published. As has been mentioned at every meeting on GTI – CBD, it is necessary to identify current taxonomic efforts in the areas and undertake priority taxonomic work for the country. For developing countries like Indonesia, taxonomic information and references are very important for supporting the major program of taxonomy work. This meeting was expected to provide information for meeting one of the goals regarding taxonomic assessment.



Participants at the workshop and seminars

Due to this, LIPI Indonesia designated 2005 as the year of science and technology, since the Indonesian Institute of Sciences has taken into account the planning to promote basic research. Regarding this proposed planning, LIPI planned to conduct a series of activities related to science and technology, such as the ASEAN Food Conference held in August 2005. To celebrate 100 years of Einstein on Physic Year on Einstein, a seminar was conducted by inviting a noble price speaker and other special guests.

Moreover, as a scientific authority, LIPI has worked closely with other professional organisations on the monitoring and assessment of Indonesia's biodiversity, especially with regard to the trade flora and fauna. Therefore, a herbaria workshop and PTTI seminar were held in connection with that year of science and technology.

The event was held at the Indonesia University of Education, Bandung on November 17-19, 2005, with more than 25 participants from the herbaria in Indonesia attending the workshop, and more than 135 participants attending the seminar. In the evening, a congress of the Indonesian Plant Taxonomy Association was held to select the next generation to take over the organization's management.



Participants' discussion

During the workshop a decision was made to prepare an index of Indonesian Herbariorum, thus establishing a network among the herbaria. From the index of Indonesian Herbariorum, it can be seen who has what botanical collection at their institutions, which subject (taxa) is handled by these institutions, and who are the taxonomists at those institutions. In the future, a collaborative study can be expected among the herbaria to study the flora in the respective regions. At the same time, a decision was made for Indonesia to propose leading a study of the Pandanaceae family for achieving the 2010 target. This proposal will be introduced at the Flora Malesiana



Registration for the seminars



Conclusion and recommendations of the workshop

Seminars, which will be held on June 17 – 20, 2007, in Leiden, the Netherlands. At these seminars, 14 papers will be presented in the Pandanaceae section, whereas 30 papers will be presented in the biodiversity section. A Biosystematics section will cover 7 papers. During the seminars, high school teachers, lecturers, and others will attend a special section designed to cover plant taxonomy education.

Conclusion

1. An Index of Indonesian Herbariorum will be published.
2. Each herbarium will develop a specific field of interest, but without duplicating that of other herbaria.
3. Collaborative study must be encouraged between the researchers at those herbaria.
4. An exchange and loaning of specimens are essential to conduct taxonomic study, and consequently, rules on exchanging and loaning specimens should be developed.
5. It has been decided to study Pandanaceae as the main research project, to achieve Flora Malesiana goals.



(2) Publication Grant

Publication of 'Proceedings of the National Conference on the Environment and Sustainable Development' and 'Abstracts of Scientific Work Conducted by CRES and Affiliates'



Publication Grant

Truong Quang Hoc

Centre for Natural Resources and Environmental Studies (CRES), Vietnam
National University, Hanoi, Vietnam

Vietnam's Ministry of Education and Training established the Centre for Natural Resources and Environmental Studies (CRES) in 1985 as a research and training centre within Hanoi University. In 1995, CRES was re-chartered to integrate the former CRES of Hanoi University and the former Mangrove Ecosystems Research Centre (MERC) of Hanoi University of Pedagogy. With this integration, CRES remains one of three research centres within Vietnam National University in Hanoi.

CRES is a multi-disciplinary institution specialising in environmental research, education, and training. Drawing on its own faculty of natural and social scientists in cooperation with both national and international institutions, CRES is recognised in the fields of biodiversity conservation, human ecology research, agroecosystems development, mangrove ecosystems and wetland research, and environmental impact assessment. CRES's research findings have significantly contributed to the development of central and local conservation practices, as well as development strategies. CRES's education and training programs have provided updated knowledge for thousands of central and local officials to complete their important tasks. Through its publications, workshops, seminars, and training courses, CRES has become an influential

force in promoting environmental awareness. Through its community development activities, it has positively affected the lives of thousands of rural Vietnamese.

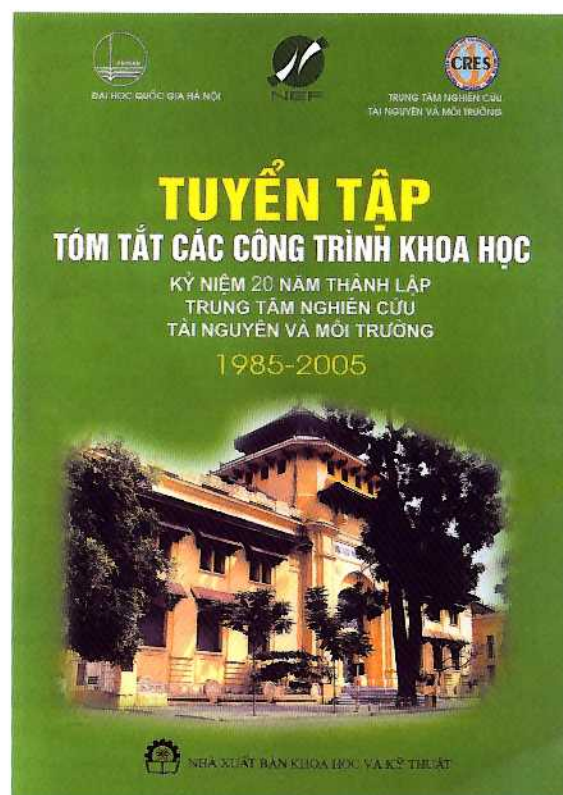
On the occasion of its 20th anniversary, CRES received valuable support from the NEF to publish two books. The titles of these books are 'Proceedings of the National Conference on the Environment and Sustainable Development' and 'Abstracts of Scientific Work Conducted by CRES and Affiliates.'

The Scientific Abstracts (114 pages) introduce the results of research activities in the field of the environment, natural resources, and sustainable development, which are implemented by CRES staff. These scientific works have been presented in Vietnam and abroad in recent years. The abstracts are written in both Vietnamese and English, including author names, titles, and abstracts of the research work concerned. The book also lists the major publications authored by CRES staff during the past twenty years of its operation.

The Proceedings include papers presented at the national conference held to celebrate the 20th anniversary of CRES. The proceedings (498 pages) include 20 papers

presented by CRES staff and affiliates. Authors of the papers are participants from the Centre's three-month course on upland resource management and six-month course on sustainable management of natural resources. They are local cadres of not only central but also provincial and district departments of Science, Technology, Natural Resources, and the Environment, Protected Areas, and provincial forest protection departments. These officials are now cooperating with CRES, functioning as the centre's counterparts when it implements research and development projects in local areas. The reports presented in the proceedings cover three major themes: the environment and sustainable development; biodiversity and conservation; and resource governance. Each paper has an abstract in English and the full text in Vietnamese.

The Centre for Natural Resources and Environmental Studies highly appreciates the valuable support from NEF in publishing these books. NEF helped to publicise the Centre's work over the last 20 years worldwide.



Proceedings of the National Conference on Environment and Sustainable Development



Publication of 'A guidebook on the birds of Lore Lindu National Park, central Sulawesi, Indonesia'



Publication Grant

Dewi M. Prawiradilaga (editor)

Research Centre for Biology, Indonesian Institute of Sciences (LIPI), Indonesia

Lore Lindu National Park is located between 119° 30'–120° 16' E and 1° 3'–1° 8' S in central Sulawesi. The park was established in 1977 and covers an area of 217,991 ha at an elevation of 200 to 2356 meters. It is largely comprised of montane and submontane forest (90%) with some lowland forest (10%), and has maximum temperatures ranging from 26 to 35°C, and minimum temperatures from 12 to 17°C.

Lore Lindu National Park has the richest biodiversity in the Sulawesi region, and 267 bird species (or 70%) out of the total 384 bird species in Sulawesi can be found in the area. Moreover, 71% of endemic species and 15 out of 16 endemic genera inhabit this park, including *Macrocephalon*, *Aramidopsis*, *Cryptophaps*, *Cittura*, *Meropogon*, *Malia*, *Geomalina*, *Heinrichia*, *Cataponera*, *Coracornis*, *Hylocitrea*, *Streptocitta*, *Myza*, *Enodes*, and *Scissirostrum*. In 1998 a new species of Cinnabar Owl (*Ninox ios* sp. nov.) was recorded in the forest surrounding Lake Tambing.

Among these birds, 60 species are threatened including 23 globally threatened species and 37 species with restricted ranges of distribution. The globally threatened species include an endangered species, namely, the Yellow-crested Cockatoo (*Cacatua sulphurea*), four vulnerable species—Maleo (*Macrocephalon maleo*), Snoring Rail (*Aramidopsis plateni*), Blue-faced Rail (*Gymnocrex rosenbergii*), and Satanic Nightjar (*Eurostopodus diabolicus*)—and one data deficient species, the Minahasa Masked Owl (*Tyto inexpectata*). In addition, there are 17 other near threatened species.

In the past few years, Lore Lindu National Park has become a focal area for various types of biodiversity research and biological monitoring, as well as a popular destination for ecotourism. Therefore, the guidebook on the birds of Lore

Lindu will provide an excellent tool for bird monitoring by such local NGOs the Celebes Bird Club (CBC), as well as park rangers, and also represents an excellent tool for conservation awareness and visitor education.

This field guide is intended to:

1. Provide basic, simple, and more accurate guidelines on the identification of resident and migratory birds at Lore Lindu National Park;
2. Assist the management of protected areas using endemic birds as an entry point for building conservation constituents;
3. Promote long-term monitoring of the bird community, especially endangered species and migratory birds; and
4. Promote bird-watching activities as a component of community-based ecotourism in support of bird conservation as well as providing additional income for the local communities.

Description of the field guide

- Language: Bahasa Indonesia
- Thematic Focus: Field Identification of birds of Lore Lindu National Park
- Scope and Coverage: 267 species
- Contents:
 - Introduction
 - Sketches or colour photographs
 - Species description
 - Name of species (scientific, common names in English and Indonesian, and local names)
 - Morphological description
 - Global and local distribution
 - Status and habitat type
 - Bibliography
- Size (physical dimensions) and length (number of pages): A5 size; about 285 pages



Loriculus exilis (Photo: Tommy Tan)



Nectarinia aspasia (Photo: Tommy Tan)



Spizaetus lanceolatus (Photo: Buttu Madika)



Trichastoma celebense (Photo: Tommy Tan)



Zosterops erythronota (Photo: Tommy Tan)



Zosterops atrifrons (Photo: Tommy Tan)



Publication of 'Practical Guide to the Butterflies of Bogor Botanic Garden/Panduan Praktis Kupu-kupu di Kebun Raya Bogor'



Publication Grant

Djunijanti Peggie

Entomology Laboratory, Museum Zoologicum Bogoriense, Zoology Division, Research Centre for Biology, Indonesian Institute of Sciences (LIPI)

There is a significant demand and need for guidebooks on Indonesian butterflies as often reflected by the many visitors coming to view our insect collections at Museum Zoologicum Bogoriense. Contrary to the occurrence and diversity of butterflies in Indonesia, an affordable guidebook on Indonesian butterflies did not exist. We are grateful to the Nagao Natural Environment Foundation (NEF) for its publication grant that allowed us to publish this guidebook. The publication of this practical guide is a great start to fulfil the need. Through the recognition of butterflies, we hope that this book can spark more interest in and cultivate greater appreciation of nature and preserving biodiversity in general.

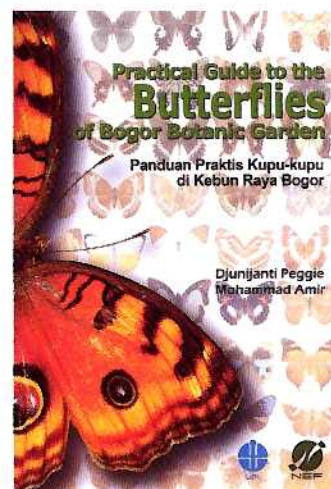
Butterflies are beautiful insects that are readily recognised by many people, because they can often be seen flying around us, such as in our gardens or backyards, and in public parks. Bogor Botanic Garden is a great place to get to know butterflies because it is easily accessible to the general public. This botanic garden, which functions as an ex-situ conservation location to preserve Indonesian flora diversity, is also home to many kinds of animals and insects such as butterflies.

This guidebook was written based on observation data obtained from certain locations in Bogor Botanic Garden. Data on the occurrence of butterflies in Bogor Botanic Garden is based on the specimens collected or observed weekly during a period of eight consecutive months, along with some subsequent observations. There are at least 96

species that can be seen: 11 species of Hesperidae, 11 species of Papilionidae, 16 species of Pieridae, 19 species of Lycaenidae, and 39 species of Nymphalidae (consisting of 7 species of Biblidinae, 3 species of Charaxinae, 5 species of Danaeinae, 3 species of Heliconiinae, 2 species of Morphinae, 8 species of Nymphalinae, and 11 species of Satyrinae).

Written in two languages by butterfly experts at the Indonesian Institute of Sciences, this book includes these 96 species that can be seen at Bogor Botanic Garden and in greater areas of western Indonesia. This practical book is prepared in so that users can easily identify the butterflies. Photographs of male and/or female of each butterfly species are provided, showing the under and upper surfaces of the wings. Photos are self-explanatory for identification of the species, with arrows shown as necessary to point out certain distinguishing characteristics. Over 100 copies of the book were made available free of charge to school libraries around Bogor and some universities in Java. Some copies were also sent to officials of the Forestry Department. Other copies are being sold at an affordable price. It is certainly our hope that this book will provide significant insight and at the same time be enjoyable to the users.

NOTE: The book was published in August 2006 under the title, "Practical Guide to the Butterflies of Bogor Botanic Garden/Panduan Praktis Kupu-kupu di Kebun Raya Bogor," by Djunijanti Peggie and Mohammad Amir.



Publication of 'Terrestrial Mammals of the West Indies'



Publication Grant

Rafael Borroto-Páez

Instituto de Ecología y Sistemática, Cuba

This book will contribute to recent studies of fossils and mammals in the West Indies. The contributions of 32 authors have been grouped in seven chapters: Recent Mammal Studies, Conservation Studies, Fossil Mammal Studies, Collection Studies, Ethnozoological and Historical Studies, Parasitology Studies, and Checklist of West Indies Terrestrial Mammals. These chapters cover such subjects as traditional and molecular systematics, taxonomy, distribution, ecology, morphology, anatomy, paleontology, ethnozoology, history, collections, conservation, invasive species, and parasitology. Our vision in organising this book is to cover as many disciplines as possible, and provide a general vision of the current status of Antillean mammalogy.

The contents will include the following:

Index

List of contributors

Introduction to the monography

SECTION 1 RECENT TERRESTRIAL MAMMALS STUDIES

- Phylogenetic and molecular analysis with cytochrome B in capromyid rodents from the West Indies
- Ecology of the eared hutia *Mesocapromys auritus*
- Systematics and comparative biology of the black-tailed hutia *Mesocapromys melanurus*
- Ecology of an introduced population of the Bahamian hutia *Geocapromys ingrahami*
- Feeding habits of the capromyids
- Review of captive studies of the Capromyidae with comments on their natural history
- The baculum in the Capromys (Rodentia: Capromyidae) of Cuba
- Morphometric analysis of the baculum in capromyid rodents
- Relative brain size in capromyid rodents
- Anatomical specializations of hutias: form and function
- Scaling and mechanics in the long bones of West Indian hutias (Rodentia, Capromyidae)
- The Cuban Solenodon *Solenodon cubanus* Peters (Mammalia: Insectivore) in Sierra del Cristal, Holguín
- Studies of solenodons in captivity

SECTION 2 CONSERVATION STUDIES

- Status and impact of introduced mammals of the West

Indies

- Current status of the hutias (Rodentia: Capromyidae) in the archipelago Los Canarreos, Cuba
- Terrestrial mammal conservation in Cuba

SECTION 3 COLLECTION STUDIES

- Terrestrial mammal collections in Cuba
- West Indian terrestrial mammals in world collections

SECTION 4 FOSSIL TERRESTRIAL MAMMALS STUDIES

- Contributions to the study of quaternary capromyid fossils in Cuba
- Geographic distribution and other considerations on species of the family Megalonychidae in Cuba
- Ecological control of West Indian birds of prey and canids on the quaternary mammals of Cuba
- The primate fossil record of the Greater Antilles

SECTION 5 PARASITOLOGY AND DISEASES

- Helminths of Cuban land mammals
- Ectoparasites of land mammals in the Greater Antilles

SECTION 6 HISTORICAL AND ETHNOZOOLOGY STUDIES

- A historical survey of research on land mammals in the Greater Antilles
- Land mammals in indigenous art in the West Indies
- Association of Cuban terrestrial mammals with aborigine cultural evidence
- Zooarchaeology of West Indian land mammals
- Preliminary study on the use of mammals by Afro-Cuban cults

FINAL SECTION

- Updated list of terrestrial mammals of the West Indies

ANNEXE TO THE MONOGRAPHY, "TERRESTRIAL MAMMALS OF THE WEST INDIES : CONTRIBUTIONS"

- A bibliography of terrestrial mammals of the West Indies



(3) Conservation Activity Grant

Development of education materials and dissemination of Mekong riverbank information



Khamseum Souriyamath

Faculty of Engineering and Architecture, National University of Laos (NUOL), Lao PDR

Summary

The purpose of this project is to develop materials for a university course on nature-oriented engineering for protecting the riverbanks of the Mekong. The education materials will be developed based on scientific research results, and include audio-visual resources. Through their participation in a series of lectures, students will gain a comprehensive understanding of the role of vegetation in riverbank protection. This project is being implemented in cooperation with Riverbank Protection Works implemented by the Ministry of Communication, Transport, Post and Construction (MCTPC), and with technical assistance provided by the Japan International Cooperation Agency (JICA).



Lecture at the National University of Laos



Field Lecture on Simple Vegetation Riverbank Protection & Greening Work by Planting Mekong Willow

Activity for Mekong riverbank greening in Laos using the Soda method—a nature-oriented, river-work engineering Technique



Viengsavanh Phasavath

Ministry of Communication, Transport, Post and Construction, Lao PDR

Summary

The Soda (fascine) method is a unique civil engineering technique of Japan used for strengthening earthen structures. It was originally introduced to Japan by Dutch engineers in the mid-19th century and has been used particularly for the protection of riverbanks. Using a bundle of locally available brushwood and stones, Soda offers low-cost construction and long-term low maintenance, which are necessary conditions for a country like Laos. Furthermore, the spaces created in layers of Soda installed at the bottom of a river provide a variety of aquatic and riparian animals with important habitats, and vegetation planted on Soda enhances the effectiveness of erosion control.

This project intends to give students of the National University of Laos a hands-on opportunity to learn about Soda from scientific perspectives. A group of 50 fifth-year undergraduate students majoring in engineering will engage in experimental planting and the monitoring of vegetation on Soda. The experiment is intended to examine appropriate plant species for Soda in Laos by monitoring growth patterns. The students are expected to understand the functions of Soda and obtain practical skills for preventing erosion through riverbank greening. This project is being implemented in cooperation with Riverbank Protection Works implemented by the Ministry of Communication, Transport, Post and Construction (MCTPC), and with technical assistance provided by the Japan International Cooperation Agency (JICA).



Simple Vegetation Riverbank Protection & Greening Work by Planting Mekong Willow (After completion in February 2003)



Simple Vegetation Riverbank Protection & Greening Work by Planting Mekong Willow



Biodiversity Week 2005 'Global Warming and Biodiversity'



Conservation
Activity Grant

Imran Tumora
Lembar, Indonesia

Abstract

Green House Gasses (GHG) are the chemical compounds found in the atmosphere that absorb infrared radiation and trap heat, producing warm temperatures at the earth's surface. The concentration level of GHG in the atmosphere increases as a result of human activities, particularly in relation to the burning of fossil fuels, such as oil, natural gas, and coal. If GHG increase at a significant rate, the atmosphere cannot send the infrared radiation back into space, thus leaving higher temperatures at the earth's surface. This process will result in global warming, which leads to a significant change in the earth's climate.

In Indonesia, the impact of global climate change is affecting the local climate, where the dry season is becoming very dry, and a high incidence of flooding occurs during the rainy season. This extreme climate causes damage to agricultural production. Furthermore, in recent years, the occurrence of natural disasters has become more serious. A healthier environment can only be achieved by the integrated effort of all humans, and environmental education is a very important tool to make people aware of environmental degradation.

The LEMBAR Foundation is a non-governmental organization which focuses on environmental conservation. In collaboration with National University, LEMBAR conducted a one-day seminar on global warming and biodiversity.



Javan Gibbon Center's stand



keyNote speaker

UNIV

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The purpose of this seminar was to increase community awareness on global warming and its impact on biodiversity, and to introduce environmentally friendly behavior to be adopted in our daily lives to help reduce the emission of GHG. The target group for this activity was local communities, especially young people and university students.

Summary

- Global warming is one of the threats to biodiversity conservation in Indonesia and in the world. Indonesia must actively participate in the effort to reduce carbon emissions in order to control the phenomena of global warming.
- There are several mechanisms for anticipating global warming phenomena. One of which is Clean Development Mechanism (CDM). However, this mechanism has not been promoted properly among the institutions in Indonesia.

Recommendation

- To promote programs for reducing the emission of Green House Gasses.
- To utilize environmentally friendly goods and materials.
- To use reusable energy instead of fossil fuels.
- To promote the CDM program to the public.



Participants

PEKAN KEANEKARAGAMAN HAYATI UNAS 2005
SEMINAR
"PEMANASAN GLOBAL DAN KEANEKARAGAMAN HAYATI"



Presenters

Understanding the Himalayan Mountain Wetlands



Bishnu B. Bhandari

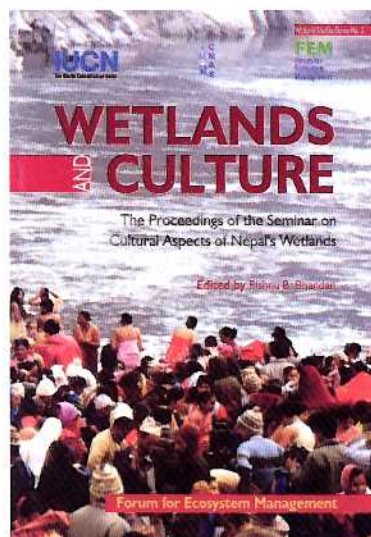
The Forum for Ecosystem Management (FEM, now Nepal Wetlands Society), Nepal

The Himalayan mountain wetlands provide many biological and hydrological environmental services, as well as providing cultural and socio-economic values and benefits. They are considered the water tower of Asia, but their condition is deteriorating. They are vulnerable to increasing population and climate change, as well as natural hazards. The wetlands are already exposed to various threats, and their remoteness, extreme climate and inaccessibility have marginalized the area and have therefore resulted in them being less-studied and less-understood.

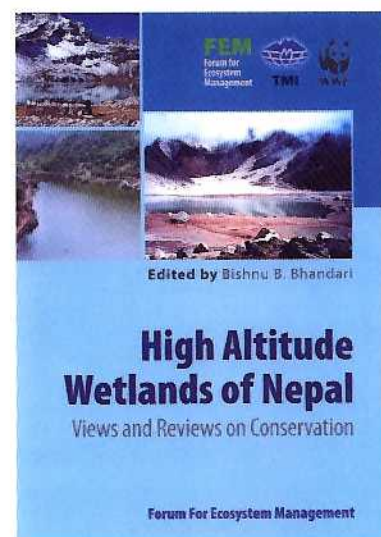
With this as a backdrop, the study was proposed to evaluate the high altitude wetlands (HAW) of Nepal with three major objectives. These objectives were:

1. To review the status and diverse characteristics of high altitude wetlands;
2. To identify gaps in the knowledge of their wise use and management; and
3. To explore ways of using these precious resources in a sustainable manner.

The Forum for Ecosystem Management (FEM, now Nepal Wetlands Society) carried out the project in the middle of 2005 with the financial support of the Nagao Natural Environment Foundation. Initially, the interested researchers, scholars and practitioners were contacted and issues facing HAW were identified. Next, a roundtable discussion, which included prospective authors, was organized. The roundtable panel suggested organizing two workshops, one dealing with the general status of HAW, and the other concerning the cultural values of wetlands in Nepal. The first "National Workshop on High Altitude Wetlands of Nepal" was organized in collaboration with the WWF Nepal Program. The publication was supported by The Mountain Institute. The workshop, attended by 34 individuals, received 8 papers along with a panel discussion on "Promoting the ecosystem approach to the wise use of high altitude wetlands", followed by an open discussion on the topic "Identifying steps towards the wise use of



Publication of 'Wetlands and Culture'



Publication of 'High Altitude Wetlands of Nepal'

wetlands". The proceedings of all sessions, papers and summaries of both panel and open discussions were compiled into the book "High Altitude Wetlands of Nepal: Views and Reviews on Conservation". The book was widely distributed at the 11th World Lake Conference in Nairobi, Kenya and at the 9th COP on Wetlands, or The Ramsar Convention, in Kampala, Uganda in 2005.

The second workshop took the form of a seminar entitled "Seminar on Cultural Aspects of Nepal's Wetlands". The Seminar was attended by 46 individuals from different disciplines and was organized in collaboration with the Center for Nepal Asian Studies (CNAS). The publication support of the book "Wetlands and Culture" was provided by IUCN Nepal. The book has 10 papers in English and 4 papers in Nepali, with abstracts in alternate languages and special addresses by two experts. The report was widely distributed in Nepal as well as in the region.

In summary, the Project produced two works, "Wetlands and Culture" and "High Altitude Wetlands of Nepal: Views and Reviews on Conservation". An inter-disciplinary approach was adopted in the implementation of the Project. (For more information, please contact: Bishnu B. BHANDARI; E-mail: jureli@simsar.wlink.com.np)



NEF Student International Workshop in Vietnam

The NEF Student International Workshop 2006-2007 was held in Cuc Phuong National Park in Vietnam from 22 to 26 January 2007. As the first attempt to facilitate the exchange of knowledge and sharing of experiences among future conservationists, 22 students on NEF scholarships in six countries (Lao PDR, Vietnam, Malaysia, Indonesia, Myanmar and

Philippines) were invited along with their university lecturers and staff from NEF counterpart organisations. The participants joined a variety of activities during the workshop, including a lecture, paper presentations, a nature walk, visits to conservation facilities, field trips, games and cultural performances.

Day 1 January 23 Monday

Morning

Proceed to Cuc Phuong National Park

Afternoon

Nature Walk in Forest

Evening

Student cultural performances



Day 2 January 24 Tuesday

Morning

Opening Ceremony

Keynote Lecture

Prof. Dr. Vo Quy (Vietnam) 'Environmental conservation: a prerequisite for poverty reduction and sustainable development'

Afternoon

Games from different countries

Visit to Endangered Primate Rescue Centre

Visit to Carnivore Conservation Centre



Day 3 January 25 Wednesday

Morning

Student Presentations

Arif Saifudin, Hesti Purnamasari and Mutia Hardhiyuna (Indonesia) 'Javan Hawk Eagle *Spizaetus bartelsi* Conservation in Indonesia'

Pinkham Vongphachanh, Souksamone Latsachanh and Vinanda Siphonesay (Lao PDR) 'Natural Resource Conservation in the Lao Context'

Hamelda Francisca Majit (Malaysia) 'Crocker Range Park, Sabah, Malaysia'

Ching Fui Fui (Malaysia) 'Effects of Different Feeds on Survival Potential of Early Laval Stage of Hoi Tai Kai *Lutjanus rivulatus*'

Zuraida Zainudin 'Occurrence and Abundance of the Bornean Sucker Fish (Genus *Gasromyzon*) from the North Western of Crocker Range, Sabah'

Tran Duc Hau (Vietnam) 'Study on Species Composition of Fish Fauna at Long Dai River, Quang Vinh Province'



Afternoon

Student Presentations

Zaw Win (Myanmar) 'Protected Area Management in Myanmar'

Pham Anh Duc (Vietnam) 'Using Benthic Macro-invertebrates for Ecological Health Monitoring of Mekong River and Tributaries'

Annielyn L. Capadosa, John Rex N. Jardinero and Benjamin Christopher J. Limos (Philippines) 'Managing a Marine Protected Area and World Heritage Site: the Case of the Tubbataha Reefs'



Evening

Vietnamese Cultural Performance and Camp Fire

Day 4 January 26 Thursday

Morning

Field Trip to Vang Long Wetland Reserve Area

Afternoon

Field Trip to Xuan Thuy National Park (Ramsar Site)



Day 5 January 27 Friday

Morning

Back to Hanoi

Evening

Farewell Party in Hanoi



NEF would like to thank the Centre for Resource and Environmental Studies of University of Vietnam, Hanoi for their assistance in organising the workshop.



**Benjamin Christopher J. Limos
(Palawan State University)**

The NEF Student International Workshop 2007 has been a great place for learning and friendship. It has given me an opportunity to learn how protection and conservation of natural resources are going in other countries of Asia. I also learned other forms of data-gathering procedures and interpretation in the workshop. I gained lots of friends and learned about their cultures which I think are somehow similar to ours in the Philippines. I would like to thank NEF for giving us such a great privilege of being part of this great activity. Long live. MABUHAY!

(Photo: Benjamin (Centre) with his Filipino colleagues)

**Ching Fui Fui
(Borneo Marine Research Institute,
Universiti Malaysia Sabah)**

I felt very granted and thankful to be one of the participants in this highly valuable NEF Student International Workshop. This workshop had transformed to be a better student, because I had found the true meaning of sharing in it. By having an opportunity to present my masters research study, it was my pleasure to see how all the students and professors from different fields of conservation study were willing to share their ideas, recommendations and suggestions in order to improve my study.

In addition, I had found the strong meaning of sharing again when I realised language was not the boundary to restrict all the participants from different countries with different culture, language and background to gather and make friends. We shared knowledge through the presentation session, while we also learned interesting cultures from different countries through games or even during lunchtime. I considered the NEF Student International Workshop was one of the best things had happened in the life of each participant. Last but not least, this workshop was the best platform for people from a variety field of studies to share knowledge and ideas how we able to make a better environment in terms of nature conservation to the world. Peace to the mother nature.



Comprehensive Programme for Conservation on Research and Activities

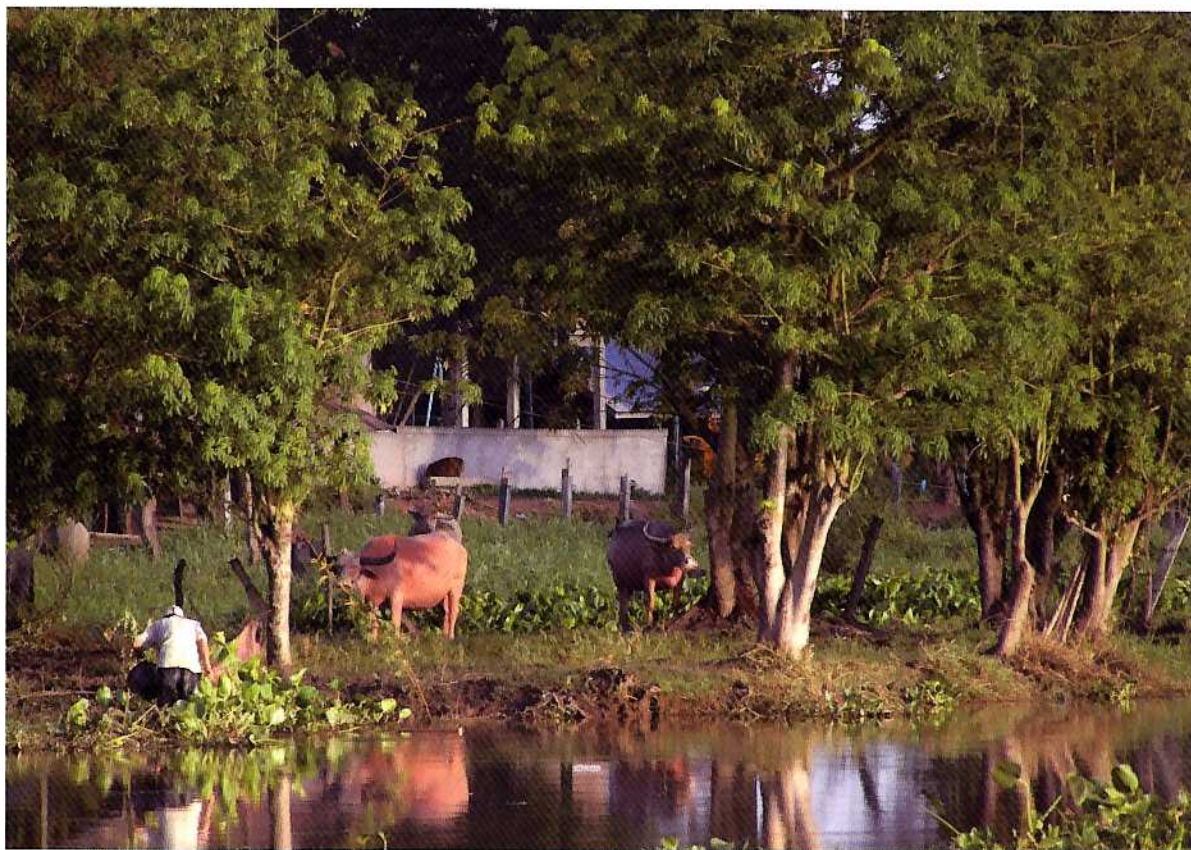
NEF is pleased to announce its new conservation programme launched in 2006. Since founded in 1989, NEF has actively promoted action for nature conservation in different parts of the world. The Research Grant Scheme has supported more than 200 research projects aimed at increasing our knowledge of the natural environment. The Scholarship Scheme has helped over 2,000 undergraduate and postgraduate students to pursue their studies in the field of nature conservation.

The executive directors of NEF are aware of the urgent need for solutions to the many serious environmental, resource and development problems in the world. Among the most serious of the world's environmental threats, the loss of biodiversity due to habitat destruction must be top of any list. To address this issue, NEF is implementing a new programme to support the intensive production of scientific work to promote awareness of resource users and that is useful for policy makers to develop future conservation policies. Under the new scheme 'Comprehensive

Programme for Conservation Research and Activities,' NEF facilitates scientific research and conservation activities in the Mekong – Chao Phraya region, by sponsoring researchers and conservation groups in four countries in the region. These are Thailand, Lao PDR, Cambodia and Viet Nam.

Ecosystems of the Mekong-Chao Phraya region support diverse fauna and flora. Among a variety of natural environments and ecosystems in the region, NEF focuses on particular types of habitats where wildlife have developed a life cycle in close relationship with humans. Those 'natural environments influenced by human intervention,' such as rice paddy fields, reservoirs, irrigation canals, grazing fields, rivers and associated environments, play an important role in providing a refuge, nursery and other critical habitat for populations of insects, fish, birds and other organisms. Although each habitat may be spatially small, the diversity of wildlife species is maintained in a complex web of the natural environment. In other words, local residents contribute to biodiversity





Throughout history, people have settled along and on banks of the Mekong

conservation, as they are involved in their day-to-day nature-based production activities, including traditional agriculture and fishing practices.

In spite of their significance, the quality of such environments is degraded due to recent changes in social and economic conditions. These include a rapid increase in population, changes in agriculture and fishing practices, and a number of development projects varying from small irrigation systems to hydroelectric dams. Since the Mekong is home to

many species and the vast majority of people living in the region depend on aquatic natural resources for their livelihoods, it is important to undertake measures for the conservation of the rivers and associated environments.

A number of internationally supported projects have invested large amounts of money and effort in the conservation of the Mekong region. However, only limited biological/ecological data on wildlife and their habitats are available. In particular, while those existing projects aim to achieve conservation and sustainable development of the region, knowledge on the interaction between different types of natural environments and species diversity is not sufficient. One of the major activities under this programme is a five year research project entitled 'Basic study on the aquatic fauna and flora, and conservation activities participated by local residents'. NEF supports researchers at the following institutions for conducting intensive field research to build basic biological and ecological data:



Rice paddy fields play an important role in providing a critical habitat for wildlife.



Natural resources from the Mekong are vital to the lives of local residents.

Thailand	Kasetsart University, Ubon Ratchathani University and Maejo University
Lao PDR	National University of Laos
Cambodia	Inland Fisheries Research and Development Institute of Department of Fisheries
Vietnam	Can Tho University

The Programme also plans to promote a variety of conservation activities working with citizen groups, student groups and NGOs.



Fish from the Mekong - important source of protein



Selling fish at a local market in Ubon Ratchathani, Thailand



List of NEF scholars in 2006

In 2006, NEF supported 397 students sitting a BSc-level or above in Indonesia, Laos, Malaysia, the Philippines, and Vietnam.

Indonesia (152 undergraduates)

University of Indonesia

Dian Juniarti
Dianing Sri Astuti
Dwi Ramadhani
Eva Fitriani
Rita Damayanti Hasikin
Robby Anzil Firdaus
Ronny Rianto
Sri Surat
Sukma Oktavianthi
Yunita Fitri Anggraeni T.
Eka Viviantira
Erny Soraya
Eva Oktarina
Kholifah
Meilisha P. Pertiwi
Pipit Marianingsih
Poppy Y. Putri
Putri R. Ratri
Fika Afriyani
Mariska Astrid Kusumaningtyas
Mulyati Dewi Aisyah
Nur Mutiah Dewi
Suryani
Sutini
Rerin Santiana
Gita Rahayu Budiarti
Uswatun Khasanah
Asminatun
Dina Mariyanti
Anggi Puspa Nur Hidayati
Ayu Roossea Mustika Putri
Devri Ary Sinaga
Diana Agustina

Asyafi'iah Islamic University

Aliman Hakim
Anastias Nurdianti
Asep Koswara
Hilim Qodriyah
Sinta Puspita Ayu
Hajar Wahyudi
Isnamaini
Iswahyudi Zuliman
Wahyuni Budhiarsih
Yunitasari Amalia
Andam Dewi Melani
Dwi Widyanti Octavia
Hetty Jariah
Ridho Tahir
Sartika
Sapan
Syahrul Lail
Winanjar Restu
Septika Wijayanti
Dedy Rahman

Arif Saifudin
Cut Safrina
Fadlurahman
Sukriyanti
Dahlia
Adi Saputra
Juliana
Nur Khodimah
Sumarni

National University

Dwi Hadiyansyah
Fidyatun Khorayah
Jannatul Ma'wah
Oki Laju Lanang
Ririn Wednes Diana Sari
Thoriq Alif Faisal
Tomi Ariyanto
Turyadi
Urip Rusnandi
Veronica Yuni Pagayanti
Dina Fitria
Fauzan Abdul Mun'im Aikatiri
Nur Rohmawati
Rahayu Kurniangsih
Rahmalia Nurul Ahsani Amda
Rini Sukmawati
Etika Sayekti Hidayati
Dessy Sulistya Ashari
Fratwi
Maysyaroh
Neneng Mardianah
Shafa Noer
Dian Fajar Vitianingrum
Windrati
Melinda Octaviana Kuswandari
Rebina Urthy Zen
Mursyidah
Wulanita Kuswotanti
Nusuki Atara

State University of Jakarta

Dewi Wulandari
Ferry Anggriawan
Ika Retna Sari
Achmad Sobari
Anna Median K.
Arief Syachrial
Ariyani
Conny Fortuna
Octavianto Samir
Rince Sinthaulay
Subhan Pradana
Yuyun Yuliyani
Daulat Yusuf Harahap
Fatyah Arfah
Fuji Setia Wati
Lutfiyah
Muna Murnianjari
Mutia Hardhiyuna

Putri Kesuma Wardhani
Supri
Listiyannah
Maria Fajri
Evindika T. P.
Nur Upik
Tinur Malasari
Muhamad Chanafi
Afdini Rihlatul Mahmudah
Desy Permata Sari
Norma Rahmawati
Sari Setyaningsih
Muhammad Fathoni
Retno Dyah Kuntari

Pakuan University

Dase Suherman
Gumilar Priyana
Iroh Yulistiawati
Rismawati
Yati Apriyati
Yosep Rikiyadi
Abdurachman
Asep Yana
Dewi Agustina
Dina Agustina
Hesti Purnamasari
Mimi Jamilah
Yuli Suprihartini
Yunis Tias Andriani
Enri Agus Setiani
Dian Sudianto
Marlina
Mita Fajriah Ibrahim
Muhamad Ahyad
Nurdiansyah
Nur Laela Fadhillah
Sanan Supriatna
Stephanie
Agustinus Sarira
Dzulfikar Failasufi
Budi Triyanto
Intan Kusumaningrum
Aam Amaliah
Ayu Septina Prasanti

Lao PDR (100 undergraduates)

Nongnouth PHANSA
Kongsy KHAMMAVONG
Khamsonpong SINTHABANDITH
Payu THAMMAVONGSENG
Anouxay PHOMMALATH
Phoutsakhone OUNCHIT
Somsouphanh SIMMANIVONG
Khamsonone PHANTHAVILAY
Phanyasook KEOLEUXAY
Philaylak YOUTTHASANTY

Sengsouly PHALEUKHAM
Laty PANGPASEUTH
Phonesavanh XAYALATH
Khaokeo LORVANXAY
Sayphin KHAMpanya
Mai PHONVIXAY
Laongdao SISOMPHOU
Southanou MANISOTH
Kanchana CHANSINA
Xaysavang PHANDANOUVONG
Salavouth MILIVONG
Yipheng THAYONGYIA
Littana CHITTAVONG
Souksakhone CHANPADITH
Khambouy SOUKHANTHA
Sisavath PHIMMASONE
Phaengta BOUNTHAVANGKHAM
Kathingthong LATSAVONGXAY
Khamxing XAYLUEXIONG
Latsmi SOUPHAPMIXAY
Vinanda SIPHONXAY
Phouthong PHOTHISAK
Santy PHIYADETH
Yileng THAOCHOUTHENG
Phetsomphone THAMMAVONG
Somphanith SIONECHANH
Souksakhone BOUNPHAVONG
Outhay KEOCHAYYOM
Khamphong KAYALATH
Bounhieng SISAVANH
Viengvilay VANTHANOUVONG
Chounnaphon SIBOUNHEUANG
Hongphakham INTHAVONG
Sengpasith HOUNGALOUNE
Kengchalith SOUKVOXAY
Soulsack VILAYPHONE
Inthanongsone INTHAVONGSA
Menglor
Santy KHOUMPHONPHACKDY
Khampanly XAYAKHONG
Inthavong SOUKBOUAKHAM
Thiphamala MANIVONG
Amphaychith BOUTBOUATHONG
Chaisoulith PHONGPHETH
Khankeo PHATHONG
Phanthoudeth PONGpanya
Khamla PHETNAVONGXAY
Thavone KHOUNSIDA
Songkane SOMSAVANH
Phouthone PHAPHO
Phayvieng VONGKHAMHENG
Sengvilay SAETERN
Khoun THAMMAVONG
Somchanh OUPHANXAY
Vilayvanh PHAISAVATH
Phoutsady OUDOMXAY
Vilaysack MAKKAPHON
Yenpapha VOLAVONG

Khanmanh VONGVANSY
Vanpaseuth PHOUTTHAVONG
Sonnasak PHAIPASITH
Vannapa PHOMMACHAN
Phetoudon PHANYAKEO
Phetdaraphone BOUTTAVONG
Bounhuong YACHONGTOU
Xaysavanh KHIAOVONGPHACHANH
Souksakhone PHANTHOLACK
Chanthala VINTHAXAY
Somta SIHARATH
Ketsana SIRIVONG
Sadsada INTHAVONG
Thani PHIMMASONE
Sayson LUANGNOUNINTHONE
Sinongpheng BOUPHANOUVONG
Phetthouly PANYADA
Malailath LITSOUNTHONE
Khammany KHAMLEK
Lorsualin LORYEAR
Anousa AMPHONDOUNGCHITH
Lattana KEOPHOMMANIVONG
Vilavong VONPHACHANH
Sisamouth KEOXAIIYA
Nouxay BOUNMIXAY
Xialor YIACHIAO
Soudaniame INTTHISANE
Viengsavanh XOMVIMANE
Chindavanh SOULIYAPHAK
Oulavanh SINSAMPHANH
Soulichanh LAMXAY
Bounmany SOULIDETH
Taykeo SOMCHANMAVONG

Malaysia (17 postgraduates)

Universiti Malaysia Sabah

Lau Foo Chwang
Siti Sarayati Hj
Effazila Way Abdin
Aini Afifa Hj. Ismail
Ang May Yen
Avelinah Julius
Hamelda Francisca Majit
Zuraida Zainudin
Kalsum Mohd
Elczah Olivia Jimmy
Ching Fui Fui
Suzen Immit Mojil
Alvin Azril Mahat
Jovinia Jowinis
Jacqueline Vincent
Ivan Koh Chong Chu
Muhammad Ehsanulhadi b. Karim

Myanmar (20 postgraduates and 20 undergraduates)

Postgraduates

Seng Aung (Ph.D.)
Hnin Khaing Aye (Ph.D.)
Ko Myint (Ph.D.)
Khin Lay Mu (Ph.D.)
Tin Tun (Ph.D.)
Chery Aung Marine (Ph.D.)
San San Khine (Ph.D.)
Saw Lwin (Ph.D.)
Saw Yu May (Ph.D.)
Thida Oo (Ph.D.)
Aye Aye Htun (Ph.D.)
May Lay Thant (M.Sc.)
Nyunt Khaing (M.Sc.)
May Thandar Myo (M.Sc.)
Thein Tun (Ph.D.)
San Tha Tun (Ph.D.)
Mar Lar Htwe (Ph.D.)
Nang Wah Wah Min (Ph.D.)
Khaing Hnin Ko (M.Sc.)
San San Aye (Ph.D.)

Undergraduates

Khaing Yee Mon Lin
Si Thu Min
Akar San
Aung Chan Myae
Zaw Zaw
Thu Han Soe
Su Sandar Aung
Tet Ne Htun
Nwae Mon Mon Aung
Kay Zin Than
Nyein Chan
Phyo Ei Hlaing
Pyae Soe Aung
Aye Ka Yi Phyu Phyu
Soe Min Tun
Yan Myo Naing
Bo San
Kyaw Sein Win Tun
Aung Myint Myat
Khaing Wut Hmone

Philippines (34 undergraduates and 5 postgraduates)

Palawan State University

Matchico, Elsie I.
Abejo, Marvin R.
Aloria, Valentin Gerald II J.
Gubat, Quency Ann L.
Limos, Benjamin Christopher D.

Siason, Ramon R.
Solida, Mark Anthony
Garcellano, James H.
Patigdas, Madel M.
Orge, Cedric Ian V.
Tenefrancia, Jonas G.
Jardinero, John Rex N.
Gabo, Astrid Korina S.
Alleda, Allan P.
Jalover, Cherry Lyn S.
Pablico, Riza Jane B.
Pagliawan, Ma. Retchie C.
Tan, Ken D.
Urqiola, Joan P.
Villamor, Irish L.
Cacho, Darelle Kaye M.
De Guzman, Arnica L.
Firmalo, Honey Rose O.
Garibay, Jessa Belle B.
Herrera, Ebenezer C.
Alpas, Romelyn B.
Quinit, Winston G.
Quirino, Alison T.
Tabayag, Erickson T.
Vicente, Florence Joy B.
Basaya, Remy M.
Cobilo, Maureen Darling Joy
Tabang, Cristina T.
Migallos, Jeffrey B.
Alaban, Ricardo V.

Western Philippines University

Agsamosam, Mercy G.
Asis, Jonnie A.
Capadosa, Annielyn L.
Laxamana, Rajie Ann E.

Vietnam (49 postgraduates)

Viet Nam National University, Ha Noi

Vuong Tan Cong
Vu Thi Thu Hang
Nguyen Khoa Hieu
Nguyen Van Hung
Pham Van Vien
Nguyen Thuy Vinh
Ho Ngoc Giang
Ngo Duc Phuong
Nong The Dien
Hoang Van Chuyen
Le Duy Hung
Nguyen Thanh
Nguyen Thi My
Vu Anh Tai
Phan Thi Thu Hang
Vu Thuc Hien

Vinh University

Cao Thang
Phan Thi Giang
Trinh Thi Hong

Viet Nam National University, Ho Chi Minh City

Vo Hai Thi

Forestry University

Do Thanh Hung
Nguyen Toan Thang

Forestry University, Ha Tay

Ngo Van Mac
Pham Van Nam
Pham Anh Tam

Viet Nam Forestry University

Le Van Thanh
Nguyen Thanh Ha

Hanoi Natural Science University

Dang Thi Huong
Le Thi Thanh Huong
Truong Ngoc Kiem
Nguyen Thi Thanh Nga
Le Nguyen Hai Ninh
Nguyen Thi Minh Phuong
Dang trung Tu

Institute of Ecology and Biological Resources

Vuong Tan Tu
Dang Huy Phuong
Dang Thi Thu Huong
Tran Thieu Du
Nguyen Duc Hiep
Nguyen Thi Hien

Agro-forestry University

Ho Thi Nhu Trang

Hue University

Nguyen Van Hoang
Phan Thi Thuy Hang
Tran Thuy Cam Ha

Ha Noi University of Pedagogy

Tran Huu Huy
Ta Thi Thuy
Tran Duc Hau
Dao Thi Hai Ly

Hanoi Pedagogical College

Nguyen Phuong Linh



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