Ambient H_2S and CH_3SH Monitoring of The Pulp and Paper Industry Peripheral Area by Detector Tube System

Student : Miss.Pantitcha Outapa

Project advisor : Asst. Prof. Turenjai Doonjindachabaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The determine method was Detector Tube System, the results occurred immediately. This method inspected volatile organic compounds such as Hydrogen Sulfide(H_2S) and Methyl Mercaptan (CH_3SH),on 21 August to 4 October 2006, in pulp and paper industry to take sample from the recovery furnace. The results showed that the smell of H_2S response to human was in the range of 0.02 to 0.06 ppm. And the concentration of CH_3SH that cause eye irritation was in the range of 0.04 to 0.1 ppm. These value were lower than the occupational standard of NIOSH and OSHA which were 10, 20 of H_2S and 0.5,10 ppm of CH_3SH respectively.

Key word : H_2S and CH_3SH

Ambient BTEX and CH_2 0 Monitoring by Detector Tube System in KKU A Case Study of Hospital and Parking Area.

Student : Miss Supannika Salao
Project advisor : Asst.prof.Turenjai Dooljindachabaporn
Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The object of this research is to measure the quantity of the Volatile Organic Compounds or VOCs. This study collected the data and measured the compounds, which were divided into two mainly types. The first type is Formaldehyde (CH_2 **0)** found in the morgue of Srinakarin Hospital. The second type is the BTEX which stands for Benzene (C_6H_6), Toluene (C_6H_5 CH_3), Ethylbenzene (C_6H_2 C_2H_5) and Xylene (CH_3) found in the parking area in front of the Building No. 7 of the faculty of Science, Khon Kaen University. The measurement was conducted by means of the Detector Tube System during the 24th of August to the 6th of November 2006. The result indicated that on the day that the formaldehyde was used, the concentration of CH_2 **0** in the morgue was in the range of 0.03 to 0.40 ppm. On the other hand, there was no quantity of CH, O's concentration found in the morgue on the day that no formaldehyde usage which equaled to -0.06 ppm. Moreover, there was no any quantity of CH_2 O's concentration found under the wind in the radiance of the morgue's area around 200 meters. The results also showed the quantity of BTEX's concentration collected in front of the Science's Building No.7 during the working days and the weekends. On the working days, the results were 0.57 to 0.61 ppm for Benzene (C_6H_6), 5 to 21 ppm for Toluene (C_6H_5 CH_3), 10 to 15 ppm for Ethylbenzene (C_6H_5 C_2H_5) and 2 to 6 ppm for Xylene (CH_3). On the weekends, the concentration were found and shown respectively as followed: 0.57 to 0.57 ppm for Benzene (C_6H_6), 4 to 6 ppm for Toluene (C_6H_5 CH_3), 7 to 9 ppm for Ethylbenzene (C_6H_5 C_2H_5) and 2 to 3 ppm for Xylene (CH,).

Key word : Ambient BTEX and CH_2 0, Detector Tube System

Ambient BTEX and CH_2O Monitoring by Detector Tube System in KKU A Case Study of Hospital and Parking Area

Student : Miss. Supannika Salao

Project advisor : Asst. Prof. Teaunjai Duljindachabaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The object of this research is to measure the quantity of the Volatile Organic Compounds or VOCs. This study collected the data and measured the compounds, which were divided into two mainly types. The first type is Formaldehyde (CH_2O) found in the morgue of Srinakarin Hospital. The second type is the BTEX which stands for Benzene (C_6H_6), Toluene (C_6H_5 CH_3), Ethylbenzene (C_6H_5 C_2H_5) and Xylene (CH_3) found in the parking area in front of the Building No. 7 of the faculty of Science, Khon Kaen University. The measurement was conducted by means of the Detector Tube System during the 24th of August to the 6th of November 2006. The result indicated that on the day that the formaldehyde was used, the concentration of CH_2O in the morgue was in the range of 0.03 to 0.40 ppm. On the other hand, there was no quantity of CH_2O's concentration found in the morgue on the day that no formaldehyde usage which equaled to -0.06 ppm. Moreover, there was no any quantity of CH_2O's concentration found under the wind in the radiance of the morgue's area around 200 meters. The results also showed the quantity of BTEX's concentration collected in front of the Science's Building No.7 during the working days and the weekends. On the working days, the results were 0.57 to 0.61 ppm for Benzene (C_6H_6), 5 to 21 ppm for Toluene (C_6H_5 CH_3), 10 to 15 ppm for Ethylbenzene (C_6H_5 C_2H_5) and 2 to 6 ppm for Xylene (CH_3). On the weekends, the concentration were found and shown respectively as followed: 0.57 to 0.57 ppm for Benzene (C_6H_6), 4 to 6 ppm for Toluene (C_6H_5 CH_3), 7 to 9 ppm for Ethylbenzene (C_6H_5 C_2H_5) and 2 to 3 ppm for Xylene (CH_3).

Key word : BTEX and CH_2O Monitoring

Ambient H_2S and CH_3SH Monitoring of The Pulp and Paper Industry Peripheral Area by DetectorTube System

Student : Miss Pantitcha Outapa
Project advisor : Asst.prof.Turenjai Dooljindachabaporn
Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The determine method was Detector Tube System, the results occurred immediately. This method inspected volatile organic compounds such as Hydrogen Sulfide(H_2S) and Methyl Mercaptan (CH_3SH),on 21 August to 4 October 2006, in pulp and paper industry to take sample from the recovery furnace. The results showed that the smell of H_2S response to human was in the range of 0.02 to 0.06 ppm. And the concentration of CH_3SH that cause eye irritation was in the range of 0.04 to 0.1 ppm. These value were lower than the occupational standard of NIOSH and OSHA which were 10, 20 of H_2S and 0.5,10 ppm of CH_3SH respectively.

Key word : Ambient H_2S and CH_3SH Monitoring

Ambient Nitrogen dioxide and Ozone Monitoring by Passive Sampling Technique in Kalasin Municipality

Student : Miss. Puinoon Leojatanarom

Project advisor : Asst. Prof. Turenjai Doolgindachbaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The ambient monitoring of NO_2 and O_3 is the first time at Kalasin Muncipality have 2 station of sampling are bus station and police station by Passive Sampling Technique divide to 3 period ,7 days per period , total 21 days between 12th July – 4th September 2006. The result found that Co-operation of public health and environmental officer Passive Sampling Technique can use monitor ambient nitrogen dioxide and ozone. Quantity of NO_2 is between not found to 73.60 ppb and ozone is between not found to 43.72 ppb,95% not over ambient air quality standard (NO_2<60 ppb , O_3 < 60ppb). Average NO_2 and O_3 at police station more than bus station. Average NO_2 at police station 18.55-32.86 ppb , at bus station 10.77-23.78 ppb. Average O_3 at police station 3.87-17.47 ppb, at bus station 3.66-9.92 ppb.

Key word : Ozone Monitoring

Ambient Particulate Matter (PM_{10}, $PM_{2.5}$) concentrations in Saraburi Province

Student : Miss. Lalita Meekeaw

Project advisor : Asst. Prof. Turenjai Doolgindachbaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

Ambient PM_{10} and $PM_{2.5}$ concentrations were collected in Saraburi Province by Gravimetric method during 10-15 August 2002. There were 4 stations; Phra Phutthabat Hospital, Phu Khae, Napralan School and Talan Municipality. The results show that the maximum PM_{10} and $PM_{2.5}$ concentrations were found at Phu Khae station including PM_{10} 77.27 $\mu g/m^3$ and $PM_{2.5}$ 48.48 $\mu g/m^3$. PM_{10} concentrations were within the National Ambient Air Quality Standard (120 $\mu g/m^3$) for 4 stations. $PM_{2.5}$ concentrations were over the US.EPA. standard (35 $\mu g/m^3$) for 2 days which was 25% of total collections.

Key word : Ambient Particulate Matter

An Application of GIS and Satellite Image for Studying Land Use Change in Lower Songkhram Basin

Student : Miss. Aunchalee Thavorn

Project advisor : Asst. Prof. Sam-ang Homchurn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of this study was to sort out land use change in the lower Songkhram Basin by using Geographic Information System. Landsat 5 in year 2001 and 2005 were interpreted by eyes then land use area was computed by using GIS Arcviwe 3.3 and then land use map was made. From the results, it was found that land use area could be divided into 4 major categories, in 2001 they were agricultural land which had an area of 2290.054_square km.(75.415% of the entire area), water area of 124.358 square km.(4.095 % of the entire area), urban and built up land had an area of 288.367 square km.(9.496% of the entire area) and forest had an area of 321.812 square km.(10.598 % of the entire area). Agricultural land was divided into 2 minor categories, they were paddy field which had an area of 2054.586 square km.(67.660% of the entire area), field crop had an area of 235.468 square km.(7.754% of the entire area). Forest area was divided into 2 minor categories, they were Drydipterocarp forest which had an area of 230.225 square km.(7.582% of the entire area)and Reparion forest had an area of 91.587 square km.(3.016 % of the entire area). In 2005 they were agricultural land which had an area of_2202.911square km.(72.545% of the entire area), water area of 126.154 square km.(4.167% of the entire area), urban and built up land had an area of 465.629square km.(15.334% of the entire area), forest had an area of241.906 square km.(7.966 % of the entire area). Agricultural land was divided into 2 minor categories, they were paddy field which had an area of 1760.634 square km.(57.980% of the entire area), field crop had an area of442.277 square km.(14.980% of the entire area). Forest was divided into 2 minor categories, they were Drydipterocarp forest which had an area of153.933square km.(5.069% of the entire area)and Reparion forest had an area of 87.933 square km.(2.897 % of the entire area).

Key word : GIS and Satellite , Land Use

An Application of GIS and Satellite Data to Riparian Forest (Paa Bung – Paa Thaam) Change in Lower Songkhram Basin

Student : Miss. Laddawan Chaleesombat

Project advisor : Asst. Prof. Sam-ang Homchuen

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of the study is to classify the areas of seasonally riparian forest in 2001 and 2005 by using Satellite Image Data and GIS application (Program Arc View version 3.3).The Landsat-5 and SPOT in 2001 and 2005 were interpreted by visual in the Lower Songkhram River Basin. The result found that in 2001 the basin was covered with seasonally riparian forest about 91.58 km^2 (3.016% of the entire area) and in 2005 about 69.34 km^2 (2.27% of the entire area).The forest area is decreased. And from 69.34 km^2 of the remnant forest only 7.12 km^2 (0.23% of the entire area) can be classified as a fertile seasonally riparian forest, the rest is a degraded seasonally riparian forest about 62.12 km^2 (2.04% of the entire area). Paddy field which had an area of 27.72 km^2 (0.91% of the entire area) and eucalyptus plantation which had an area of 5.10 km^2 (0.17% of the entire area).

Key word : GIS and Satellite

An Application of GIS and Satellite Image for Studying Land Use Change in Upper Songkhram Basin.

Student : Miss Paweena Phurawong

Project advisor : Asst. Prof. Sam-ang Homchurn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of this study was to sort out land use change in the upper Songkhram Basin by using Geographic Information System. Landsat5 in year 2001 and 2005 were interpreted by eyes then land use area was computed by using GIS Arcviwe 3.3 and then land use map was made. From the results, it was found that land use area could be divided into 4 major categories, in 2001 they were agricultural land which had an area of 2791.152 square km. (84.78 of the entire area), water area of 80.0998 square km.(2.64 % of the entire area), urban and built up land had an area of 43.9549 square km.(1.33 of the entire area) and forest had an area of 377.1203 square km.(11.455 % of the entire area). Agricultural land was divided into 2 minor categories, they were paddy field which had an area of 1871.6855 square km. (56.85 % of the entire area), field crop had an area of 919.4662 square km.(27.93 % of the entire area). Forest area was divided into 2 minor categories, they were Drydipterocarp forest which had an area of 286.556 square km.(8.704 % of the entire area)and Riparian forest had an area of 90.5643 square km.(2.751 % of the entire area). In 2005 they were agricultural land which had an area of 2963.743 km.(90.01 of the entire area), water area of 41.885 km.(1.27 % of the entire area), urban and built up land had an area of 45.715 square km.(1.39 % of the entire area), forest had an area of 241.75 square km.(7.38 % of the entire area). Agricultural land was divided into 2 minor categories, they were paddy field which had an area of 2002.144 square km. (60.80 % of the entire area), field crop had an area of 961.599 square km.(29.21 % of the entire area). Forest was divided into 2 minor categories, they were Drydipterocarp forest which had an area of 111.196 square km. (3.38 % of the entire area)and Riparian forest had an area of 130.554 square km.(4.0 % of the entire area), which the dominant species in bamboo.

Key word : Land Use

Assessment of carbon sequestration in wood of high Importance Value Index and the structure of forest in the Plant Genetic Conservation Project Sirindhorn Dam, Sirindhorn, Ubon Ratchathani under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn .

Student : Miss Sirinad Phunchua

Project advisor : Asst. Prof. Dr.Pisit Charoensudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

From the study of Assessment of carbon sequestration in wood of the high importance value index and the structure of forest in Plant Genetic Conservation Project Sirindhorn Dam, Sirindhorn, Ubon Ratchathani under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn, it was found that there were a total of 46 tree species belonging to 26 Families with a mixed forest and deciduous forest ecosystem. Plants with the high importance value index in mixed forest were *Terminalia corticosa, Parinari anamense* and *Canarium subulatum.* Plants with high Importance Value Index in deciduous forest were Shorea *obtuse*, *Dipterocarpus obtusifolius* and *Mangifera caloneura*. From the study of carbon sequestration in wood, it was found that *Terminalia corticosa* and *Shorea obtusa* had the high importance value index in mixed forest and deciduous forest. To calculate the volume of wood samples, I found that if the amount of carbon equal to 50 percent of the biomass, *Terminalia corticosa* and *Shorea obtusa* average carbon storage in wood were 60.30 and 33.75 kg / plant, respectively. Also, to calculate carbon storage in wood according to the allometric equation of Ogawa et al. (1965) was found that *Terminalia corticosa* and *Shorea obtuse* had the average of carbon storage in wood as 26.48 and 18.24 kg / plant, respectively. Besides, from an assessment of carbon sequestration in wood with a high index of inhalation of mixed forest and deciduous forest, it was found that *Terminalia corticosa* and *Shorea obtusa* could store carbon in wood about 0.59 and 0.23 tons /rai, respectively. Moreover, the amount of carbon in the wood of *Terminalia corticosa* and *Shorea obtusa* on the Plant Genetic Conservation Project at Sirindhorn Dam for 2936 rai is equal to 1736 and 667.27 tons of total area, respectively. From this reason, a total of the two tree species that could store carbon in wood was 2403.32 tons of the whole area.

Key word : Carbon Sequestration

Available Phosphorus and Potassium in The Fecal From The Cultivation of Red Earth Worm With Plant Residues.

Student : Mr.Apinan Khaungsatung

Project advisor : Asst. Prof. Dr.Pisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

Available phosphorus (P) and potassium (K) in the waste from the cultivation of red earth worm found that soil which compose Pokchoi, Cabbage and Chinese Cabbage but not red earth worm ;quantity of phosphorus is 98.91, 87.31, 91.53 ppm and quantity of potassium is 163.17, 174.23, 180.51 ppm. Soil which has vegetable and red earth worm; quantity of phosphorus is 279.52, 280.96, 277.37 ppm and quantity of potassium is 357.10, 491.36, 401.47 ppm. When using statistics (One-way ANOVA) compare between soil which has red earth worm and soil which does not has red earth worm found that quantity of phosphorus and potassium is different significance ($p>0.05$) but when compare between soil which has red earth worm found that they are not different significance ($p<0.05$)

Key word : Phosphorus and Potassium

Available phosphorus and potassium in the soil leachate from cultivation of red worm *(Lumbricus rubellus)* **with plant residues**

Student : Miss Nisarut Moonrungsee

Project advisor : Asst. prof. Dr. Pisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The study of available phosphorus and potassium in the soil leachate from the cultivation of red worm *(Lumbricus rubellus)* with three kinds of plant residues; chinese lettuce, cantonese and cabbage were determined. The experimental design was Competely randomize design; CRD with three replicates.The result showed that adding red worm in the soil leachate with plant residues was increased the available phosphorus and potassium in the soil leachate. However, only available potassium was significantly different from potassium in soil and soil with vegetable residues. The concentration of available phosphorus and potassium in Cantonese in the fourth week was the highest with 2.747 ppm and 3.517 ppm, respectively. These K_a and P_a concentrations were very low due to P was fixed by soil cation and K was exchanged by the organic matters from the red worm feces.

Key word : phosphorus and potassium, soil leachate

Available phosphorus and potassium in the soil leachate from cultivation of red worm *(Lumbricus rubellus)* with plant residues.

Student : Miss Nisarut Moonrungsee

Project advisor : Asst. Prof. Dr.Pisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The study of available phosphorus and potassium in the soil leachate from the cultivation of red worm (*Lumbricus rubellus*) with three kinds of plant residues; chinese lettuce, cantonese and cabbage were determined. The experimental design was Competely randomize design; CRD with three replicates.The result showed that adding red worm in the soil leachate with plant residues was increased the available phosphorus and potassium in the soil leachate. However, only available potassium was significantly different from potassium in soil and soil with vegetable residues. The concentration of available phosphorus and potassium in Cantonese in the fourth week was the highest with 2.747 ppm and 3.517 ppm, respectively. These K_a and P_a concentrations were very low due to P was fixed by soil cation and K was exchanged by the organic matters from the red worm feces.

Key word : Soil leachate

CO emissions from Cement Industry Stack in Saraburi province.

Student : Miss. Palm Boonkusol

Project advisor : Asst. Prof. Turenjai Doolgindachbaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

There was a measurement of CO which has been emissions from the cement industry. There were three different industrial units measured and the measurement took place from September 2006 to November 2006. It is composed of TPI Polene Public Company Limited ,CEMEX (Thailand)Co Limited and Asia Cement Public Company Limited. The research indicated that the proportions of CO of three factories were in the average (CO<690 ppm). The TPI Polene Public Company Limited was the plant which emited the highest quantity of CO which was 5.15 ppm, followed by CEMEX (Thailand)Co Limited was 3.79 ppm, and finally Asia Cement Public Company Limited is 3.49 ppm.

Key word : CO emissions

Community's participation in Community Forest Management : A case study of Kaen Toa Community Forest, Pa Ma Now Sub-district, Ban Fhang District, Khon Kaen Province

Student : Mr. Jakkapop jailad
Project advisor : Asst. Prof. Dr. Acharaporn Pagdee
Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This study aims to survey community participation in community forest management (CFM) at Kaen Toa community forest, Pa Ma Now sub-district, Ban Fhang district, Khon Kaen province. It is also to identify social-economic factors influencing community participation. The survey was conducted from July to October, 2006. Household representatives selected by an accidental sampling technique were asked to complete a semi-structured questionnaire. Data analysis is descriptive-based. F-test and Scheffe's test were used to examine factors influencing community participation. In total, 135 household representatives participated in this survey. The majority of participants have high expectation for benefits gained from community forest. They reported of participating in CFM activities but not on a regular basis. Key obstacles for effective CFM identified by the participants include lack of financial support, community perception on value of the community forest, and community understanding toward CFM. From statistical tests, social-economic factors with significant influence on community participation at least in one activity are number of family members, size of lands owned by a household, and expectation of benefits gained from the community forest at 0.05 significant level.

Key word : Community Forest

Effect of Dissolved Oxygen on the Mortality Rate of Nile Tilapia *(Tilapia nilotica)* at different Ages

Student : Miss Kusuma Juntaros

Project advisor : Asst. Prof. Dr. Pisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The effect of dissolved oxygen level on the mortality rate of one and four week-old of Nile Tilapia *(Tilapia nilotica)* were studied using an applied static toxicity test. Experimental design was CRD with four DO levels as the treatments with three replicates. DO levels were set from the lowest preparable level (2 mg/l) to the saturation level (8 mg/l) with 2 mg/l interval. The number of dead fish from each treatment was collected every two hours and the DO level were monitored at the same time. Median lethal concentration (LC_{50}) of DO on one and four week-old were 0.63 and 0.10 mg/l , respectively.Young fishs (one week old) did not tolerent to low DO concentration and at 2 mg/l DO level the mortality rate was significantly higher than high DO level ($p<0.05$). Losing large number of fish was able to see at the begining stage and 4 weeks old fish had more tolerant to low DO concentration. At 2 mg/l DO levels mortality rate is higher than high DO levels significantly ($p<0.05$). The number of lost fish was also large at the begining and if compares between the tolerant of fishs with different ages, Young fishs(one week) were less tolerent to low DO concentration than the older (four week) significantly ($p<0.05$).

Key word : Dissolved Oxygen

Efficiency of Water Lettuce and Duckweed in Removing Suspended Solids and Total Dissolved Solids from effluent of Khon Kaen University Oxidation Ponds.

Student : Mr. Sarut prapatpong

Project advisor : Associate Professor Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

In this research, efficiency of water lettuce (*Pistia stratiotes* Linn.) and duckweed (*Lemna perpusila* Torr.) with cover areas of 100% in removing suspended solids and total dissolved solids from the effluent of Khon Kaen University waste water treatment system was studied. The period of the research was 5 weeks and 3 replicates were used. The samples were collected and analyzed once a week. From the results, it was found that in week 3 and 5 of the experiment, water lettuce could significantly reduce suspended solids in the samples ($p < 0.05$), the percentages of reduction in week 3 and 5 were 96. In addition, water lettuce could also significantly reduce total dissolve solids of the sample in week 1,2 and 3 with the reduction percentages of 8,12 and 29 respectively. Duckweed showed no significant differences in suspended solids and total dissolved solids removed efficiencies. In conclusion, water lettuce showed higher efficiency in reducing suspended solids and total dissolve solids than duck weed. The highest average ability of water lettuce in reducing suspended solids in week 3 and 5, total dissolved solids in week 3.

Key word : Water Lettuce and Duckweed

Environmental Significant Aspect Assessment in Baking Factory.

Student : Miss Nuchanat Limbupasiriporn

Project advisor : Associate Professor. Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The purpose of this study is to assess environmental aspects occurring in Oishi foods; aking factory. The environmental aspects studied comprised of water pollution, noise pollution, smoke and solid waste. In the study, production processes were integrated along with entrepreneur interview. Significance of environmcntal aspects were assessed by evaluating both chances of occurance and seveirity of impacts of the problems. Results of the study showed follows, ranked based on importance: waste water, solids waste, smoking and particulate matters and noise pollution.

Key word : Environmental Significant**,** Aspect Assessment

Environmental Significant Aspect Assessment in Baking Factory.

Student : Miss Nuchanat Limbupasiriporn

Project advisor : Assoc.Prof.Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The purpose of this study is to assess environmental aspects occurring in Oishi foods; baking factory. The environmental aspects studied comprised of water pollution, noise pollution, smoke and solid waste. In the study, production processes were integrated along with entrepreneur interview. Significance of environmental aspects were assessed by evaluating both chances of occurance and seveirity of impacts of the problems. Results of the study showed follows, ranked based on importance: waste water, solids waste, smoking and particulate matters and noise pollution.

Key word : Aspect Assessment

Environmental Significant Aspects Assessment in fish sauce industry.

Student : Miss Yaninee Teerngam

Project advisor : Assoc.Prof.Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The purpose of this study is to assess environmental aspects occurring in Tip Rayong fish sauce factory. The environmental aspects studied comprised of water pollution, noise pollution, smoke and solid waste. In the study, production processes were integrated along with entrepreneur interview. Significance of environmental aspects were assessed by evaluating both chances of occurance and seveirity of impacts of the problems. Results of the study showed follows, ranked based on importance: waste water in washing, noise pollution in bottling, solids waste in washing and solids waste in bottling.

Key word : Aspects Assessment

Ethnobotany of Aquatic-plants at Nong Han wetland , Kumphawapi District Udonthani Province.

Student : Miss. Apinya Pornpipat

Project advisor : Asst. Prof. Dr. Adcharaporn Pagdee

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This ethno-botanic study is to survey aquatic plants used by villagers at Nonghan wetland,Kumphawapee district, Udonthani province. It is also to describe traditional practice for aquatic plant consumption. The study took place at Bandiam village, Kumphawapee,Udonthani from June to August,2006. Data were collected through in-depth interview of seven senior villagers who specialize in herbs consumed in the community and through field and local market surveys. In total, 62 species from 33 families of aquatic plants were reported of being used by villagers. The family mostly used is CYPERACEAE i.e. *Scirpus grossus* L.f., *Cyperus corymbosus* Hook.f. Use of aquatic plants is usually for household consumption,including food, medicines, household tools, animal feeds,and others e.g.,ceremonial plants and decoration materials. Edible and medicinal plants are most frequently harvested,accounted for 45% and 26% of all identified plants respectively. Flowers are the most consumed,compared to other parts. The participants reported that traditional knowledge is passed along from generation to generation through storytellers rather than written form. Currently due to technology development and lack of written documents, this traditional knowledge, especially medicinal use is fading away.

Key word : Aquatic-plants

Impacts from the use of Nonghan, Kumpawapee District, Udon Thani Province for Ecotourism Activities to the Wetland Ecosystem.

Student : Miss Russamee Sonta

Project advisor : Asst. Prof. Dr.Acharaporn Pagdee

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This study aims to assess impacts from the use of Nonghan, Kumpawapee district, Udonthani province for ecotourism activities to the wetland ecosystem. A field survey together with questionnaire interviews was conducted at Bandiam village, Kumpawapee district from June to September 2006. Seventy five household representatives selected by an accident sampling method participated in the survey. The study presents that 32 households involve in village's home-stay program, accounted for 11.76% of the total households. Approximately 300 - 400 tourists visit Nonghan per year, of which about 170 tourist use home-stay services (record in 2006). Usually, the highest season for tourist activities is the "water lily blossom" from November to December. Participants perceived that community's capability to organize ecotourism activities is fair due to site accessibility. The majority of participants (84.25%) reported that the use of Nonghan for ecotourism activities does not substantially impact the wetland ecosystem. However, certain environmental problems i.e. trashes around the lake and dense freshwater weeds can be observed. Only 15.75% of the participants thought that ecotourism activities caused ecosystem changes. The three most identified activities causing changes include fishing, boating, and bird and plant watching respectively.

Key word : Ecotourism Activities

Nitrogen in the leachate from the cultivation of red worm *(Lumbricus rubellus)* with plant residues.

Student : Miss. Suwanna Patthajai

Project advisor : Asst. prof. Dr. Phisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

Total Kjeldahe Nitrogen (TKN) and Nitrate-nitrogen (NO_3-N) in the leachate from the cultivation of red worm *(Lumbricus rubellus)* with three kinds of plant residues; lettuce, cantonese and cabbage Were determined. The experimental design was Completely Randomized Design: CRD with three replicates. The results showed that adding red worm in the leachate with plant residues was significantly ($p<0.05$) increased the kjeldahl nitrogen (TKN) and Nitrate-nitrogen (NO_3-N). The concentration of (TKN) the second week was the highest with 190.4 mg./l. when cultivation the red worm with cantonese while the lowest begin of experiment was 22.4 mg./l. Nitrate-nitrogen concentration in the fourth week in was the highest with 0.25 mg./l. when cultivation the red worm with cabbage while the lowest begin of experiment was 0.02 mg./l. It indicate that the leachate from the cultivation of red worm amount of Nitrogen is combine most of Organic nitrogen that can chang into Nitrat so plant can use it.

Key word : Nitrogen

Noise level that on-site traffic policemen received at Mittraparb Highway-Prachasamosorn Rd. Intersection.

Student : Miss. Panjama Janyalert-a-dool

Project advisor : Associate Professor Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The on-site level that traffic police received at Mittraparb-Prachasamosorn Rd. Intersection, Meaung district, KhonKaen Province was examined. The study was done both in the workday and weekend situation from 08.00am-04.00pm using Leq 1 hour technique. The results showed that in the workdays, the highest noise level was found to be between 08.00-09.00 am with the noise level of 81.9 dBA, Noise level detected between 08.00-09.00 am and 12.00-01.00pm were statistically different from other periods ($p < 0.05$). As for weekend, the highest noise level were detected at 2 period, i.e08.00-09.00am and 15.00-16.00pm, with the noise level of 81.1 dBA. Noise level detected between 10.00-11.00am and 12.00-01.00pm were statistically difference from other periods ($p < 0.05$). The noise level both in workday and weekend had no statistically significant difference ($p > 0.05$) and didn't meet the US.EPA's standard with the noise level over than 65 dBA when using Leq 1 hour technique.

Key word : Noise level

Noise Pollution in SRITHAIMAI KANKASET Company Limited Muang district Nhongbualamphoo province.

Student : Miss Pajaree Wilaipan

Project advisor : Asst. Prof. Dr.Acharaporn pakdee

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This study is to measure noise levels that may consider pollution in rice mill processing at SRITHAIMAIKANKASET Company Limited Muang district Nhongbualamphoo province. Five milling processes in normal operation, including 1) chip off, 2) winnowing, 3) sieving, 4) polishing, and 5) packaging were measured noise levels (Leq (5)) using a sound level meter in the morning and afternoon on the 20th , 27th of July and the 3rd of August 2006. The study presents that noise levels in the process number 1),2),3), and 5) are close to noise limit allowed for safety working environment in factories. Only the process number 4 exceeds the noise level (90.13-90.93dBA), according the Ministry of Interior and the Ministry of Industry Announcements on safety working environment in factories 2003 (90dBA for 8 hrs working). This noise excess may occur from vacuum fans and polishing motors. Although other processes are within a safety limit, noise levels are close to the margin and that can be harmful to workers. Therefore, wearing earmuffs or earplugs should be mandatory for all onsite workers.

Key word : Noise Pollution

Organic Matter and Nitrogen in Soil from The Cultivation of worm (*Lumbricus rubellus*) with Plant Residues.

Student : Miss Nisara Pansila

Project advisor : Asst.prof.Dr.Pisit Chareonsudjai

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

Organic matter (OM) and nitrogen (TKN) in soil from the cultivation of red worm (*Lumbricus rubellus*) with three kinds of plant residues; *Brassica pekinensis Lour*, *Brassica camprestris L. ssp. chinensis (Lour.)Rupr* and *Brassica oleracea L.var.capitata*. were determined. The experimental design was Competely randomize design; CRD. With three replicates. The results showed that adding red worm in soil with plant residues was significantly ($p<0.05$) increased the organic matter (OM) and total Kjeldal nitrogen (TKN).The concentration of OM and TKN in *Brassica camprestris L. ssp. chinensis (Lour.)Rupr* were the highest with 5.84% (w/w) and 773.11 mg/kg, respectively. On the other hand , adding of *Brassica oleracea L.var.capitata* in soil with red worm had the lowest OM and TKN of 5.11% (w/w) and 620.33 mg/kg, respectively. There revealed that soil qualities were significant improved after the cultivation with red worm.

Key word : Organic Matter

Species Diversity of tree, DonKaew area in NongHan Wetland , Kumpawapee District , Udon Thani .

Student : Mr. Supakorn Phuchangtong

Project advisor : Assistant Professor Samang Homchuen

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The survey was conducted on Tree Diversity of DonKaew area in Nong-Han Wetland Kumpawapee District, Udon Thani Province ,during June to August 2006 .The study is based on land use type, which can be identified as Agricultural Area, Villages, Temple and School Area . All tree were identified into 42 families and 104 species. Those included 29 exotics and 75 native species. The biggest number species are in Leguminosae. The remnant forest is a semi-natural dry evergreen forest , which the dominant species is *Dipterocarpus alatus* Roxb. (IVI= 46.4053)

Key word : Species Diversity

Species Diversity of tree, DonKaew area in NongHan Wetland , Kumpawapee District , Udon Thani .

Student : Mr. Supakorn Phuchangtong

Project advisor : Asst. Prof. Samang Homchuen

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The survey was conducted on Tree Diversity of DonKaew area in Nong-Han Wetland Kumpawapee District, Udon Thani Province ,during June to August 2006 .The study is based on land use type, which can be identified as Agricultural Area, Villages, Temple and School Area . All tree were identified into 42 families and 104 species. Those included 29 exotics and 75 native species. The biggest number species are in Leguminosae. The remnant forest is a semi-natural dry evergreen forest , which the dominant species is *Dipterocarpus alatus* Roxb. (IVI= 46.4053)

Key word : Species Diversity, tree

SPECIES DIVERSITY OF TREES IN FORESTED AREAS AT THE NATIONAL STARCH AND CHEMICAL (THAILAND) LIMITED, MUANG DISTRICT, KALASIN PROVINCE

student: Miss Yupaporn Worpaeng.
Project advisor : Asst. Prof. Adcharaporn Pagdee
Department of Environmental science, Faculty of Science, Khon Kaen University

A study on species diversity of trees in forested areas at the National Starch and Chemical (Thailand) Limited, Muang District, Kalasin Province was conducted as part of the requirements for students enrolled in the course 319 093 Cooperative Education in Environmental Science. The survey-based research aims to identify tree species in the industry's forest areas and to create a checklist of trees and their characteristic description. The study is also to analyze forest structure and compare it to an adjacent forest in an attempt to examine forest condition changes that may occur due to industry's activities. The survey took place from June to September 2006 in two selected study sites: one is the remaining forest in the industry's complex and the other is a private forest located in the west border of the factory. Fifteen quadrats with the size of 10x10 m were used for data sampling and forest structure analysis in each study site. At the industry's forest site, 31 species, 28 genera, 23 families of trees were identified of which *Dipterocarpus obtusifolius* Teijsm. ex. Miq., *Xylia xylocarpa* (Roxb.) Taub. ver. Xylocarpa, and *D. tuberculatus* Roxb. obtained the highest important values, which are 108.53%,39.50% and 21.69% respectively. At the private forest, 25 species, 23 genera, 19 families of trees were observed. *Xylia xylocarpa* (Roxb.) Taub. ver. Xylocarpa, *D. obtusifolius* Teijsm.ex. Miq., *Canarium subulatum* Guillaumin are dominant species with important values of 83.90% , 68.27% and 45.28% respectively. In total, 39 species, 34 genera, 26 families were identified in both study sites of which the majority of observed species are in Dipterocarpaceae Family. Shannon-Wiener's diversity index for the industry forest is 3.060675, while the one for the private forest is 2.698813. Finally, the two forest communities share similar species composition and structure. According to Sorensen's Similarity index, approximately 60.71% of tree species could be observed in both communities.

ความหลากชนิดของพรรณไม้ยืนต้นในพื้นที่อุตสาหกรรมบริษัทเนชั่นแนล สตาร์ช แอนด์ เคมิเคิล (ไทยแลนด์) จำกัด อำเภอเมือง จังหวัดกาฬสินธุ์

นักศึกษา : นางสาวยุภาพร วอแพง รหัสประจำตัว 463020516-5
อาจารย์ที่ปรึกษาโครงการวิจัย : ผศ.ดร. อัจฉราภรณ์ ภักดี
ภาควิชาวิทยาศาสตร์สิ่งแวดล้อม คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น

การศึกษาความหลากชนิดของพรรณไม้ยืนต้นในพื้นที่อุตสาหกรรม บริษัทเนชั่นแนล สตาร์ช แอนด์ เคมิเคิล (ไทยแลนด์) จำกัด อำเภอเมือง จังหวัดกาฬสินธุ์ ดำเนินการในช่วงเดือนมิถุนายนถึงเดือนกันยายน พ.ศ. 2549 เพื่อสำรวจชนิดพรรณไม้ยืนต้น วิเคราะห์โครงสร้างป่าไม้ และจัดทำบัญชีรายชื่อพรรณไม้พร้อมคำบรรยายลักษณะและการใช้ประโยชน์ โดยมีการเปรียบเทียบข้อมูลกับป่าไม้ส่วนบุคคลที่มีแนวเขตติดกับโรงงานฝั่งตะวันตก การเก็บข้อมูลใช้วิธีการวางแปลงตัวอย่าง (Quadrate Technique) ขนาด 10 X10 เมตร จำนวน 15 แปลง คิดเป็นพื้นที่ 1,500 ตารางเมตร ในแต่ละพื้นที่ศึกษา ผลการศึกษาพบว่า พื้นที่อุตสาหกรรม บริษัทเนชั่นแนล สตาร์ช แอนด์ เคมิเคิล (ไทยแลนด์) จำกัด พบไม้ยืนต้นทั้งหมด 31 ชนิด 28 สกุล 23 วงศ์ พรรณไม้เด่น ได้แก่ ยางเหียง *Dipterocarpus obtusifolius* Teijsm. ex. Miq., แดง *Xylia xylocarpa* (Roxb.) Taub. ver. Xylocarpa และ ยางพลวง *Dipterocarpus tuberculatus* Roxb. โดยมีค่าความสำคัญเท่ากับ 108.53%, 39.50% และ 21.69% ตามลำดับ บริเวณป่าไม้ส่วนบุคคล พบไม้ยืนต้นทั้งหมด 25 ชนิด 23 สกุล 19 วงศ์ พรรณไม้เด่น ได้แก่ แดง *Xylia xylocarpa* (Roxb.) Taub. ver. Xylocarpa, ยางเหียง *Dipterocarpus obtusifolius* Teijsm.ex. Miq. และ มะกอกเลื่อม *Canarium subulatum* Guillaumin โดยมีค่าความสำคัญเท่ากับ 83.90% , 68.27% และ 45.28% ตามลำดับ โดยการศึกษาทั้งสองบริเวณ พบไม้ยืนต้นรวมทั้งหมด 39 ชนิด 34 สกุล 26 วงศ์ บริเวณพื้นที่อุตสาหกรรม บริษัทเนชั่นแนล สตาร์ช แอนด์ เคมิเคิล (ไทยแลนด์) จำกัด มีค่าความหลากหลายทางชีวภาพของพรรณไม้ยืนต้น (Shannon-Wiener's diversity index) เท่ากับ 3.060675 และป่าไม้ส่วนบุคคล มีค่าเท่ากับ 2.698813 สำหรับการวิเคราะห์ความคล้ายคลึงกันของระบบนิเวศ โดยใช้ Sorensen's Index พบว่าพื้นที่ป่าไม้ทั้งสองแห่ง มีความคล้ายคลึงกันของชนิดพรรณไม้เท่ากับ 60.71 %

Study of the Potential of Phu Phra Bat Historical Park as an Ecotourism Site, Evaluating by Weighting Score Method with additional Environmental factors.

Student : Miss Supajit Kunjorn

Project advisor : Asst. Prof. Dr. Phenprapha Phetcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of the study was to determine potentials of Phu Phra Bat Historical Park as an ecotourism site by evaluating the weighting score method with additional environment factors. The criteria applied in this study included eight aspects; 1) potential factors attracting tourists, 2) opportunities to present appreciation of the site and resources to tourists, 3) opportunities to conduct variety of recreational activities, 4) suitability of resource bases to conduct recreational activities, 5) tourist development, 6) opportunities for local participation to manage tourist site, 7) network with other local and regional tourist sits, and 8) availability of the tourist site. The data were collected from field survey, 3 sets of background information from the authorized officers, 121 tourist-interviewing questionnaires, and related document. It was found from the study that the respondents were 69% women and 31% men. Most of them were pupils/ student (81%). The reason of visit was to relax (57%). 82.6% were convinced to return. According to the results of potential analyses of the site, the potential score accounted for 2.55, which was considered the high potential to be ecotourism site and become one of the principal tourist attractions of the region. Finally, According to analyses of impacts from being supported as an ecotourism site, the score accounted for 0.33, which was not significant impact.

Key word : Ecotourism, Weighting Score

Taxonomic study of the genus *Caulokaempferia* (family Zingiberaceae)in Pho Khou Kwaye Protected Area and Boloven Plateau, the People's Democratic Republic of Lao.

Student : Mr. Supachai Koonterm

Project advisor : Asst.Prof. Sam-ang Homchuen

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This study aimed to review literature, to collect specimens, and tomorphologically investigate the specimens, of the genus *Caulokaemferia* (familyZingiberaceae) found in two protected areas of the People's Democratic Republic ofLao (Laos PDR), the Pho Khou Kwaye Protected Area (Bolikhamxay Province) andthe Boloven Plataeu (Champasak Province). To date, the genus comprised of twentytwoknown species, fourteen of which are distributed in Thailand. Other taxa aredistributed from Northern India (Sikkim), Bhutan, Myanmar, Southern China, Laosand Vietnam. After intensive survey and collections, five species were discovered,three of which are known species, i.e. *C. bracteata* K.Larsen & S.S.Larsen, *C. burtii*K.Larsen & Jenjitt., and *C. laotica* Picheans. & Mokkamul. Other two taxa are newtosciences, and will be reported in other publications. The localities (possibly "type"localities) of the two previous reported taxa from purchased specimens, *C. bracteata*K.Larsen & S.S.Larsen and *C. burtii* K.Larsen & Jenjitt., are also reported here for thefirst time. *C. bracteata* K.Larsen & S.S.Larsen was found in Pho Khou KwayeProtected Area at latitude 18° 24.744' N and longitude 103°5.206' E on crackedsandstone in dry evergreen forest at the altitude of 987m. *C. burtii* K.Larsen & Jenjitt.was discovered at latitude 15° 04.585' N and longitude 106°12.364' E, on the humidblanket forest of the Boloven Plateau at the altitude of 1,275m.

Key word : *Caulokaempferia*

The Study of Udonthani Municipality Solid Waste Characteristic in Rainy, 2006

Student : Miss Chuthiraporn Changthong

Project advisor : Asst.prof.Turenjai Dooljindachabaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The Study of Udonthani Municipality Solid Waste Characteristics in Rainy, 2006 , at Udonthani sanitation landfill where the study was 2 times between were 28th June - 4th July 2006 and 20th July - 26th July 2006 total 14 days. The result of the characteristics of Udonthani municipality solid waste are the bulk density is 244 kg/m^{3} and the component of solid waste are food and garbage 53 %, plastics and foams 25 %, papers 9 %, wood and leaf 4%. The rest of them were glasses, metal, rubble, tile and so on. Found hazardous waest in the total waste that drug cans, syringes and coal mingled in total solid waste. The moisture content is 62%, ash content 18 % and the higher solid calorific (DSCV) 3,734 Kcal/Kg.

Key word : Municipality Solid Waste

The case study of PHA TAEM National Park as Tourist Ecotourism Attracted Potential by Environmental factor added in Weighting Score Method.

Student : Miss Wacheewarobon Sangsawang

Project advisor : Asst. Prof. Dr. Penprapha Petcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The potential Studies of PHA TAEM National Park reserve for Tourist Ecotourism Attracted Potential by Environmental factor added in Weighting Score Method. The Official survey from 3 unit, the tourism quationar 300 unit. The reference document : The study result from the female tourism (44.0%). The male tourism (56.0%) The tourism group of student (48.0%) and the tourism group of traveler and vocation (83.0%). From the case study, 2.65 scores of the potential value show the PHA TAEM National Park reserve maintain the highly potential to be one of the main Tourism Ecotourism Attracted in north eastern Thailand.

Nevertheless, the study in tourism Affort to the environment show 0.67 score means the PHA TAEM National Park reserve is effected from tourist in lower level.

Key word : Tourist Ecotourism

The distribution of fish study in lower songkhram river basin by GIS application.

Student : Miss. Sunant Supakosol

Project advisor : Asst. Prof. SamangHomchuen

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The study of a distribution of fish in the lower Songkhram basin is conducted in June – September 2006 by the application of GIS (arcview 3.3) and GPS . The aim of the study is to create fish database and its habitats(fish bank) which local people are not allowed to do fishing in such area. The result shows 37 conserved habitats (fish bank) both natural and man made. The fish that can distribute well over the basin are Clown featherback (*Chitala ornate)*, *Hypsibarbus lagleri* and snake fish *(Channa striata)*, respectively. The rare species is *Datnioides pulcher Kottelat* .

Key word : Distribution of fish

The objective of the study was to determine potentials of Phu Phra Bat Historical Park As an ecotourism site by evaluating the weighting score method With additional environment factors.

Student : Miss Supajit Kunjorn

Project advisor : Asst. Prof. Dr. Penprapha Petcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of the study was to determine potentials of Phu Phra Bat Historical Park as an ecotourism site by evaluating the weighting score method with additional environment factors. The criteria applied in this study included eight aspects; 1) potential factors attracting tourists, 2) opportunities to present appreciation of the site and resources to tourists, 3) opportunities to conduct variety of recreational activities, 4) suitability of resource bases to conduct recreational activities, 5) tourist development, 6) opportunities for local participation to manage tourist site, 7) network with other local and regional tourist sits, and 8) availability of the tourist site. The data were collected from field survey, 3 sets of background information from the authorized officers, 121 tourist-interviewing questionnaires, and related document. It was found from the study that the respondents were 69% women and 31% men. Most of them were pupils/ student (81%). The reason of visit was to relax (57%). 82.6% were convinced to return. According to the results of potential analyses of the site, the potential score accounted for 2.55, which was considered the high potential to be ecotourism site and become one of the principal tourist attractions of the region. Finally, According to analyses of impacts from being supported as an ecotourism site, the score accounted for 0.33, which was not significant impact.

Key word : Ecotourism

The Potential of Municipal Solid Waste as Calorific Power: The Case of Khon Kean Municipality.

Student : Miss Rattaporn Teerawattana

Project advisor : Asst.prof.Turenjai Dooljindachabaporn

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

Khon Kean Municipal Solid Waste was collected by a municipality during 29th July to 4th August 2006, was quartered and studied characteristics for evaluating the potential as calorific power. According to the study result, the average of solid waste bulk density is 230.35 kg /m3. Three main components that consist of the average of food waste, plastic and paper are 47.59, 25.71, and 11.52 percent respectively. The average of total moisture content is 53.66 percent. The average of total solid is 46.34 percent. The average of volatile Solid is 80.10 percent. The average of ash content is 19.90 percent. The average of calorific value in plastic or foam was 3.9 X 10^4 kg/kcal more than rubber and paper that were 3.4 x10^4 and 1.2X10^4 kg/kcal respectively. The Potential of Khon Kean municipal solid waste as a calorific value was 1.87 X10^6 kg/kcal/day.

Key word :

The Potential of Phanom Rung Historical Park, Burirum Province as a Tourist Site by Weight Score Method.

Student : Miss Satinee Siriwat

Project advisor : Asst. Prof. Dr. Phenprapha Phetcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The potential value of Phanom Rung Historical Park, Chaleam Phra Khiat District, Burirum Pfovince was figured by using the Weighting Score Method which studied in 6 criteria: accessibility, traveling, facility, the importance and the attraction of the tourist site, traveling season, gathering of tourist attraction and security. Two different versions of questionnaires were used. The first version consisted of 4 questionnaires were used to obtain the background information of the site from the people who are responsible for the site. Another version consisted of 228 questionnaires were used to interview the tourists. The results showed that about 54% the interviewees were woman and other 46% were men. The majority of the tourists aged ranged from 16-25 years old made up 40.4%. The highest percentage was that of student, 36.4%.The tourists living in the North East were 67.1%. The tourists came to travel and relax 82.5%. The tourists came with families for 63.6%. The tourists visited the site for the first times were 52.6%. 99.1% of the tourists agreed to pay the entrance fee and every respondent hoped to visit there again. For the opinion about facilities ,the results showed that traveling (59.6%) , rest house (58.8%) , toilet (57.5%) , garbage spots (54.8%) , brochure (48.6%) , food and beverage(56.1%), souvenirs(51.3%), parking lot(60.5%) , authorities' services (45.1%) ,environmental conservation (46.0%), security(53.5%). The results of this investigation show that there is a high touristic potential in 6 criteria. The total potential value is 2.78. It means that Phanom Rung Historical park , Chalerm Phra Khiat District, Burirum Province is the first choice to be selected by the tourists who come to travel in the North-Eastern part of Thailand.

Key word : Potential of Phanom Rung Historical Park, Weight Score Method

The Potential of Phra That Nadune, Naduen district, Mahasarakham province As a Tourist Site By Weighting Score Method.

Student : Miss Rutchanun Srisupak

Project advisor : Asst. Prof. Dr. Phenprapha Phetcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The study of the potential of Phratat Nadue, Mahasarakham as tourism site by Weighting Score Method which using 6 factor: reaching; facility in the touring important and attraction of the touring place; time that available for touring ; summing of touring places and safety for this study which using 140 questionnaires for tourists and 3 basic data surveying form them field In the study, the tourists which are surveyed are (52%) female and (48%) male and their age are between 26-35 years (84%), adomicile almost northest (84.3%) and mostly is a government official and to tour for relaxing which are (73.6%) ,and (99.3%) of surveyed tourists think that their will come back to Phrathat Nadue district again. In case of 6 factors of the study showed which the high potential is reaching important and attraction of the touring place, time that available for touring and summing of touring places' score is 2.31,2.21,3and3,respectively, Facility in the touring and safety's score is 1.9 and 2,respectively,which is the medium potential. From the evaluate using 6 factor that the score is 2.4 which high potential as tourist site.

Key word : Potential of Phra That Nadune

The Quality of Supply Water in Khon Kaen University's Dormitories.

Student : Mr.Ariya Hongpokaphun

Project advisor : Associate Professor Kitti Akamphon

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

From the investigation of physical, chemical, and biological parameters of Khon Kaen University's water supply, it was found that the parameters that meet The Health Department Standards on Water Supply Quality for Drinking Water Standards were turbidity, pH, and suspended solids. Both residual chlorine and coliform bacteria surpassed the above standards. Results from the analysis showed that there were negative correlations between residual chlorine and distance of the water supply pipeline, while the amount of coliform bacteria showed positive correlations with the distance($p<0.05$)

Key word : Supply Water

The study of total dust in inside building in the rice mill of Srithaimaikarnkaset.Co.,Ltd

Student : Miss Pawares Thabsri

Project advisor : Asst. Prof. Dr. Penprapa Pedcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

This project was studied at Sri Thai Mai Agricultural Company, Nongbualumphu. To study the total amount of minute dust inside the rice-mill building, the total average amount of minute dust in working time was considered. It was observed that the working rice-mill and rice mill room areas were the source of the minute dust that could be lead to the health of the workers. The samples were sampled by using personal pump. From this study, it was observed that:

1. The total average amount of minute fine that was observed inside the rice-mill building at the working rice-mill area was 6.24 milligrams per cubic meter.

2. The total average amount of minute fine that was observed inside the rice-mill building at rice mill room areas was 3.04 milligrams per cubic meter.

To prevent the occurring of minute dust inside the building, the rice-mill and transfer line should be clean; to decrease the accumulated dust that is the cause of the diffusion of the dust inside the building and the apertures of the rice-mill and rice mill room areas should be close. For rice mill room , the opened wall should be closed with plastic to prevent the distribution of the dust and easily for the transportation of rice to other processes.

Moreover, the workers should wear dust respirator at the working time for their health and the leaks that are the cause of dust should be close to prevent the increasing of the amount of the dust inside the building.

Key word : Total dust

The total dust from the rice mill of Srithaimaikarnkaset.Co,Ltd

Student : Miss. Venus Nisaitrong

Project advisor : : Asst. Prof.Dr. Penprapa Phetcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The purposes of this survey were to study the quantity of dust in the rice mills and in the environment around them. This study was at Srithaimaikarnkaset.Co.,Ltd in Nong bua lam phu Province. Total suspended particulate matters (TSP) were collected in the rice mills and in the environment around them. Average sample collected time is 24 hours in the rice mills and collected time is 24 hours in the community around them. Results from this study total suspended particulate matter in the rice mills collected time is 24 hours average of 2.822 mg/m^3 which is exceed the standard level of dust as of the guide line from Department of Pollution Control 2538. Investigation of dust in living community of rice mills showed that on the west of rice mills total suspended particulate matter average of 0.311 mg/m^3 and on the east of rice mills total suspended particulate matter average of 0.190 mg/m^3 the number obtained in this study showed a higher level of dust in the comparative community but not exceed the standard level of dust as of the guide line from Department of Pollution Control 2538. This study indicated the total suspended particulate matter in the rice mill and nearby community is high level despite not exceed the standard level. It is necessary the owner of rice mills related government authorities should monitor this problem closely in order to prevent and reduce this dust problem.

Key word : Total dust

Using Ash to the replace of Lime for adjusting the pH of wastewater in the activated sludge wastewater treatment at the Pulp and Paper Mill.

Student : Miss Nittaya Jitbantoeng

Project advisor : Associate Professor Dr. Penprapa Phetcharaburanin

Department of Environmental Science, Faculty of Science , Khon Kaen University. Thailand.

The objective of the study is to use ash to the replace of lime for adjusting the pH of wastewater in the activated sludge wastewater treatment system at the pulp and paper mill. By the way as using white ash and black ash which were generated from boilers equipped at the pulp and paper mill. Actually, this research is also an experimental study that was set to study the properties, the alkalinity, the optimum volume of neutralizing value in wastewater, and the characteristic of precipitation by the jar test. The results from the test on properties of ash was demonstrated that the major component in base was the calcium oxide (CaO) and it depended on a quantity of CaO. In white ash contained a certain amount of CaO was 60.53 % by weight, on the other hand, black ash was about 16.60 % by weight. The study of alkalinity on the equal concentration between white ash and black ash, white ash was higher than black ash in both of the first experiment group which did not have precipitate thrown and the second experiment group which had precipitate thrown. Ultimately, the status of alkalinity steady rose and depended on the increase of the concentration. At the concentration of 0.03 to 0.06 g/ml, the alkalinity speedily increased and when added more concentrated, it slightly increased. Then I continued to find the appropriate ash solution volume that added in wastewater for adjust ting the pH value to 7. By considered the volume of ash solution could use the status of alkalinity in white ash solution that was efficient on neutralization value. I discovered that the white ash solution was used in the less volume than the black ash solution of the black ash solution in the ratio of 5 times increased of the white ash solution as well as the second experiment group which had precipitate thrown used the volume in the ratio of 3 times increased of the white ash solution. therefore, the first experiment group that did not have precipitate thrown used the volume

The other study of the characteristic precipitation by the jar test was using thee ash solution neutralized the level of wastewater. I found that after they were mixed for by the jar test and left them to form the precipitate for an hour. The precipitates were formed to each other by the white ash solution more than the black ash solution. That process was used for adjusting the pH of 1 litre wastewater to be neutral water (pH and the optimal concentration was 0.05 g/ml (used 10 g of ash : 200 ml of DM water) which used the volume of the white ash solution in the first experiment group that did not have the precipitate thrown for 2.00 ml and used the second experiment which had Lime precipitate thrown for 15.00 ml. The results indicated that white ash was absolutely better than black ash for using to the replace of lime for adjusting the pH of wastewater at the pulp and paper mill.

Key word : replace of Lime, activated sludge wastewater treatment