

A survey of large trees for shaded area temperature reduction in summer time

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The objective of this research project was to study efficiency and factor which effected on ground temperature beneath the shade of suitable large trees for use. Factors that effected in decreasing temperature of 5 species of large trees were the efficiency of piercing light, the total height of trees, the height of the canopy and width of the canopy. The result showed that the most efficiency was *Peltophorum pterocapum* (**16.60%**) follow by *Erythopleum succirubrum Gagnep* (15.37%), *Samanea saman (Jacq.) Merri* (14.42%) , *Mangifera indica Linn.* (14.40%) and *Cassia fistula Linn.* (12.85%) , respectively. Effected factors in decreasing temperature on the shade of large trees were the efficiency of piercing light, the total height of trees, the height of canopy and had no relation of the width of canopy.

Key word : large trees, temperature reduction

A survey of medium trees for shaded area temperature reduction in summer time.

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The purpose of the project was to study efficiency of temperature reduction where under medium trees, and study factors which reduced temperature. Study area was Khonkaen University. The samples were collected from 5 species of medium trees: *Alstonia scholaris*, *Simarouba gauca*, *Terminalia catappa*, *Michelia champaca* and *Muntingia calabura*. The data collected by measure temperature and light intensity under the shade and opening. Together measured characteristic of trees: height of trees, height of canopy and width of canopy. The results showed that; *Alstonia scholaris* had efficiency of temperature reduce with 15.02% . *Simarouba gauca* had efficiency to temperature reduction to 14.08%. *Terminalia catappa* had efficiency to temperature reduction to 13.55%. *Michelia champaca* had efficiency to temperature reduction to 12.76%. *Muntingia calabura* had efficiency to temperature reduction to 10.46%.

The results founded that the factors which reduce temperature were the efficiency to reduce lighting, height of trees and height of canopy. However it is not relation with width of canopy.

Key word : medium trees, temperature reduction

Benefits from Biogas Production Case Study: National Starch and Chemical (Thailand)

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This paper was aimed to examine the benefits from UASB-based biogas production at a case company, National Starch and Chemical (Thailand) Co.,LTD. The data on power consumption in starch production process was collected to analyze the energy, financial, and environmental rewards. The results showed that the company produced biogas of 15,000cm³ /day which it could replace the 8,250 liter oven oil, generate the electricity of 18,000kw/hour, 9,000 liter diesel fuel, and 6,900kg cooking gas. Replacing oven oil with biogas could reduce cost totaled 207,120,070Baht from year 1995 to 2009 and payback period was 3 years and 6 months.

In regard of environmental analysis, if biogas produced was used as fuel for boiler in place of oven oil, the Co₂ emission reduced by 7720.57 tons/year. If biogas produced was used as fuel for electricity generation, equating to the coal Co₂ emission reduced by 2120.80tons/kW/hour/year, crude oil Co₂ emission reduced by 1698.34 tons/kW/hour/year, natural gas Co₂ emission reduced by 1169.46 tons/kW/hour/year. If the company employed biogas residues from production process to generate the electricity, the coal Co₂ emission reduced by 1,675.43tons/kW /year, crude oil Co₂ emission reduced by 1,341.69 tons/kW/year, natural gas Co₂ emission reduced by 923.87 tons/kW/year, respectively.

Key word : Biogas Production

Biomass energy production as a charcoal, in the area Nong Kung village, Nong Rua district, Khon Kaen province

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The objective of this project was to study the production process production quantity and biomass sources that are used in the production of industrial charcoal production in households Nong Kung village, Rua district, Khon Kaen province. The result showed that all of biomass were used to be materials charcoal production such as components of a tree the most (*tamarindus indica*). 70.94 percent of the biomass in the community is from in the wood's scraps and tips with trunks of wood. 88.46 percent is buy from the paddy field and plantation. Howto burn charcoal used Clay oven. Used the wood as raw material for charcoal is wood that was cut from the paddy field and plantation, There was no cutting of trees from the forest community. This will impact the adoption of wood used in charcoal on the production of less than bringing wood from the forest to use. The need to encourage the planting of trees along with a replacement to ensure minimal impact and a source of biomass available as a Sustainable.

Key word : Biomass energy

Breeding ecology of pigeon *Columba livia* at The Office of Academic Services Building Khon Kaen University.

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Rock pigeon *Columba livia* is a member of the bird Family Columbidae. The bird is a common in Thailand. Breeding ecology of the rock pigeon at the Office of Academic Services Building Khon Kaen University was studied at last May to July 2011. The purposes of this study was to monitor the population of pigeon, furthermore ; hatching rate and one week survival rate were collected the data in breeding area. The results found that the *Columba livia* populations in study time were 126 – 139. Seventeen nests of pigeon and 27 eggs were found in area. Clutch size in this study was 1 – 3 eggs/nest and, the incubation time was 7 day. Hatching rate of all eggs were 59.25 percentages and one week survival survival rates were 48.15 percentages.

Key word : Breeding Ecology, *Columba livia*

Effect of Atrazine on development of Rugose frog (*Microhyla ornata*) tadpole.

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Effect of herbicides on development of Rugose frog were study in (*Microhyla ornata*). The rugose frog tadpoles were collected at pond area on the Sa-plastic, Khonkan University. The four differences concentration including 0 mg/L , 1 mg/L , 5 mg/L and 10 mg/L were studies in this laboratory the tadpoles of rugose frog were studies on 5 week. In this study, 30 tadpoles per treatment were average weight and survival rate monitored including on 5 week. The result found that the survival rate of tadpoles at 1 mg/L were higher control, 5 mg/L and 10 mg/L respectively. However, the average weight and survival rate of rugose frog tadpoles were not significantly different. ($p > 0.05$)

Key word : Rugose frog

Efficiency of Garden Paving Materials in Roof Surface Temperature Reduction.

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The purpose of this project was to investigate the efficiency of garden paving materials in roof surface temperature reduction. The study was done on the 6th floor of SCO8 building, faculty of science, Khon kaen University. The study period was between March 2010 to May 2010. Temperature on and under paving materials, together with the temperature on the roof deck were measured. Five types of paving materials were investigated , i.e. finished wooden floor, white polished pebble, black polished pebble, antique brick, and laterite. Data were collected during 11-12.30 a.m., 12.30-14.00 a.m. and 14.00-15.30 The results showed that the efficiency in decreasing roof deck temperature of the paving materials were different at the confidence level of 0.05. The efficiency were in the order from the highest to the as follows: laterite, white polished pebble, antique brick, finished wooden floor, and black polished pebble. The difference of these abilities were due to the albedo effect and the structure characteristics of materials.

Key word : Efficiency of Garden

Electrical Generation from rice husk energy Muangtoung Subdistrict Suwannaphom District Roi Et Province.

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The objective of this research is to study quantity and quality of rice husk in order to predict the capacity of Electrical Generation from rice husk, and to study the way in using rice husk in Muangtoung Subdistrict Suwannaphom District Roi Et province for guiding to plan and manage using of alternative energy in community. In addition field samplings and households interviewing by questionnaire were conducted and the studied secondary data had been used.

The study in term of quality was found that during 2009/2010 in Muangtoung Subdistrict there were 12,727 rais of cultivated areas which produced 4,191 tons of rice, and could predict the amount of rice husk about 922 tons. Currently, there were 21 rice mills in the community, and rice husk from all of the rice mills were used in 3 main ways as follow; 1) using as the compost by 14.55% Of the total amount of rice husk 2) adding rice husk in the stables for protecting humidity by 18.50 % 3) the rest were purchased to be used for adjusting the soil condition in farmland by 66.95 %. According to the study, it was found that currently, rice husk in Muangtoung Subdistrict was depleted in different ways. However, if these rice husks are used as fuel for electric current generation, they can produce electric current up to 101,420 KWh, and help to reduce 54,563.96 tons. of carbon dioxide from electrical generation.

Key word : Electrical Generation, rice husk energy

ENVIRONMENTAL IMPACTS COMMUNITIES ENCOUNTERED AT SAMLIEM INTERSECTION TUNNEL CONSTRUCTION SITE (WORKING PHASE)

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This survey-based study aims to identify environmental impacts communities in/around Samliem Intersection Tunnel Construction Site (working phase) have encountered. It is also to survey community opinions towards this construction project, especially alternatives to reduce impacts. Data were collected using self-administered questionnaire. Data analysis includes descriptive statistics and Chi-square Test of Independence. Three hundreds and eighty four (384) people living in/around the construction site within 500 m proximity participated in this survey. From the survey, 57.70% of samples reported that they did not get any impact from the project. However, the majority of samples (32%) identified that traffic congestion is the most obvious problem caused by the construction. Furthermore, the respondents (68%) expressed when the project was paused that finding a new contract company so that construction works could continue was urgently needed. They (26%) suggested that to reduce impacts the project needs to follow a time table strictly so it can be done on time. Finally, community perception on environmental impacts, including noise disturbance, vibration from machine operations, dust, wastewater and garbage problems shows significant connection with distance from the site to where the respondents live ($\chi^2 = 53.135, 33.108, 29.666, 22.587, 28.569$, p-value < 0.05, respectively).

ผลกระทบด้านสิ่งแวดล้อมต่อชุมชนในพื้นที่ก่อสร้างทางลอดสี่แยกสามเหลี่ยม (ระยะก่อสร้าง)

นักศึกษา : ศิรินันท์ บัณฑิตพานิชชา

อาจารย์ที่ปรึกษาโครงการวิจัย : ผศ.ดร. อัจฉราภรณ์ ภัคดี

ภาควิชาวิทยาศาสตร์สิ่งแวดล้อม คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น 40002

การวิจัยมีวัตถุประสงค์เพื่อสำรวจผลกระทบด้านสิ่งแวดล้อมที่สำคัญต่อชุมชนในพื้นที่ก่อสร้างทางลอดสี่แยกสามเหลี่ยมในระยะก่อสร้าง ความคิดเห็นของชุมชนต่อโครงการฯ และแนวทางเพื่อลดผลกระทบจากการดำเนินการก่อสร้าง การเก็บข้อมูลอาศัยแบบสอบถามที่ให้ผู้ตอบกรอกข้อมูลเอง (Self-administered questionnaire) ทำการวิเคราะห์ข้อมูลเชิงพรรณนา และทดสอบความสัมพันธ์ทางสถิติระหว่างผลกระทบสิ่งแวดล้อมกับคุณลักษณะส่วนบุคคลของกลุ่มตัวอย่าง ด้วย Chi-square Test of Independence จากการสำรวจมีผู้ร่วมตอบแบบสอบถามซึ่งเป็นประชาชนที่อาศัยประจำในบริเวณพื้นที่ก่อสร้างฯ ภายในรัศมี 500 เมตร จากสี่แยกสามเหลี่ยม ทั้งหมด 384 คน ร้อยละ 57.70 ของกลุ่มตัวอย่างระบุว่าไม่ได้รับผลกระทบด้านสิ่งแวดล้อม ส่วนผลกระทบสิ่งแวดล้อมที่กลุ่มตัวอย่างส่วนใหญ่ (ร้อยละ 32) ระบุว่าส่งผลกระทบต่อชุมชนมากที่สุด คือ ปัญหาการจราจร สำหรับความคิดเห็นของชุมชนที่มีต่อโครงการเมื่อการก่อสร้างหยุดชะงักลง พบว่าร้อยละ 68 ต้องการให้เร่งจัดหาผู้รับเหมาใหม่โดยเร็ว และวิธีที่ชุมชนต้องการให้โครงการดำเนินงานในการลดผลกระทบสิ่งแวดล้อมคือ ให้รับดำเนินการให้เสร็จเพื่อเป็นการแก้ไขผลกระทบทั้งหมด (ร้อยละ 26) จากการทดสอบความสัมพันธ์ทางสถิติพบว่าระยะทางจากโครงการถึงที่พัก/สถานที่ทำงานที่อยู่ประจำในช่วงเวลาก่อสร้างมีความสัมพันธ์กับ เสียงดังรบกวน การสั่นสะเทือนของอาคาร ฝุ่นละออง น้ำเสีย และขยะ ($\chi^2=53.135, 33.108, 29.666, 22.587, 28.569$ ตามลำดับ, $p<0.05$)

Invasive Alien Species and Management in Khonkaen University.

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Invasive alien species, which have been seen extensively in almost all areas of Thailand, impact on the biological diversity of native species to decrease. The purposes of this study were to investigate the diversity of the invasive alien species in Khon Kaen University, and find the ways to manage them. The study was conducted from July to September 2553 by field surveying both land and water ecosystems. In this study, only invasive alien species which are listed as 1 from 4 items according to classifying of the Office of Natural Resources and Environmental Policy and Planning Year 2552 were studied. The study was found that there are 5 families, 7 species of invasive alien species in Khon Kaen University which are classified into one kind of water ecosystem that is Water Hyacinth (*Eichhornia crassipes* (Mart.) Solms), and 6 kinds of land ecosystem species includes Water Pennywort (*Hydrocotyle umbellate* L.), Crofton weed (*Ageratina adenophora* (Spreng.) R.M.King & H.Rob), Siam weed (*Chromolaena odoratum*(L.) R.M.King&H.Rob.), Foxtail Grass (*Pennisetum pedicellatum* Trin.), Lalang (*Imperata cylindrica* (L.) P. Beauv), and Lantana (*Lantana camera* L.). However, Khon Kaen University deals with these invasive alien species by hiring Disaster Prevention and Mitigation office Zone 6, Khon Kaen to collect water hyacinths for making the compost and cutting grass along the road regularly.

Key word : Invasive Alien Species, Management

KKU Campus's Street and Microclimate Amelioration.

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The purpose of this research was to investigate the efficiency of the trees along the streets of Khon Kaen University to assist in the improvement of atmosphere. The study focused on the efficiency of the trees in road surface temperature and light transmittance reduction and their abilities in increasing moisture in the peripheral atmosphere. Five species of plants were selected including Tamarind, Queen's flower, Cork Tree, Raintree and Tropical Almond. The study was conducted in summer between March - May 2010. General information of the trees and efficiency in light transmittance reduction, relative humidity increment and road surface temperature reduction of the trees were collected both in the shade and in the open area.

The results showed that Raintree had the highest temperature reduction potential with 11.69 percent efficiency and also had the highest light transmission reduction efficiency of 92.68 percent. Tropical Almond had the highest relative humidity increment of 11.10 percent. It was found that the performance in cooling the streets by Queen's flower and Cork Tree were not different at the confidence level of 0.05. And it was also found that the correlation between the cooling efficiency and the temperature within the canopy were significant at the confidence level of 0,05.

Key word : Microclimate Amelioration

Mortality of vertebrates on a rural road at KhonKaen university, Mueang district, KhonKaen province Thailand.

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Roadkill is an important to wildlife population decline especially amphibian and reptiles. This survey was study diversity of animal mortality on road at rural road between Adunyaram temples (Wat Pa Adunyaram) to Mariwan road at Mueang district, KhonKaen province Thailand. This road in study area was 2.7 km of length. Field surveys were started on 5 July 2010 — 27 September 2010. The results found the total number of vertebrates dead on the road were 234 organisms. The vertebrates which died on

road were classified to 4 class, 7 order, 15 family and 16 species. The results presented that 11 ~mammals, 63 birds, 14 reptiles and 146 amphibians were died by road kill. *Bufo melanostictus*, *Passer montanus* and *Kaloula pulchra* were top three vertebrates on which it died on the road. Eight species of vertebrate including *Oligodon taeniatus* , *Xenopeltis unicolor* , *Enhydryis plumbea* , *Dendrelaphis pictus* , *Calotes versicolor* , *Bufo melanostictus* and *Kaloula pulchra* were classified to Least concern (LC) by Thailand red data 2005.

Key word : Mortality of vertebrates, rural road

Possibility of Used Algae (*Spirulina* sp.) as to Indicator of Surface Water Quality.

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The objective of this study were investigated the possibility of used *Spirulina* sp. as to indicators of surface water quality. in two natural water sources (Kaen Nakhon lake and Plastic pond) and two waste water contaminated sources(Sri Than lake and Thung Sang lake). The physical and chemical factor of four water sources was surveyed during June to August, 2010 by sampling in 3 different sampling sites of each source for four times. The result found that the average temperature of Kaen Nakhon lake, Plastic pond, Sri Than lake and Thung Sang lake was 32.4, 34.0, 33.0 and 31.9 degree Celsius, respectively. The average electrical conductivity of above-mentioned water sources was 374, 224, 1755 and 734 us/cm, respectively. The potential of Hydrogen ion (pH) was 10.44, 10.04, 9.93 and 10.26, respectively. The value of dissolved oxygen (DO) was 10.9, 7.7, 8.3 and 9.2 mg/L, respectively. The BOD of each source was 2.1, 2.4, 14.7 and 13.1 mg/L, respectively. The quantity of *Spirulina* sp. was 28, 1, 5 and 43 body per milliliter. The quantity of *Spirulina* sp. in Thung Sang lake had hightest of 43 body per milliliter. This lake was represented contamination of water. At Kaen Nakhon lake found *Spirulina* sp. of 28 body per milliliter, it could be representative of natural water sources. The results showed that the quantity of *Spirulina* sp. was correlation with pH and DO at the potential of Hydrogen ion (pH) was 10-11 and the value of dissolved oxygen (DO) was 9-11 mg/L. Thus, *Spirulina* sp. could be used as indicator of surface water quality.

Key word : *Spirulina* sp.

Potential of *Dracaena fragrans* for reducing Trichloroethylene (C₂ HC₁₃) in Printing House and Copy Service Academic Resources Center, Khon Kaen University.

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Project advisor : Asst.prof.Turenjai Dooljindachabaporn

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The objective of research were studied the potential of *Dracaena fragrans* for reducing trichloroethylene (C₂HC₁₃) substance in Printing House and Copy Service Academic Resources Center. Khon Kaen University. Trichloroethylene concentrations were measured by detector tube system and 10 plants of *Dracaena fragrans* 2 years old, 15-20 leaves per plant were place in the 64 ra^r printing room and 80 m² copying room during the December 2010 to January 2011. The results showed that *Dracaena fragrans* reduced trichloroethylene in the print room and copy room 5 % and 70 %, respectively.

Key word : *Dracaena fragrans*, Trichloroethylene (C₂ HC₁₃)

Species and Amount of Animal That Dead on Road between Traffic Circle at Stadium Center and Bung SITHAN in Khon kaen University.

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Present from the number of vehicles a lot more to chance these animals will die because they are car pedal and hit more as well, the author has interest in the study of dead animals from roaming the streets in Khon Kaen University.

The result showed that dead animals were totally found 10 orders, 122 remains on the first road. Dead toads (*Order Anura*) were found 59 remains and the percentage of frequency was 48.36 % which was the most percentage followed by dead earthworms (*Order Opisthopora*) 30 remains and the percentage of frequency was 32.79 %. A bird (*Order Passeriformes*), a centipede (*Order Centipedes*), a dragonfly (*Order Odonata*), a rat (*Order Rodentia*), a millipede (*Order Millipede*) were found each one, respectively.

Dead animals were totally found 13 orders, 105 remains on the second road. Dead toads (*Order Anura*) were found 39 remains and the percentage of frequency was 37.14 % which was the most percentage followed by dead earthworms (*Order Opisthopora*) 34 remains and the percentage of frequency was 32.38 %. A snake (*Order Squamata*), a centipede (*Order Centipedes*), a dragonfly (*Order Odonata*), a butterfly (*Order Lepidoptera*), a tree frog (*Order Anura*) were found each one, respectively.

From the correlation analysis between the number of dead animals and the quantity of vehicles in workdays showed that correlation between the number of dead animals and quantities of vehicles in workdays of both the first road and the second road had r 0.973, 0.887, respectively which were positive values, so both factors were significantly associated ($p < 0.001$)

Key word : Amount of Animal , Dead on Road

Thai - Laos Border Trade of Endangered species of wild plants , Mukdahan Province.

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Project advisor : Asst. Prof. Samang Homchuen

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This research aims to examine the wild plants species that have been traded in Mukdahan province and to identify the attachment status of wild plants according to THE CONVENTION ON INTERNATIONAL TRADE IN ENDANGER SPECIES OF WILD FAUNA AND FLORA .The project was studied during February to September 2553 using survey data collected in the border market around the permanent crossing point, Maung district, Mukdahan province . The results was found that there was trading of 3 families 72 species of wild plants which belong to the list of Annex I total one family were 1 Fammily (Orchidaceae) 4 species (Paphiopedilum exul, Paphiopedilum hirsutissimum, Paphiopedilum g..odefroyae, Dendrobium cruentum). Also, there were 3 families (Orchidaceae,Cycadaceae,Nepenthaceae) 68 species that belong to the list of Annex II. According to the study, it was found that there was widely illegal trade of wild plants along the border. The main reason why there were still trading of wild plants was because of the weak penalties for violating in trading wild plants; moreover, the execution of official duties was not strict enough. Some staffs did not understand the CITES Convention, and the buyers did not know that the Endangered species of wild plants were not allowed to trade.

Key word : Endangered species, wild plants

Thai-Laos Border Trade in Endangered Wild Plants, Nong Khai Province.

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This study aimed to explore the trade of endangered species of wild flora along the border between Thailand and Laos, Nong Khai Province and the reasons why the trade of wild plants still exists. The study was conducted from February to September 2553 by interviewing staff and direct vendors around 6 temporarily permitted areas in Nong Khai province. The study was found that there is one family Orchidaceae and 33 species trade of endangered species of wild flora in a temporarily permitted area that is Pengjan temporarily permitted area, Tambol Pon Pang, Rattana vapee sub-district Nong Khai province. The endangered species of wild flora that have status under The Convention on International Trade in Endangered Species of Wild Fauna and Flora one kind of the first account Annex I is *Dendrobium cruentum*, 32 kinds of the second account Annex II and no plants of the third account Annex III. The reason why the trade of endangered species of wild flora is still found, mostly is from the staff who allow the villagers to trade the endangered species of wild flora. It is just like helping neighboring countries because they are quite poor, and some officers have not known or understood in (CITES) convention. Moreover, there may be goods trafficking across the outside of temporarily permitted area which there are not enough staff to monitor and control.

Key word : Endangered Wild Plants

The relationship between household economic social conditions and use of Nong - Han Kumpawapi Wetland, Udonthani Province

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This surveyed-based research examines statistical connection between household socio-economic conditions and use of Nong Han wetland resources, Udonthani province. It also identifies activities of how households use the wetland resources. Data were collected by onsite observation surveys, together with a personal interview questionnaire during July-October 2009. In total, 122 household representatives from 14 villages in all Tambon located around Nong Han participated in the questionnaire. The majority of villagers (82% of the participants) reported of access to and using Nong Han. The most evident use activities include catching fish and other aquatic animals (27.49%), followed by harvesting of aquatic plants (26.02%). From the statistical test, there is no significant connection between socio-economic conditions and the use of Nong Han wetland. However, villagers who reported not using Nong Han explained their reasons; the important ones are that villagers did not have time and usually wetland products can be bought from other villagers (25%), villagers can harvest similar products from their orchards and/or farms (19.44%) and many market goods can substitute the use of wetland products (13.89%).

Key word : Economic Social

Using Benefit Area of Botanic Garden in North-eastern Thailand At Khonkaen Province.

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Project advisor : Dr.Lamyai Neeratanaphan

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The objective of this study was to investigate the use of area in the Botanic Garden of the Northeast and its deterioration. Two study groups were given separate questionnaires, the first group is the general public of 19 people and the second is the villagers of 196. The survey was conducted during June to July 2010. The study found that 75 percent of villager utilized the area and 25 percent did not. The most utilization of the area was water (20.77%), relaxation (17.66%),fisheries(15.06%). The most deteriorated area was at the lotus pond (42.8%), Pae Rim Tung restaurant (42.70%), the pond (14.5%). The most deteriorated condition that was visible was the increase of garbage (60%) and the polluted pond(40%). The study found that the community and the general public utilized the area in accordance with the serving objective of the Botanic Garden. Regarding the deteriorating conditions of the area, we propose that every sector, the authorities, officials, villagers and the general public should be more aware of the common benefit of the Botanic Garden and work together to manage the utilization.

Key word : Using Benefit Area, Botanic Garden