

A Study of Environmental Impacts on Maejo-Chumphon University Lamae District, Chumphon Province

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Abstract

This study employed survey research to collect data on environmental impacts comprising electrical energy, garbages, water, and green areas arised from teaching and learning facilitation and managerial administration in Maejo University, Chumphon campus. Interview was conducted with executives of the university and a set of questionnaires was used for data collection administered with staff and personnel of the university. Obtained data were analyzed by using descriptive statistics and the statistical package.

Results of this study revealed four issues including: 1) there were no clear regulations of waste management which contradict to the image of the green university as claimed; 2) water quality met the required standards. However, it could not be used for drinking because it was from rainwater and groundwater; 3) the green areas in the university were found that the land was composed of sandy soil which was suitable for Queen's flower (*Lagerstroemia speciose*) and Kra thin saba (*Acacia mangium wilds*) because Queen's flower was a symbol of the university, and it could be grown in the local environment; 4) the electricity consumption in the university in 2016 was less than in 2015. In addition, inappropriate behaviors of electricity using included leaving classrooms and student dormitories without turning off the lights and electric fans and keeping air conditioners turning on in the offices where there was no one in the office. The practical solution dealing with environmental impacts is to actively establish cooperation between every section on the university campus in order to lead the university to the Green University as expected. In addition, campaigns provoking environmental awareness regarding waste management and energy saving should be held regularly. Green zoning and water management should also be initiated.

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Introduction

Maejo-Chumphon University has a 15-year development plan between 2012 and 2026 as “the University of Life” which respects and realizes the importance of nature and environment under the philosophy which is “to focus on the development of graduates who possess wisdom, persistence, perseverance and moral integrity for the prosperity of Thai people in an agriculture-based society.” The programs include Tourism Development, Business Administration, Fisheries, Crop Production Technology, and Political Science. It aims to produce graduates for the agricultural sectors and other industries in the labor market.

The environment is the aggregation of surrounding things naturally occurred or humanmade for their needs. The environmental impacts have continuously increased and caused natural calamity such as global warming, flood, and landslide. Apart from paying attention to the environmental conservation and rehabilitation, the awareness of environmental resource utilization and learning plans should be emphasized. In order to consider the recent land use in the green zone in Maejo-Chumphon University, it was found that there were several kinds of activities operated by

students, university personnel and several sections in the area. It is evident that those activities can cause negative impacts towards environmental resources without effective approaches and strict implementation dealing with problems including the increase of waste, the decrease of green area, wastewater and energy wasting. These affect the environment on the university campus.

In order to put the importance on the environment as a part of management in Maejo-Chumphon University and move forward to the concept of the green university, the researcher aimed to explore the environmental impacts of the university as the learning space of environmental management and provoking environmental awareness among students, university personnel, and related sections. It was expected to establish cooperation and responsibility towards the environmental impacts caused by teaching and learning activities in the four issues: 1) the internal problems; 2) energy consumption for learning and teaching activities; 3) quality of water used in dormitories and teaching and learning activities; and 4) the decrease of trees on the campus caused by facility development.

This study was done by surveying and collecting the data of environmental impacts in order to find out approaches of environmental management. It focused on encouraging every section to be a part of development aligned with the strength of university and the university development plan “GO-ECO-U” and piloting development projects as models for the local community to further develop and apply, especially conservation of the biophysical environment with the least effect on local surroundings. It was expected to lead to the development of the university with sustainable management.

Objectives

Specifically, this study aimed to

1. survey and collect data of environmental impacts related to wastes, electricity consumption, water quality and the increase of green area caused by teaching and learning activities and the internal management of Maejo-Chumphon University;
2. propose approaches focusing on the cooperation of every section in the university in order to manage environmental impacts caused by teaching and learning activities and internal management.

Methodology This study employed a survey research conducting the data as participants perceived about the environmental impacts including the impacts of wastes, electricity source, water quality and the land management of green areas affected by learning and teaching activities and the internal management of Maejo-Chumphon University. The research area was divided into 3 zones; 1) student dormitories, 2) Boonrod Supaudomrerk building, and 3) 80-Year Anniversary Building. The survey tool and procedures for conducting data designed as follows.

3. *Interview Form:* The forms for interviewing with four members of the management team was used for investigating the management policy towards the environmental impacts, wastes, the electricity source, water quality and the green areas within Maejo-Chumphon University.

4. *Questionnaire:* A set of questionnaire was used to collect data from the sample group including university students and personnel in the university. The dependent variables were designated according to the research objectives for collecting opinions of the sample group with the questionnaire. The questionnaire consisted of 3 parts:

Part 1: General information of the sample group including sex, age, occupation and domicile with selected choices

Part 2: Questions about opinions of the sample group regarding three topics: wastes, electricity using, water quality, and green areas

Part 3 Recommendations as open-ended questions

5. *Examining and analyzing the data about wastes*: The data were conducted by the types of wastes by placing sorting bins with labels for understanding and remembering how to separate wastes correctly among the sample group members. Providing statements and understandable labels were made in order to establish mutual understanding in waste sorting for data collection.

6. *Examining and analyzing DO (Dissolved Oxygen), temperature, pH and transparency*: Data were collected related to drinking water and water used for other purposes. The samples of water were collected in four days and five times a day in the student and teacher dormitories, 80-Year Anniversary Building, and earthen huts. The water quality from each source was compared with the standard quality.

7. Designing follow-up tools, identifying types of impacts and indicators and examining undesired behaviors on consuming energy sources in each section: Data were collected by repeatedly monitoring and examining in the mentioned period and used for further analysis.

8. Surveying plant species and preparing growing fields on the campus was done by preparing plots, selecting plants, estimating the number of plants, the length of growing period and monitoring. Data were collected for comparing the growth rate of each species.

9. The workshop “The Lesson of Environmental Management and Social Responsibility” was held to establish mutual understanding between university officers and students.

Data Analysis and Statistics

Qualitative and quantitative data analyses were applied in this study. The statistic tools include frequency, percentage and mean. Obtained data were in tables with descriptions and analyzed with descriptive statistics.

According to the data collection on dry wastes, it was found that the quantity of dry wastes was rated as “Good” as it was less than 0.36 grams/person. The majority amounts of dry wastes were plastic materials (27.36 %), plastic bottles (15.64 %), boxes (4.82 %), and plastic cups (12.95), respectively. All mentioned wastes could not naturally be degradable (Figure1).

Findings

The research of environmental impacts on the campus aims to survey and collect environmental impacts including wastes, electrical energy, water quality and the proportion of green areas on the campus caused by teaching and learning activities and university management including negative impacts on four issues: 1) wastes, 2) water quality, 3) energy, and green areas. According to the data, findings were as follows.

1. Wastes It was found that the management team had a policy of waste management. However, the system was unclear because there was no key person responsible for it. Moreover, the projects which had already been held were not practical. Recently, the Subdistrict Administrative Organization had been paid monthly by the university for waste

disposal. Some organic wastes were used to produce compost. In addition, it was agreed that internal departments, management team, university personnel and students should cooperate to lead Maejo-Chumphon University to the full concept of Green University. According to the obtained data, the quantity of each waste type was wet wastes at 14% , dry wastes was at 71.3% , hazardous wastes was at 5.46% , and recycle wastes was at 9.51% . Currently, the university still lacked of approaches of waste management and regular campaigns provoking environmental awareness. This also included a problem about stray dogs and other pets on the campus. As for opinions of the participants regarding practical solutions, 96 % of them agreed that knowledge about waste sorting should be provided whereas 96% voted for zoning to reduce wastes in the university. 94% of participants also thought that the 3R (Recycle, Reuse, and Reduce) campaign should be promoted.

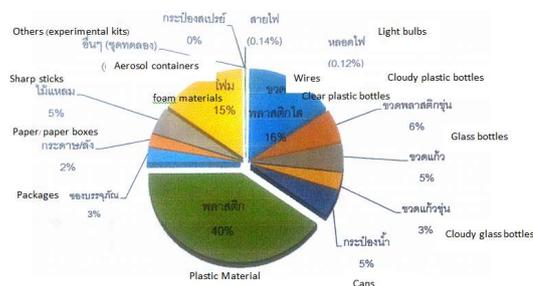


Figure 1 Types of solid wastes

2. Water Quality It was found that university personnel had realized the importance of cleanliness of drinking water. However, water sources in the university could not be used for drinking because it was from rainwater and groundwater. The sample water indicated an average temperature of 28.7 C, pH at 6.93, and DO at 4.23. It could be noticed that the university lacked of the water management system. As for the quality test of drinking water and other purposes, cleanliness, color, and smell were examined and found that the majority of consuming water in the university, which had already been treated, were muddy and red. The high level of limestone sediments was also found in the water. This was because the groundwater source was located near the sea. The sample water indicated an average temperature of 28.6 C, pH 7.09, and DO 3.68. It was assumed that the level of dissolved oxygen was low because groundwater does not expose to sunlight. To sum up, the water quality at 80-Year Anniversary Building was occasionally qualified to use excepted in the time when water was overused and stored in the clarifier process in the insufficient required length of time. This caused the pH balance to be acid. At the area of

earthen houses, the water quality was not qualified for consumption because of greenish-black color and containing the smell of accumulated soil. The sample water indicated an average temperature of 28.6 C, pH 6.39, and transparency rate at 13.75. The level of DO was at 1.56 which was lower than the standard level.

3. Energy Resources It was found that the university expensed on electricity consumption of 80-Year Anniversary Building in 2015 was higher than in 2014 at 59,919.6 baht. The use of electricity in 2016 was lower than in 2017, and the differentiation was 419,471.85 baht (Table 2) . The approaches managed by the university were having signs warning to turn off lights after class or finishing activities, setting up automatic timers to turn off air conditioners in the office and running a campaign to raise awareness of using electricity effectively among university students. As for questionnaires about behaviors in energy resource using from the sample group, it was found that the undesired behaviors of most participants did was leaving classrooms and dormitories without turning off lights and electric fans (Mean =).

The proposed solutions from the sample group were that renewable energy which should be implemented in the university ($\bar{x} = 4.94$), reducing electricity consumption by turning off every electronic appliance when leaving houses and offices ($\bar{x} = 4.82$) and selecting electric appliances with the EGAT label no. 5, standard and energy efficiency labelling of Thailand ($\bar{x} = 4.74$).

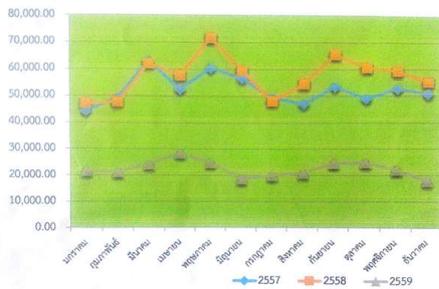


Figure 1 Graph showing electricity consumption in Boonrod Supaudomrerk building between 2014 and 2016

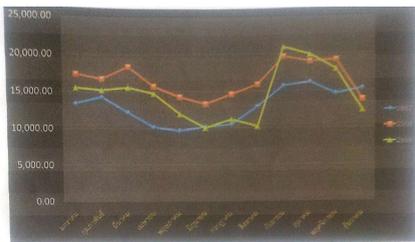


Figure 2 Graph showing electricity consumption in 80-Year Anniversary building between 2014 and 2016

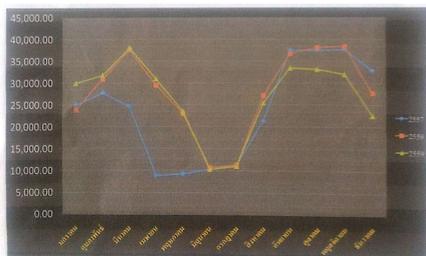


Figure 3 Graph showing electricity consumption in student dormitories between 2014 and 2016

Buildings	Electricity Expense (baht)		Differentiation (baht)	Electricity Expense (baht)		Differentiation (baht)	Remarks
	2014	2015		2014	2015		
Boonrod Building							Decreased
Student Dormitories							Decreased
80-Year Anniversary Building							Decreased
Total							Decreased

Table 2 Annual electricity expense between 2014 and 2016

4. Green Areas Results of the study revealed that the university management team agreed that the green areas in the university had changed from the past. Although the land of the university was the forest degradation area, it was recovering. The land development had caused deforestation in the area. The development came with the loss of green areas. Those activities included the construction of new buildings, renovating buildings, expansion of agricultural and fishery areas. The future policy for green areas should attempt to increase the land of conserved plants, recover the forest degradation area by growing plants which could grow well in infertile soil condition such as Queen’s flower (*Lagerstroemia speciose*) and Kra thin saba (*Acacia mangium wilds*). It was expected to lead to the concept “Go eco” with the ecosystem, the system of dependency between men and nature.

Also, the researcher had experimental plots for examining the growth rate of plants in the university. The plants examined in this research were Queen's flower trees, Kra thin saba, ironwoods, stink beans, and Champacas. The random measurement was done every 15 days. It was found that the growth rate of trees showed a minor change whereas ironwoods did not show a significant change. It could be assumed that all examined trees were slow growing trees. As for opinions of the participants answering the questionnaire, 65 % of the participants voted Queen's flower as a plant to be grown in the university because it was a symbol of university and tolerant in every weather condition whereas 35% of the participants voted Kra thin saba because it could be grown in sandy soil condition, and sold for income generating of the university.

Conclusions and Discussions

The population growth and continuing industrial development resulted in a decrease in reserved power sources. In the meantime, the intensifying of global warming has caused the world's climate change. This leads to natural disasters causing the increasing loss of lives and assets. As a result, every section should cooperate to find out effective policies and

approaches to reduce environmental impacts actively. According to the data analysis, the following were discussions:

1. There were four environmental impacts on the university including wastes, energy resources, water quality, and green areas. The mentioned impacts varied and depended on places, time, quantity, and purposes of utilization.

2. The factors affecting environmental impacts in the university were geographical attributes and the management issues including the university policy, users, and activities of users. This was analyzed from behaviors of users, the management policy of university and traits of land use.

3. According to the data collection, indicators of environmental impacts could be analyzed in 4 following points.

- 3.1 Wastes: The indicators of this study were waste types, sorting bins, waste sorting, behaviors, and the waste management of the university.

- 3.2 Energy: The indicators were the perception of participants towards environmental impacts, behaviors of consuming energy and energy management.

3.3 Water Quality: The indicators of this study were DO, temperature, pH, color, transparency and water management in the university.

3.4 Green Areas: The indicators were the data of plant species, appropriate plant species for the local environment, soil condition, the growth rate of plants and the management of the university.

4. According to results of this study, it was found that the timespan of research period should be set lasting more than five years in order to compare findings of each impact. This is for finding significant changes caused by land use of the university. However, the university should realize the world situation that environmental impacts are critically watchful due to the expansion of natural disasters. In addition, King Bhumibol's theory and work principles of "nature to cure nature" should be applied as an approach of the management plan on environmental impacts in the university.

Recommendations

According to results of this study, it was found that it did not cover patterns of utilization because the comparison of each factor could not reveal significant changes caused by utilization for each specific purpose of the university. The limitation of this study was timespan of research

period which should be longer than five years. In order to find out significant impacts of land utilization, the practical methodology should be done by collecting the data in the former period or spending some more years to collect adequate data. This is for having a practical research plan, setting a follow-up system, proposing a policy of reducing impacts systematically, and establishing concrete application. According to this study, recommendations from the research were proposed as follows.

1. Energy consumption should be planned and monitored on how to use it effectively and efficiently for getting the most out of it and reduce the loss of energy in every process. For example, inspection and maintenance of electric appliances should be usually applied in order to reduce leaking of energy.

2. It is recommended to choose tools and appliances with high energy saving performance such as electric appliances with the EGAT label no. 5 and energy saving tubes. Reusing by repairing usable things, reducing waste, and recycling are also needed.

3. Rewarding university personnel or students as role models who save energy and separate wastes helps establish the value of using resources with consciousness.

4. Applying King Bhumibol's theory and work principles of "nature to cure nature" is recommended. The technology for wastewater treatment should be designed in the simple and practical model in order to reduce high cost. It should also be constructed by using local materials. In the meantime, environmental impacts should be regularly monitored for conducting data used for water management in the future.

5. Organic waste management in the university should be concerned about the most effective use of natural resources. A complete system of organic waste management should be implemented. Controlling the number of organic wastes produced in the designated area should be initiated. Otherwise, organic wastes should be sorted at the origin in order to make use of it. However, disposing of the massive quantity of organic waste requires the technology which can be processed fast because organic wastes can affect the environment easily and quickly. Recently, it has been found that earthworms can convert organic wastes effectively and quickly. This method is an effective and eco-friendly organic waste management. On top of disposing of organic wastes, there are several advantages of earthworms using such as vermicompost and worm tea. In the process of this method, it also helps increase the size of earthworms. Today,

vermicomposting is commercial and useful for most kinds of plants.

6. Environmental awareness towards the problem of organic wastes should be established by limiting their own needs or consuming with appropriate and reasonable quantity. In addition, the quantity of organic wastes should be monitored and evaluated whether it has increased or decreased. This is for improvement in the future.

7. Waste sorting bins labeled with understandable signs should be available everywhere on the campus in order to establish this value in the public which people must follow and know the environmental policy of the university. This is a means which wastes can be sorted at the beginning. Moreover, waste sorting should be campaigned actively in order to have financial benefits. For example, the selling prices of sorted wastes in the market are clear plastic bottles at 5 baht/kilogram, cloudy plastic bottles at 5-10 baht/kilogram, glass bottles at 1 baht/ kilogram, cloudy glass bottles at 0.5 baht/ kilogram, paper at 3 baht/ kilogram, and copper metal at 10 baht/kilogram.

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