MAEJO UNIVERSITY

THE OPERATION GREEN UNIVERSITY REPORT 2022

รายงานผลการดำเนินงาน
แม่โจ้ มหาวิทยาลัยสีเขียว 2565

มหาวิทยาลัยแม่โจ้
MAEJO UNIVERSITY

UI GreenMetric
World University Rankings

The operation green university report 2022

Operated by

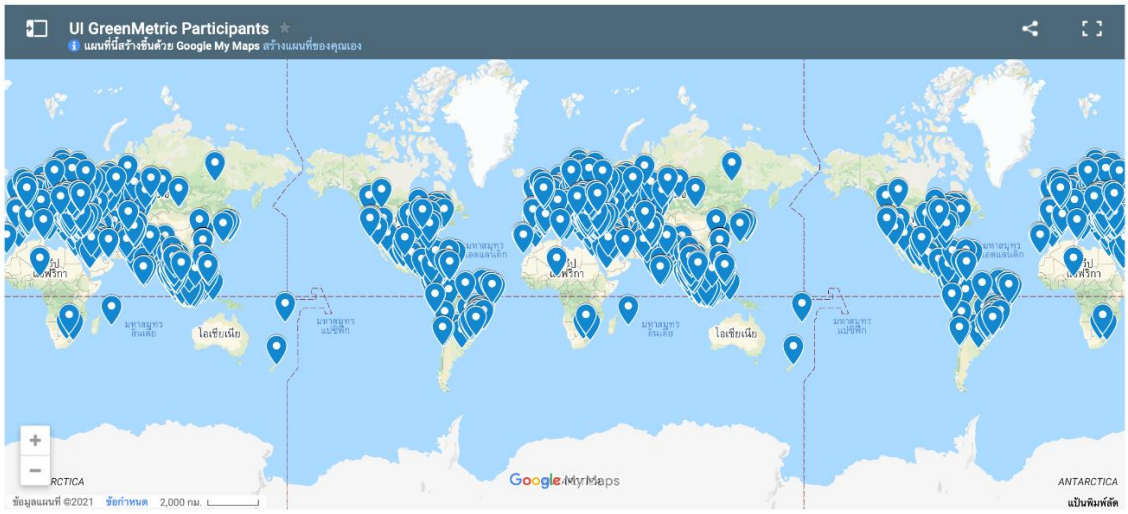
Green University Strategy Board

Executive Summary

Operation of Maejo University to join the Green University Ranking

The UI Green metric World University Ranking is one of the projects that will help university moves towards Green and Eco-university internationally. The assessment criteria refers to criteria compiled from numbers of universities around the world, which is a collective agreement to move towards a Green and Sustainable Future. Maejo University entered the rankings for the first time in 2013 and was ranked 194th among universities worldwide. In the following year (2014), the university was ranked 10th in Thailand, and has continued to operate until the present. In the year 2020, the university was ranked 6th nationally and 110th internationally from 912 universities around the world. Based on performance and scores, the university ranking can be considered to have a good development.

However, in 2021, due to the COVID-19 pandemic, project activities are cannot be done as usual, which is something that universities and organizations around the world are also affected. Therefore, this year some plans may be revised to suit the epidemic prevention measures.



List of UI GreenMetric participant in 2020 base on location (UI GreenMetric website)

Since more and more universities around the world apply for the ranking competition each year, more details and up-to-date assessment criteria are updated annually. Sustainable development issues (SDGs), global climate change planning and biodiversity planning have been added, and the situation prepared for the epidemic but still based on the same 6 key criteria and indicators.

The criteria for consideration consisted of 6 main indicators as follows:

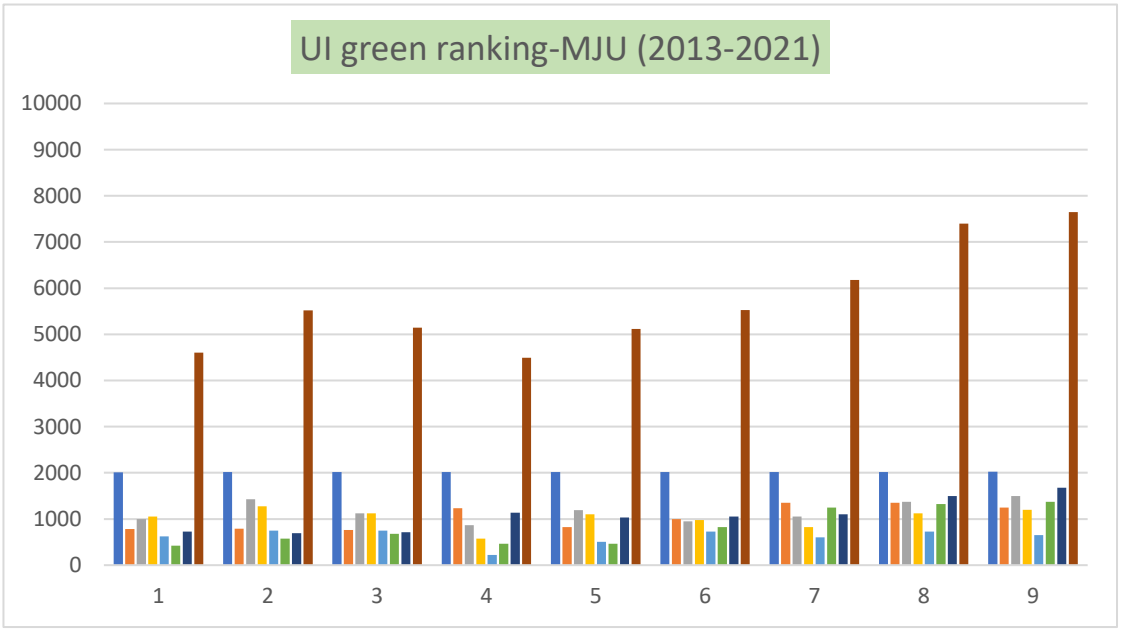
1. Setting and infrastructure - 15%
2. Energy and Climate Change - 21%
3. Waste - 18%

4. Water - 10%
5. Transportation - 18%
6. Education and research- 18%

Self-assessment of University

The results of the assessment of scores according to the criteria of all 6 indicators of Maejo University from 2013-2021.

However, in 2017, a detailed method of calculating and evaluating key indicators and sub-measures for each topic was announced in order to understand the assessment methods. This should cause each university to plan for improvement, to develop more deficiencies in each area (refer to the World Green Universities Ranking Guide), and to make small improvements to each of the criteria and indicators each year. If you look at the past 3 years, it will be found that Maejo University has improved in global rankings. It was found that in 2018 it ranked 215 out of 719 universities, 2019 ranked 181 out of 780 universities and last year ranked 110 out of 912 universities worldwide. The country's ranking is sixth with a score of 7,400, a 74% increase from 2019's total score of 6,175 (61.75%). The best ranking in the world is Infrastructure category (Setting and infrastructure, SI) ranked No. 5 in the world and No. 1 in Thailand.



Maejo University Green University Performance evaluated from 2013 - 2021

From the performance of each category, compared to the year in which the data was collected, it was found that several categories had nearly doubled their assessment results over the past 9 years. For example, the setting category from the first year 786 points increased to 1,250 points, the Transportation category from 425 to 1,375 points, and the Education category from 724 to 1,675 points in 2021. In the rest of the categories, the results were satisfactory. In its implementation, the working team has applied assessment criteria and assessment results to analyze and improve work practices in terms of data collection and development of project activities to be consistent with sustainability and environmental friendliness according to the context and consistently appropriate with the university.

In 2021, the team gathered data on operations and activities related to becoming a green university according to the assessment criteria of UI GreenMetric 2021 and imported the data into the assessment system on November 7, 2021. The results of 2021 (compare with 2020) are as follows:

	SI (1,500)	EC (2,100)	WS (1,800)	WR (1,000)	TR (1,800)	ED (1,800)	Total (10,000)
2020	1,350	1,375	1,125	725	1,325	1,500	7,400
2021 Result	1,250	1,500	1,200	650	1,375	1,675	**7,650**

UNIVERSITY PROFILE

Name	:	**Maejo University**
Established	:	**1934**
Country	:	**Thailand**

1. VERIFIED DATA

Category	Point	Maximum Point	Percentage
Setting and Infrastructure (SI)	1,250	1500	83.33 %
Energy and Climate Change (EC)	1,500	2100	71.43 %
Waste (WS)	1,200	1800	66.67 %
Water (WR)	650	1000	65.00 %
Transportation (TR)	1,375	1800	76.39 %
Education (ED)	1,675	1800	93.06 %
Total Score	7,650	10000	76.50 %

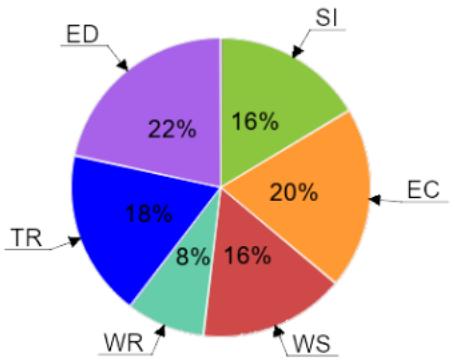


figure 1.1 Overall Score Diagram

Performance in 2021

2. RESULTS SUMMARY

World Ranking	SI Ranking	EC Ranking	WS Ranking
121	50	96	313
	WR Ranking	**TR Ranking**	**ED Ranking**
	359	191	50

3. WORLD RANKINGS HISTORY

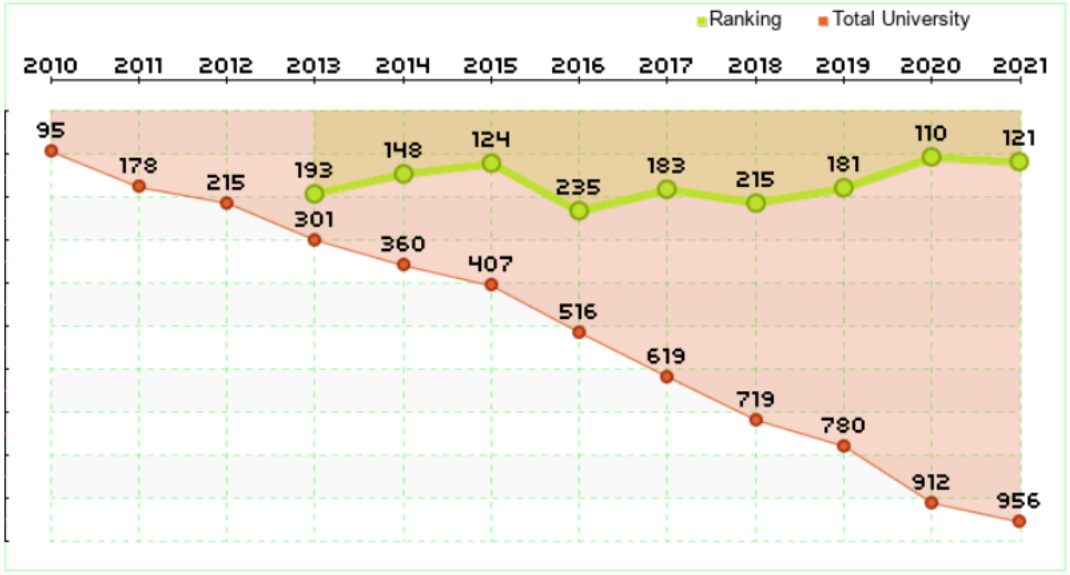


Figure 3.1 World Rankings History Diagram

4. RANKING IN THAILAND

Country Ranking	SI Ranking	EC Ranking	WS Ranking
9	2	3	15
	WR Ranking	**TR Ranking**	**ED Ranking**
	21	16	3

Performance in 2021

Questionnaire Data

University Profile

Username : mju.ac.th
University Name : Maejo University
University Leader : President : Assoc. Prof. Weerapon Thongma, Ph.D

PIC Profile

PIC Name : Yaowanit Tarachai
PIC Position : secretary of Green university project
Email : yaowanit555@gmail.com

Submitted Date : 2022-10-31 22:58:30 (GMT +7)

Setting and Infrastructure

Question		Answer
1.1()	Type of higher education institution	[1] **Comprehensive**
1.2()	Climate	[2] **Tropical Wet and Dry**
1.3()	Number of campus site	3
1.4()	Campus setting	[2] **Suburban**
1.5()	Total campus area (m^2)	3374680.54
1.6()	Total campus ground floor area of buildings (m^2)	110869.35
1.7()	Total campus buildings area (m^2)	343322.75
1.8(SI.1)	The ratio of open space to total area.	[5] **> 95%**
1.9(SI.2)	Total area on campus covered in forest vegetation (please provide total area in square meters)	[3] **> 9 - 22%: 16.89 m^2**
1.10(SI.3)	Total area on campus covered in planted vegetation (please provide total area in square meters)	[5] **> 40%: 42.20 m^2**
1.11(SI.4)	Total area on campus for water absorption besided forest and planted vegetation (please provide total area in square meters)	[3] **> 10 - 20%: 18.51 m^2**
1.12()	Total number of regular students (part time and full time)	15106
1.13()	Total number of online students (part time and full time)	0
1.14()	Total number of academic and administrative staff	1399
1.15()	Estimated annual total population	16505
1.16(SI.5)	The total open space area divided by total campus population.	[5] **> 70 m² / person**
1.17()	Total university's budget (in US Dollars)	22,876,031,432.12
1.18()	University's budget for sustainability effort (in US Dollars)	7,104,852,860.10
1.19(SI.6)	Percentage of University's budget for sustainability effort	[5] **> 15%**
1.20(SI.7)	Percentage of operation and maintenance activities of building in one year period	[5] **100%**
1.21(SI.8)	Campus facilities for disable and maternity care	[4] **Facilities are partially available and operated**
1.22(SI.9)	Security and safety facilites	[5] **Security infrastructure is available and fully**

		functions and security responding time for accidents, crime, fire, and natural disasters is less than 10 minutes
1.23(SI.10)	Health infrastructure facilities for students and academic and administrative staff wellbeing	[4] **Health infrastructure (first aid, emergency room, clinic, hospital and certified personel) available**
1.24(SI.11)	Conservation: plant (flora), animal (fauna), and wildlife, genetic resources for food and agriculture secured in either medium or long-term conservation facilities	[5] **Conservation program fully implemented**
Energy and Climate Change		
Question		Answer
2.1(EC.1)	Energy efficient appliances usage	[5] **> 75%**
2.2()	Total campus smart building area (m^2)	302856.44
2.3(EC.2)	Smart Building implementation (percentage of the total floor area of smart building to the total all floors building area (smart and non-smart buildings area).	[3] **> 25% - 50%**
2.4(EC.3)	Number of renewable energy sources in campus (solar power, bio diesel, wind power, etc)	[5] **> 3 sources**
2.5()	Please specify renewable energy sources in campus and provide capacity produced in kilowatt hour	[2] **Bio Diesel**: **24114.52 kWh** [3] **Clean Biomass**: **2517.90 kWh** [4] **Solar Power**: **2224277 kWh** [5] **Wind Power**: **11869.80 kWh**
2.6()	Electricity usage per year (in kilo watt hour)	9275740.20
2.7(EC.4)	The total electricity usage divided by total campus population (kWh per person). Formula: (2.6) / (1.15)	[4] **279 - 633 kWh**
2.8(EC.5)	The ratio of renewable energy production divided by total energy usage per year	[4] **> 2 - 25%**
2.9(EC.6)	Elements of green building implementation as reflected in all construction and renovation policies	[5] **> 3 elements**
2.10(EC.7)	Greenhouse gas emission reduction program	[5] **Program(s) aims to reduce all three scopes emissions (Scope 1, 2 and 3)**
2.11()	Please provide the total carbon footprint (CO_2 emission in the last 12 months, in metric tons)	7958.39
2.12(EC.8)	The total carbon footprint divided by total campus population (metric tons per person). Formula: (2.11)/(1.15)	[3] **> 0.42 - 1.11 metric ton**
2.13(EC.9)	The number of innovative program(s) in Energy and Climate Change	[5] **More than 3 programs**
2.14(EC.10)	Impactful university program(s) on climate change	[5] **Provide training and educational materials for surrounding communities, at national level, and at regional and international level**
Waste		
Question		Answer
3.1(WS.1)	Recycling program for university waste	[4] **Partial (> 50% - 75% of waste)**
3.2(WS.2)	Program to reduce the use of paper and plastic on campus	[5] **more than 3 programs**

3.3(WS.3)	Organic waste treatment	[5] **Extensive (> 75% treated)**
3.4(WS.4)	Inorganic waste treatment	[5] **Extensive (> 75% treated)**
3.5(WS.5)	Toxic waste treatment	[5] **Extensive (> 75% treated) or campus produces a minimum amount of toxic waste**
3.6(WS.6)	Sewage disposal	[4] **Treatment for down cycling**
Water		
Question		Answer
4.1(WR.1)	Water conservation program and implementation	[5] **> 50% water conserved**
4.2(WR.2)	Water recycling program implementation	[5] **> 50% water recycled**
4.3(WR.3)	Water efficient appliance usage	[4] **> 25 - 50% of water efficient appliances installed**
4.4(WR.4)	Treated water consumed	[3] **> 25% - 50% treated water consumed**
4.5(WR.5)	Water pollution control in campus area	[5] **Policy and programs for water pollution control are fully implemented and monitored regularly**
Transportation		
Question		Answer
5.1()	Number of cars actively used and managed by University	89
5.2()	Number of cars entering the university daily	1278
5.3()	Number of motorcycles entering the university daily	1787
5.4(TR.1)	The total number of vehicles (cars and motorcycles) divided by total campus population. Formula: (5.1+5.2+5.3)/(1.15)	[3] **> 0.125 - 0.5**
5.5(TR.2)	Shuttle service	[5] **Shuttle service is provided by university, regular, and environment friendly. Or shuttle use is not possible (not applicable)**
5.6()	Number of shuttles operated in your university	4
5.7()	Average number of passengers of each shuttle	9
5.8()	Total trips of shuttle services each day	126
5.9(TR.3)	Zero Emission Vehicles (ZEV) policy on campus	[5] **Zero Emission Vehicles are available, and provided by university for free**
5.10()	Average number of Zero Emission Vehicles (e.g. bicycles, cano, snowboard, electric car, etc.) on campus per day	386
5.11(TR.4)	The total number of Zero Emission Vehicles (ZEV) divided by total campus population. Formula: (5.10)/(1.15)	[5] **> 0.02**
5.12()	Total ground parking area (m^2)	32042
5.13(TR.5)	Ratio of parking area to total campus area. Formula: ((5.12/1.5) x 100%)	[5] **< 1%**
5.14(TR.6)	Transportation program designed to limit or decrease the parking area on campus for the last 3 years (from 2018 to 2020)	[5] **Program resulting in more than 30% decrease in parking area or parking area reduction has reaches its limit.**
5.15(TR.7)	Number of transportation initiatives to decrease private vehicles on campus (e.g. car sharing, charging high parking fees, metro / tram / bus services and etc)	[5] **> 3 initiatives, or initiative no longer required**

5.16(TR.8)	Pedestrian path on campus	[5] **Pedestrian paths are available, designed for safety, convenience, and in some parts provided with disabled-friendly features**
5.17()	Approximate daily travel distance of a vehicle inside campus only (in Kilometers)	2456.26
Education and Researc		
Question		Answer
6.1()	Number of courses/subjects related to sustainability offered	822
6.2()	Total number of courses/subjects offered	3624
6.3(ED.1)	The ratio of sustainability courses to total courses/subjects	[5] **> 20%**
6.4()	Total research funds dedicated to sustainability research (in US Dollars) (average per annum over the last 3 years).	2,128,807.80
6.5()	Total research funds (in US Dollars) (average per annum over the last 3 years).	3,896,847.81
6.6(ED.2)	The ratio of sustainability research funding to total research funding	[5] **> 40%**
6.7(ED.3)	Number of scholarly publications on sustainability published. (average annualy for the past 3 years)	[4] **84 - 300**
6.8(ED.4)	Number of events related to sustainability. (average annualy for the past 3 years)	[5] **> 47**
6.9(ED.5)	Number of student organizations related to sustainability	[5] **> 10**
6.10(ED.6)	University-run sustainability website	[5] **Website is available, accessible, and updated regularly**
6.11()	Sustainability website address (URL) if available	https://green.mju.ac.th/?page_id=3289lang=en
6.12(ED.7)	Sustainability report	[5] **Sustainability report is published annually**
6.13(ED.8)	Number of cultural activities on campus	[5] **More than 3 events per year**
6.14(ED.9)	Number of university program(s) to improve teaching and learning	[5] **More than 3 Programs**
6.15(ED.10)	Number of sustainablity community services project organised and/or involving students	[5] **More than 3 Projects**
6.16(ED.11)	Number of sustainability-related startups	[2] **1 - 5 startups**

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Performance summary

[1] Setting and Infrastructure (SI)

Number of Campus sites

Due to the year 2022, Maejo University area has changed physically, the university area has changed the area as follows.

Maejo University is an academic institution in Chiangmai with an area of 12,879 rai **(**20,606,400 m^2**)** and divided into 3 campuses:

1. Main campus (2,019.18 rai/3,374,680.54 m^2)
2. Phrae campus (2,000 rai/3,200,000 m^2)
3. Chumphon campus (2,005 rai/ 3,208,000 m^2)

Main campus (2,019.18 rai/3,374,680.54 m^2)

MJU Phare Province Campus (2,000 rai/3,200,000 m^2) consists of buildings, farms, gardens, and forests.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">MJU Chumporn Province Campus; area (2,005 rai/ 3,208,000 m^2) ; consists of buildings, farms, beach, and forests.</td></tr>
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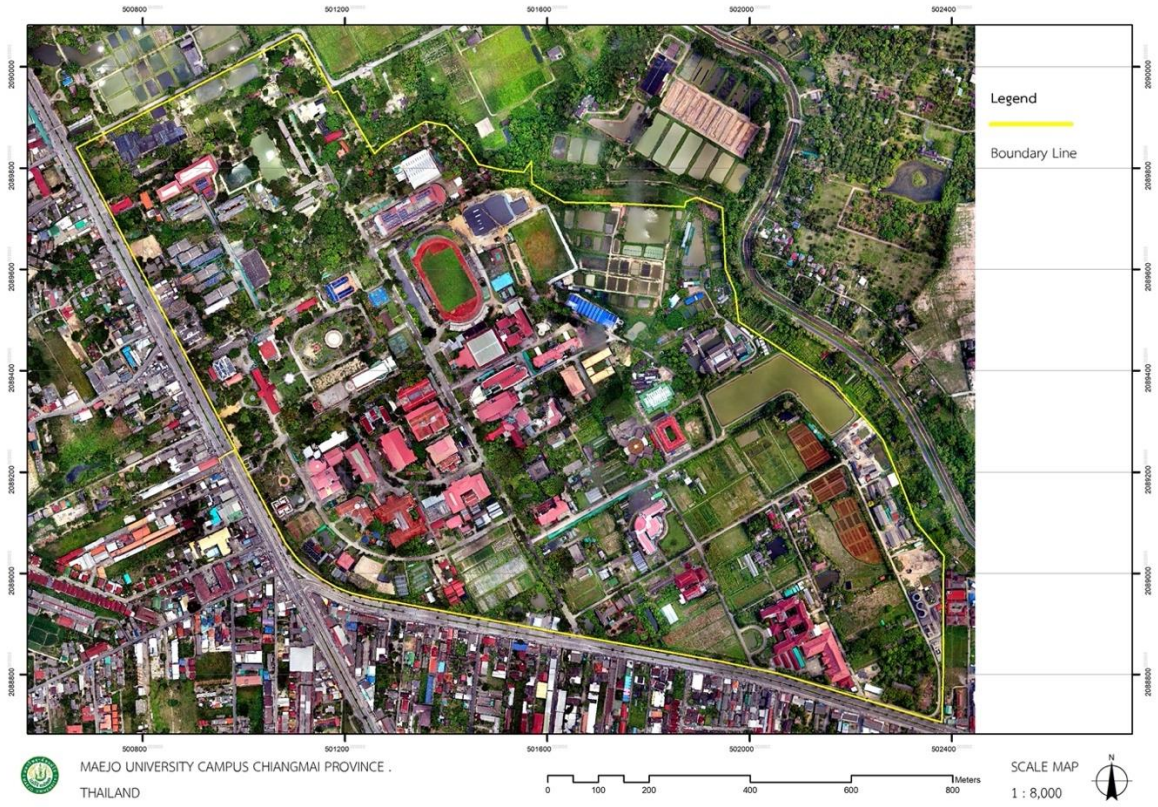


Maejo University is located in Sansai District, Chiang Mai Province, Thailand. It is in the suburb of Chiang Mai and approximately 15 km away from the city.

The area evaluated for UI green issues is composed of the main campus of Chiang Mai and an agricultural farm. The lands on the campus are as follows:

Total main campus area

	Area description	Total area (m^2)
	Total main campus area - Main campus 776.46 rai - Faculty of Animal Science and Technology 293.00 rai - School of Renewable Energy 25.25 rai - Agricultural farm 1,014.46 rai - Total : 2,019.18 rai **Total area** = {(776.46+1,014.46+25.25+293.00 rai) X 1,600} = 3,374,680.54 m^2	3,374,680.54 m^2

Total population

Student (full time) = 15,106
Staff = 1,399
Sum = 16,505

The ratio of total open space to the university population
((3,374,680.54 – 110,869.35) / 16,505) = 197.75 square meter per persons

Table 1 number of students

ลำดับที่	คณะ	จำนวนนักศึกษา		รวมนักศึกษาทั้งหมด
		ชาย	หญิง	
1	คณะผลิตกรรมการเกษตร	1,173	1,176	2,349
2	คณะวิศวกรรมและอุตสาหกรรมเกษตร	278	443	721
3	คณะวิทยาศาสตร์	611	560	1,171
4	คณะวิทยาลัยบริหารศาสตร์	434	730	1,164
5	คณะบริหารธุรกิจ	969	2,425	3,394
6	คณะพัฒนาการท่องเที่ยว	166	609	775
7	คณะเทคโนโลยีการประมงและทรัพยากรทางน้ำ	293	219	512
8	คณะเศรษฐศาสตร์	239	335	574
9	คณะศิลปศาสตร์	407	828	1,235
10	คณะวิทยาลัยพลังงานทดแทน	544	166	710
11	คณะวิทยาลัยนานาชาติ	53	52	105

ลำดับที่	คณะ	จำนวนนักศึกษา		รวมนักศึกษาทั้งหมด
		ชาย	หญิง	
12	คณะสารสนเทศและการสื่อสาร	491	359	850
13	คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม	203	307	510
14	คณะสัตวศาสตร์และเทคโนโลยี	425	555	980
15	คณะพยาบาลศาสตร์	5	51	56
รวมจำนวนนักศึกษาทั้งหมด		**6,291**	**8,815**	**15,106**

Table 2 Number of personnel classified by personnel type and department Maejo University

จำนวนบุคลากร แยกตามประเภทบุคลากร และหน่วยงาน สังกัดมหาวิทยาลัยแม่โจ้

หน่วยงาน	ข้าราชการ	พนักงานมหาวิทยาลัย	พนักงานมหาวิทยาลัยเงินรายได้	ลูกจ้างประจำ	ลูกจ้างชั่วคราวเงินงบประมาณ	พนักงานส่วนงาน	รวม
คณะเทคโนโลยีการประมงและทรัพยากรทางน้ำ	1	38	0	0	0	4	43
คณะบริหารธุรกิจ	2	55	0	0	0	5	62
คณะผลิตกรรมการเกษตร	4	104	0	6	0	29	143
คณะพยาบาลศาสตร์	0	11	0	0	0	0	11
คณะพัฒนาการท่องเที่ยว	0	28	0	0	0	0	28
คณะวิทยาศาสตร์	17	152	0	2	0	20	191
คณะวิศวกรรมและอุตสาหกรรมเกษตร	4	59	0	2	0	6	71
คณะศิลปศาสตร์	11	81	0	0	2	3	97
คณะเศรษฐศาสตร์	0	42	0	0	0	3	45
คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม	0	48	0	0	0	3	51
คณะสัตวแพทยศาสตร์	0	5	0	0	0	0	5
คณะสัตวศาสตร์และเทคโนโลยี	2	36	0	1	0	9	48
คณะสารสนเทศและการสื่อสาร	0	21	0	0	0	0	21
ฟาร์มมหาวิทยาลัย	0	12	0	1	0	2	15
มหาวิทยาลัยแม่โจ้	0	1	0	0	0	0	1
มหาวิทยาลัยแม่โจ้ - ชุมพร	0	57	0	0	0	5	62
มหาวิทยาลัยแม่โจ้ - แพร่ เฉลิมพระเกียรติ	1	137	0	0	0	24	162
วิทยาลัยนานาชาติ	0	17	1	0	0	5	23
วิทยาลัยบริหารศาสตร์	1	32	1	0	0	10	44
วิทยาลัยพลังงานทดแทน	0	27	0	0	0	2	29
สถาบันบริการตรวจสอบคุณภาพและมาตรฐานผลิตภัณฑ์	0	6	0	0	0	1	7
สถาบันรับรองระบบการผลิตผลิตภัณฑ์การเกษตร	0	0	1	0	0	0	1
สำนักงานมหาวิทยาลัย	1	229	0	3	0	96	329
สำนักงานสภามหาวิทยาลัย	0	9	0	0	0	0	9
สำนักบริหารและพัฒนาวิชาการ	1	34	0	0	0	4	39
สำนักวิจัยและส่งเสริมวิชาการการเกษตร	0	34	0	2	0	9	45
สำนักหอสมุด	1	29	0	0	0	9	39
อุทยานวิทยาศาสตร์เทคโนโลยีเกษตรและอาหาร	0	1	1	0	0	0	2
รวม	46	1,305	4	17	2	249	1,623

Note: The number of personnel used to calculate the population per area (Chiang Mai) does not include personnel from Maejo-Phrae University and Maejo–Chumphon University.

total number of personnel = (1,623 – 62 – 162) = 1,399 persons

The total campus buildings of Maejo University is **343,323.75 m²** from 116 buildings in main campus Chiang Mai.





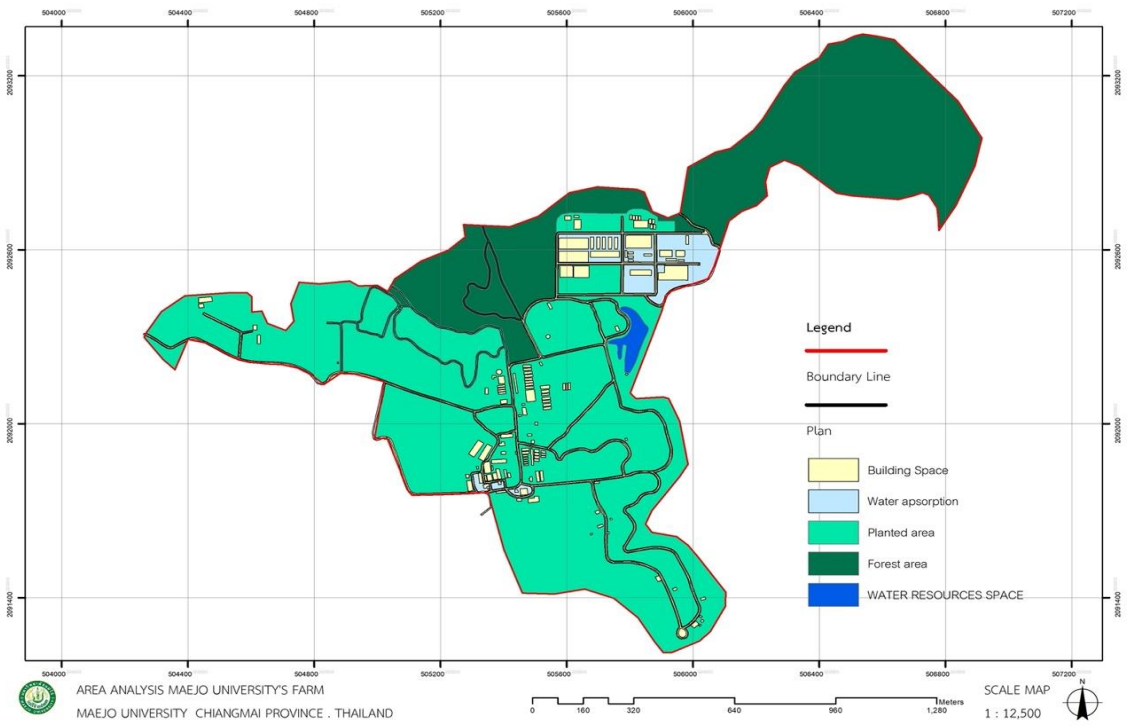

Some buildings of Maejo university, Chiang Mai.

The ratio of open space to total area

The ratio of open space to the total area Total main campus ground floor area of buildings = 338,459.66 m^2 Open space to the total area = 3,054,784.88 m^2 The ratio of open space to the total area ((3,374,680.54 - 338,459.66)/ 3,374,680.54 x 100) = 89.97%	**89.97%**

Open space area in the university

Maejo University-Main Campus				
No.	**list**	**Square meter area**	**Rai area**	**percentage (%)**
1	Building Space	518,506.03	324.07	41.74
2	Water Absorption	373,594.54	233.50	30.07
3	Planted Area	212,805.32	133.00	17.13
4	Forest Area	40,650.13	25.41	3.27
5	Water Resource Space	96,775.77	60.48	7.79
total		**1,242,331.79**	**776.46**	**100.00**



Maejo University Farm				
No.	**list**	**Square meter area**	**Rai area**	**percentage (%)**
1	Building Space	137,040.60	85.65	8.44
2	Water Absorption	50,272.02	31.42	3.10
3	Planted Area	894,901.02	559.31	55.13
4	Forest Area	529,437.60	330.90	32.62
5	Water Resource Space	11,489.35	7.18	0.71
total		**1,623,140.59**	**1,014.46**	**100.00**

Buildings and open space area (green color) in Maejo Farm

Faculty of Animal Sc and Technology				
No.	**list**	**Square meter area**	**Rai area**	**percentage (%)**
1	Building Space	82,420.98	51.51	17.58
2	Water Absorption	62,522.59	39.08	13.34
3	Planted Area	312,155.48	195.10	66.59
4	Forest Area	0.00	0.00	0.00
5	Water Resource Space	11,707.67	7.32	2.50
total		**468,806.71**	**293.00**	**100.00**

Buildings and open space areas (green color) in Faculty of Animal Sc and Technology

School of Renewable Energy				
No.	**list**	**Square meter area**	**Rai area**	**percentage (%)**
1	Building Space	17,665.90	11.04	43.73
2	Water Absorption	16,226.18	10.14	40.16
3	Planted Area	4,323.65	2.70	10.70
4	Forest Area	0.00	0.00	0.00
5	Water Resource Space	2,185.68	1.37	5.41
total		**40,401.42**	**25.25**	**100.00**

Buildings and open space area (green color) in School of Renewable Energy

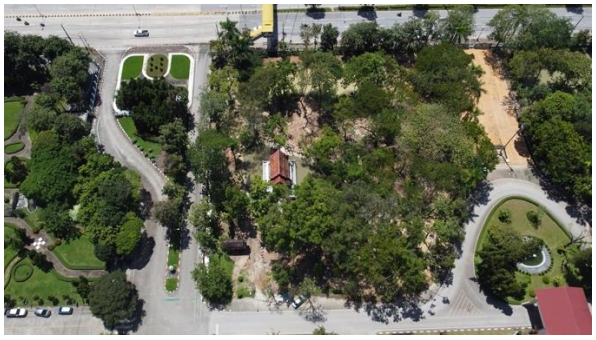
Total area on campus covered in forest (percentage)

The forest in our main campus area is referred to the previous trees and old trees that are still conserved until now, although some areas were already developed.

	Total area on campus covered in forest (percentage) main campus = 40,650.13 m² farm = 529,437.60 m² % total area campus covered in forest is {(40,650.13 + 529,437.60)/ 3,374,680.54} x 100= 16.89%	16.89%

Total area on campus covered in planted vegetation (percentage)

	Total area on campus covered in planted vegetation (percentage) main campus = 212,805.32 m² farm = 894,901.02 m² Faculty of Animal Science and Technology = 312,155.48 m² School of Renewable Energy = 4,323.65 m² % total area campus covered in in planted vegetation is (1,424,185.47 / 3,374,680.54) x 100% = 42.20%	42.20%

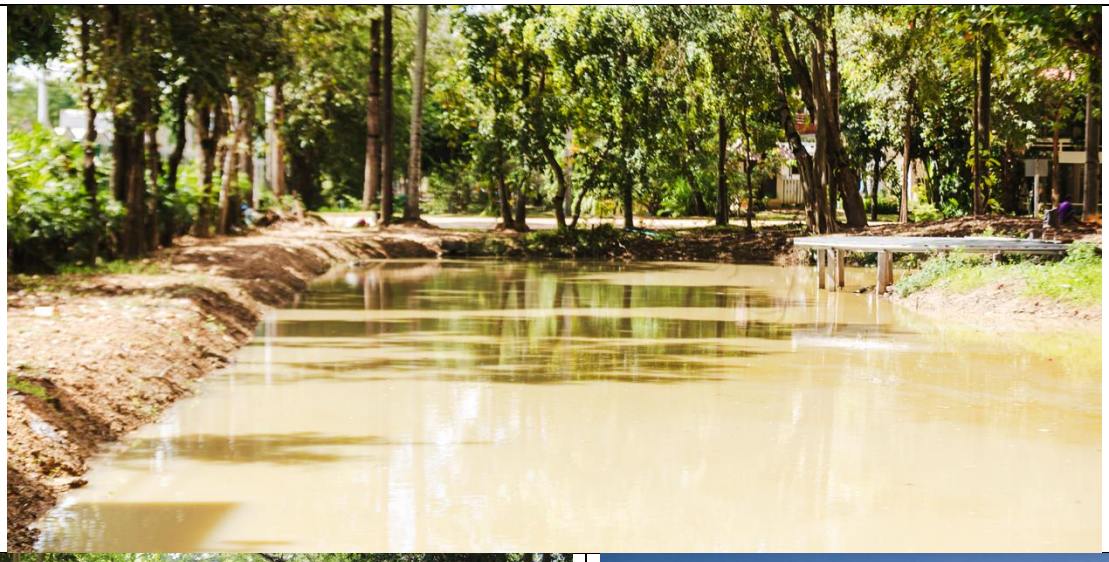


In our university area, both annual flowering and perennial plants are cultivated. The field crops and ornamental plants are cultivated for educational and research study purposes as well as for events and landscape. Thus our campus can support environment in case of air pollution and water absorption.

Planted vegetation and water absorption areas

Total area on campus for water absorption besides forest and planted vegetation (percentage)

	Area description	Total area (m^2)
	Total area on campus for water absorption besides forest and planted vegetation (percentage) main campus = 373,594.54 m^2 farm = 50,272.02 m^2 Faculty of Animal Science and Technology = 62,522.59 m^2 School of Renewable Energy = 16,226.18 m^2 Total WATER RESOURCES SPACE = 122,158.47 m^2 % total area campus covered in in planted vegetation is (624,773.80 / 3,374,680.54) x 100% = 18.51%	**18.51%**



Water absorption, the area besides forest and planted on our campus

University budget for sustainability effort (in US Dollars)

The average of total university budget per annum over the last 3 years in US Dollars. (2019 - 2021)

Year / Budget	2019	2020	2021	Average
Baht	1,477,444,700	2,082,049,260	2,062,099,610	**1,873,864,523.33**
USD	4,898,689.32	66,631,972.99	68,822,483.75	**22,876,031,432.12**

University budget for sustainability efforts

Year / Budget	2019	2020	2021	Average
Baht	265,158,726	417,299.314	638,010,846	**301,195,623.77**
USD	7,591,734.94	13,354,860.11	21,293,611,985.25	**7,104,852,860.10**

**1 USD = 33.375 bath, 27 October 2021)*

In 2021, Maejo university has an annual budget **1,873,864,523.33** Baht (**22,876,031,432.12** USD$) and has invested **301,195,623.77** Baht (**7,104,852,860.10** USD$) in sustainability which is **22.98** percent of the total budget

The average of sustainability efforts per annum over the last 3years in US Dollars. ((2021-2019 (SI6))

2019	2020	2021	Average
17.95 %	20.04 %	30.94 %	22.98 %

Percentage of operation and maintenance activities during Covid-19 pandemic

Total campus buildings area 338,459.66 m^2
Total operated building 338,459.66 m^2
Percentage building that operated and maintenanced 100%

1. All buildings are always maintained in a ready-to-use condition.

2. There is annual maintenance of utility systems such as air conditioning systems, electrical systems, elevators, etc.






3. A big cleaning day for the university is established annually. Disinfectants (Silver-Nano) are sprayed in all buildings and the university's COVID-19 prevention measures are always in compliance.

4. Renovate the building to be a co-working space.



5. Green office policy endorsement

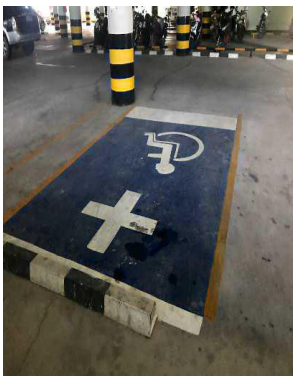
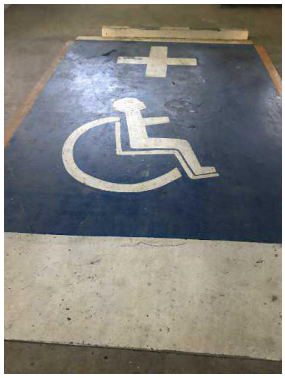




Green office policy endorsement

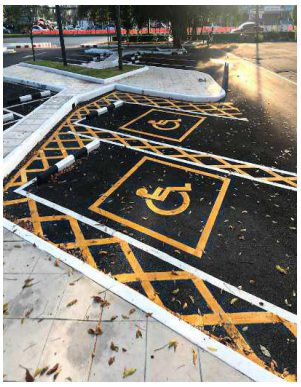
Campus facliities for disable, special needs and or maternity care

1	Total campus buildings area	338,459.66 m^2
2	Total operated building	338,459.66 m^2
	Percentage building that operated and maintenanced	100%


Reserved parkings for people with disabilities





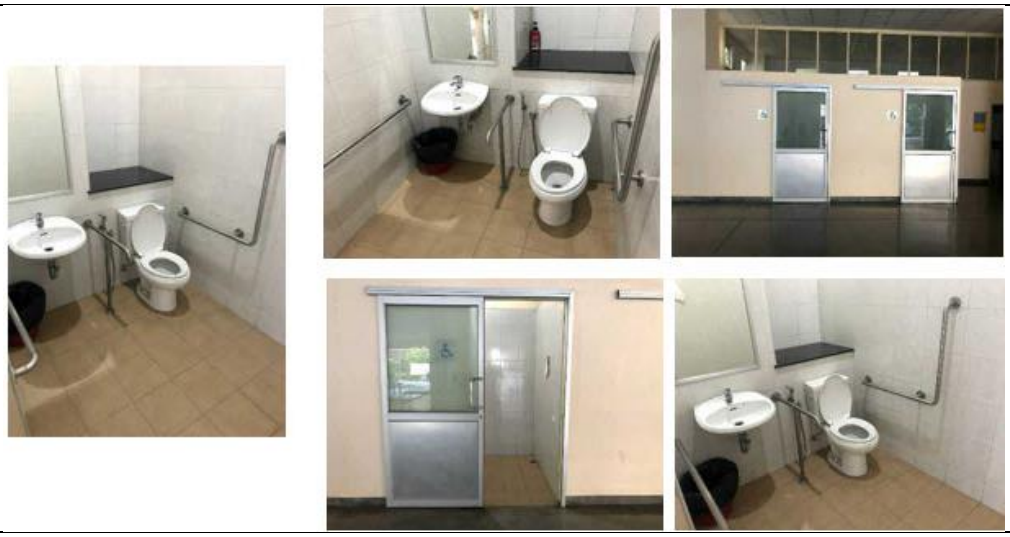
Reserved parkings for people with disabilities



Wheelchair ramp

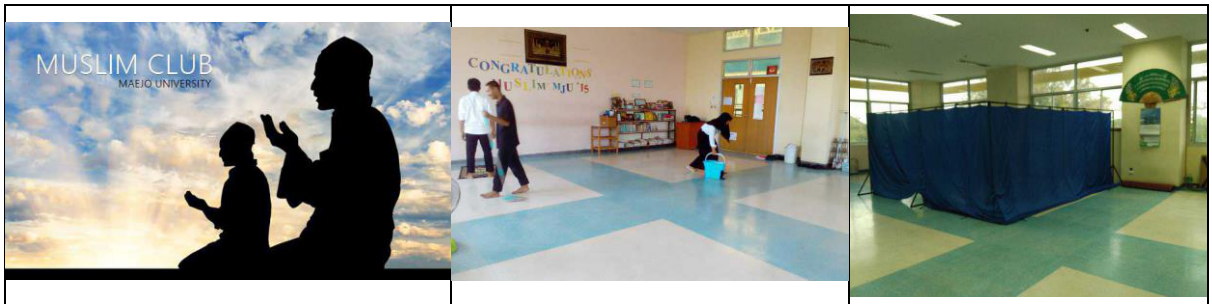


Biking, jogging and walking paths



Accessible toilet

Area for religious ceremonies



Area for religious ceremonies

Maejo University cares about the well-being and lifestyle of all students, and personnel, both public utilities and public facilities, have been arranged to facilitate the disabled, the elderly, women and children. In addition, the area has been provided for various religious activities.

1. Reserved parkings for people with disabilities
2. Wheelchair ramp
3. Accessible toilet
4. Biking, jogging and walking paths

5. *Area* for religious ceremonies

(https://fkm.unair.ac.id/pojok-laktasi-fkm-unair-fasilitas-yang-memadai-hingga-research-group/)

Security and safety facilites

1. CCTV at University's gate
2. Fire Hidrant at Maejo University
3. Preparation of plans and fire drill drills once a year

The University has a safety infrastructure and response times for accidents, crimes, fires, and natural disasters in less than 10 minutes. As for the security of the buildings, student dormitories, sports fields, and other university facilities, security personnel is stationed at key points, and CCTVs are installed to enhance security. Security personnel patrols around the University's area 24 hours a to secure the bank located on the campus and the area with ATMs. If any abnormal events are found, they will be reported to the radio center. The radio center has staff stand by 24 hours. They will coordinate with related parties or external agencies, such as Mae Jo Police Station, to support the person or suppress the incident immediately after. They also help to take care of

The safety of assets, such as wallets and ATM cards that students or owners have left at the ATMs, can be picked up at the Kasetsart Network Radio Control Center.

The University has a policy for various faculties to participate in the Green Office project, with some activities related to the environment and safety in the office. External speakers will conduct disaster prevention and mitigation plan drills at least once a year. The drill's goal is to use the safety response time in fire evacuation drills at most 10 minutes/time.

https://drive.google.com/drive/folders/1LO8GcuVi1DU7hgpeGNaDj918NTzdVigh
https://infocomm.mju.ac.th/wtms_newsDetail.aspx?nID=24614&lang=th-TH
https://library.mju.ac.th/greenlibrary/?portfolio=%e0%b8%ab%e0%b8%a1%e0%b8%a7%e0%b8%94-5
https://drive.google.com/drive/folders/1LO8GcuVi1DU7hgpeGNaDj918NTzdVigh

CCTV camera system

The university CCTV system control room

CCTV cameras at different key points within the University

CCTV cameras at the intersections inside the University

CCTV cameras at intersections at the University's main gates

CCTV cameras in the building

CCTV cameras around the University's dormitories areas

Security personnel patrols the University's area for safety

24 hours security

Station at the university gates.

Security personnel patrols all-important areas,

including ATMs location

Security personnel patrols all-important areas,

including ATMs location

Fire extinguisher and building alarm equipment

FHC fire extinguishers and equipment are ready for use in case of a fire

Fire extinguishers and building equipment

Fire extinguishers and equipment

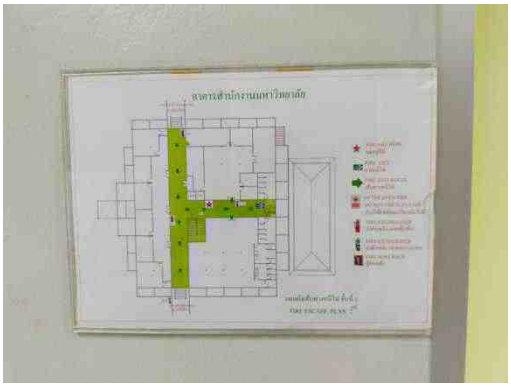
Fire extinguishers and equipment

Fire extinguishers and equipment

Fire extinguishers and equipment

The graphic Annunciator informs the location of the incident in the building.

The graphic Annunciator informs the location of the incident in the building.

 Install fire extinguishers and fire escape flags in various buildings.	 Install fire extinguishers and fire escape flags in various buildings.
 Fire exit sign	 Fire escape route

Disaster Prevention and Mitigation Plan Training	
 Disaster Prevention and Mitigation Plan Training	 Checking the readiness of the fire extinguisher

Fire evacuation drill

จุดรวมพล

Assembly point

Fire evacuation drill

Disaster Prevention and Mitigation Drills

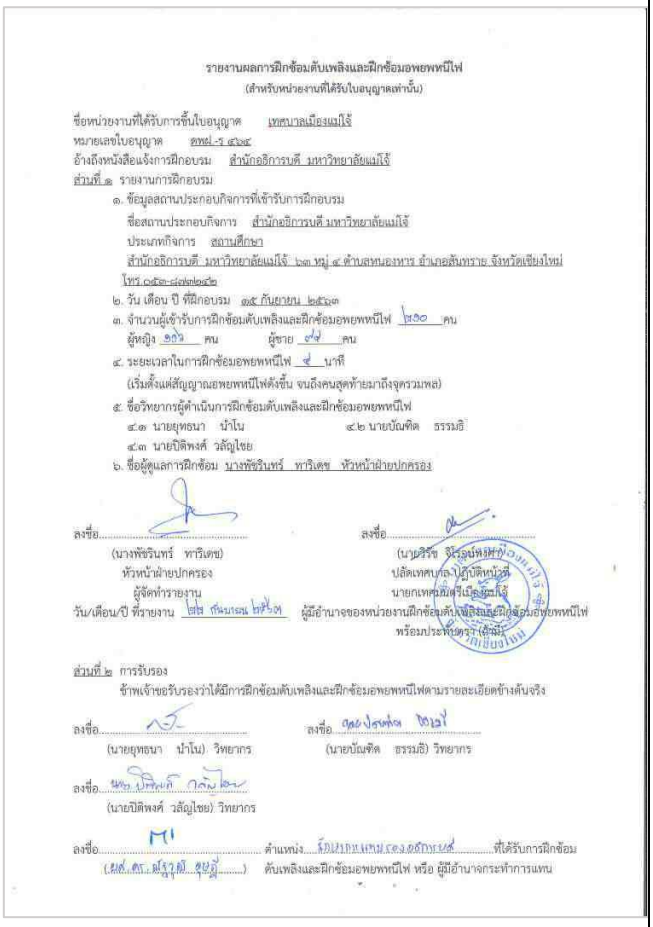
Lecturer team

The team of lecturers and participants participates in the training.

เทศบาลเมืองแม่โจ้

สำนักงานมหาวิทยาลัย มหาวิทยาลัยแม่โจ้

ใบรับรองการฝึกซ้อมแผน



รายงานผลการฝึกซ้อมตับเพลิงและฝึกซ้อมอพยพหนีไฟ

(สำหรับหน่วยงานที่ได้รับใบอนุญาตเท่านั้น)

Report on the results of the training plan.
It takes 4 minutes. (University office building)

Health infrastructure facilities for students, academics and administrative staffs' wellbeing

1. **Outdoor stadium** (Inthanin Football Stadium tennis court basketball court futsal stadium Takraw Stadium Volleyball Stadium) promotes physical activity. And connect the unity of students, teachers, academics, staff and people around Maejo University who come to use the service.

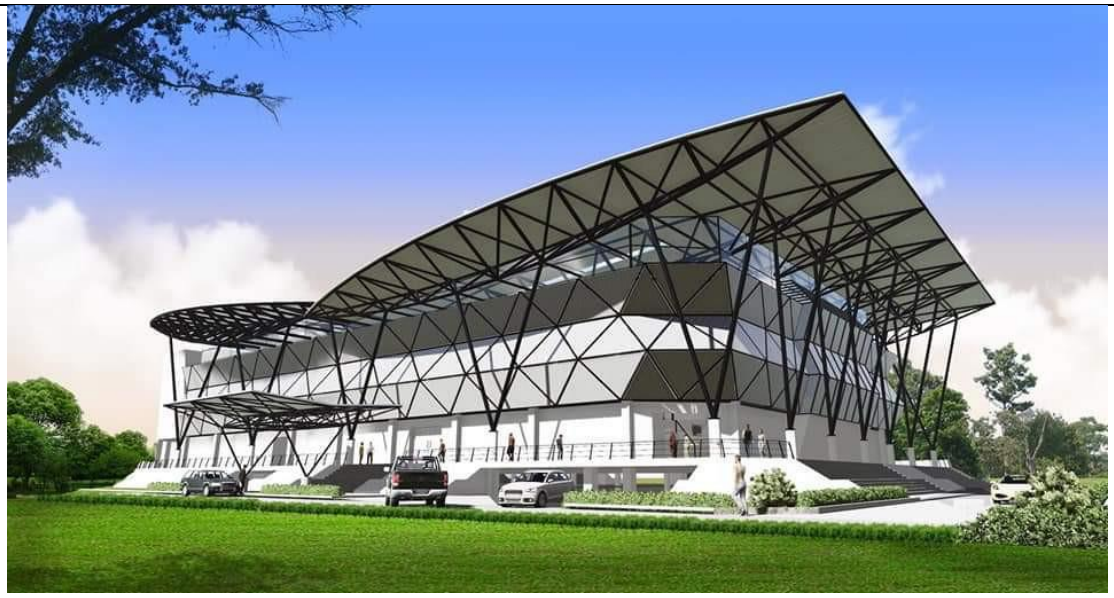
2. **King Rama IX Sports Center Building, Zone B**: Taking a student who has had accident from playing sports within the university to be treated at university's network hospital.

3. **Ubonratana Rajakanya Swimming Pool International standard indoor pool**
International standard indoor swimming pool, size 50 meters, area 8,000 square meters.

4. **Campaign to reduce car use motorcycle by traveling by bicycle or walking**: Reduce the use of vehicles that use fuel. Reduce air and noise pollution problems traffic problems The use of bicycles is another option. Because it is a vehicle that does not use any fuel and also results in a healthy cyclist. does not create pollution in the emission of toxic fumes no noise pollution problem And it saves travel expenses. Including allowing all departments to participate in driving to become a green university of Maejo University.

5. **MJU Sport Complex**: Maejo University is working to build MJU Sport Complex, sports and recreation building, Maejo University. It is a large sports complex that will support a full range

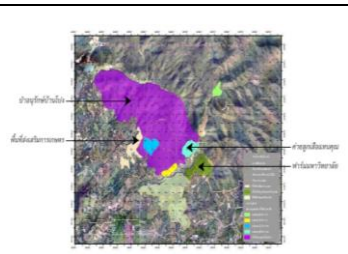
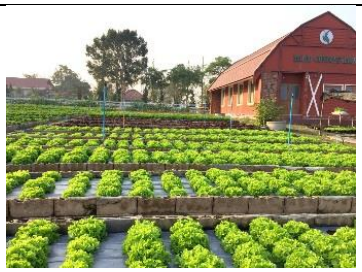
of sports activities. Promote healthy exercise for students and staff, including people in the surrounding communities to use the service. In line with the Maejo 100-year strategy, University of Life. for society and community It is expected to open for service within 2023. The large MJU Sport Complex is a 4-storey building (including the basement) with a usable area of 14,920 square meters that can support a full range of sports activities for students, staff, and the surrounding people to use the service thoroughly. which this building is specially designed with the concept of connecting triangles by transcribing meaning from inthanin inflorescence Maejo University's flowers that looks like a clump together showing love, unity and harmony with consistent characteristics in both structural forms and architecture therefore used to design the structure of the building by building a Smart Building, designing and managing energy consumption Both wind power, water power, and electric power are the most cost-effective. and control the building using digital technology To step into a modern smart building It is considered the first energy-saving building in a sports building in Thai universities. Ready to push for a green building to support Green University



MJU Sport Complex

Conservation: plant, animal, and wildlife, genetic resources for food and agriculture secured in either medium or long-term conservation facilities

The university has conservation areas for both plants and animals for the benefit of preserving agricultural species for research and teaching and learning support both in the field and in online databases for academic services such as planting plots to collect and conserve food crops (rice, corn), local vegetables and economic vegetables (chilli, eggplant, lime, okra, long beans), local medicinal plants and fruit trees (longans, mangos). We also a conserves various orchid species as well.

		
Map showing the operating areas of the Plant Genetic Conservation Project Maejo University Chiang Mai Province	Animal conservation	Vegetables plots
		
Orchids garden	Fruit trees plot	Fish conservation
		
RSPG website		Herbs garden

In addition, the university also has projects related to the conservation of biological, physical and socio-cultural resources, namely: Plant Genetic Conservation Project under The Royal Highness Princess Maha Chakri Sirindhorn which aims to:

- Progressing the understanding of personnel and organization, and to introduce volunteers and companies to plant genetic conservation.
- To build links between various organization, including government agencies and private sections on virtue foundation.
- To create a plant genetics database system that can be communicated around the country.

Additional evidence link:

https://researchex.mju.ac.th/dbplant/

https://rspg.mju.ac.th/wtms_index.aspx?&lang=th-TH

https://www.youtube.com/watch?v=**03**ujJo**9**sTeY

Maejo University has worked in response to the royal initiative of the Plant Genetic Conservation Project under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn by allocating some areas of the Ban Pong Forest Conservation and Development Project to participate in the project since 1994 and expanding the project area to 3 areas as follows: Plant Genetic Conservation Project Maejo University-Chiang Mai, Plant Genetic Conservation Project Maejo University-Phrae Chalermprakiet, Plant Genetic Conservation Project Maejo University-Chumphon. Its objectives are to understand and see the importance of plant genetics, to share ideas and practice until the benefits of the Thai public, and to have a system of plant genetic information to be communicated throughout the country.

1. Maejo University-Chiang Mai Area, Chiang Mai Province

1. Conservation project collecting wisdom and propagating Lanna herbal plants can collect and conserve herbs. There are a total of 600 plants on an area of approximately 10 rai located in a conservation forest area and are utilized by communities in the area of Pong Village, Pa Phai Sub-District, Sansai District, Chiang Mai Province

2. Project on the establishment of a botanical garden for collecting indigenous medicinal plants in the northern region at the Maejo University farm area. A total of 34 species of medicinal plants can be gathered to be planted in the area.

Plant Species	Plant Species	Plant Species
1. *Morinda citrifolia* L.	13. *Zingiber officinale*	25. *Dregea volubilis*
2. *Curcuma longa*	14. *Polyscias fruticosa* (L.) Harms	26. *Nasturtium officinale*
3. *Azadirachta indica*	15. *Andrographis paniculata*	27. *Houttuynia cordata*
4. *Codiaeum variegatum*	16. *Cymbopogon citratus* Stapf.	28. *Jasminum sambac*
5. *Sesbania grandiflora* (L.)	17. *Phlogacanthus pulcherrimus* T.Anderson.	29. *Averrhoa carambola*
6. *Acacia concinna*	18. *Piper sarmentosum* Roxb.	30. *Annona squamosa*
7. *Artemisia lactiflora*	19. *Gymnema inodorum* (Lour.) Decne.	31. *Artocarpus heterophyllus*
8. *Citrus hystrix*	20. *Broussonetia kurzii*	32. *Sandoricum koetjape*
9. *Aloe vera*	21. *Phyllanthus emblica*	33. *Cleistocalyx nervosum*
10. *Boesenbergia rotunda*	22. *Oroxylum indicum*	34. *Solanum torvum*
11. *Zingiber cassumunar* Roxb.	23. *Eleutherococcus trifoliatus*	
12. *Piper nigrum*	24. *Morus alba*	



3. Conservation and utilization of Thai orchids under the Plant Genetic Conservation Project, Maejo University conducts breeding, nursery, and cultivation of Thai orchids, exploring and collecting Thai orchid species.



4. The project to study the genetic and physical characteristics of indigenous Thai melon varieties operates in the field of Vegetable Crops, Horticulture Course, Faculty of Agricultural Production to collect and study the physical characteristics of indigenous Thai melons to conserve and collect Thai melon varieties so that they do not disappear in the future.


2. Maejo-Phrae Chalermprakiet University Area, Phrae Province

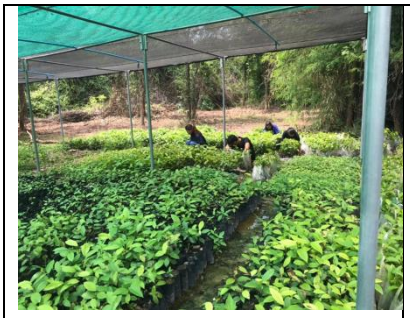
1. Conservation of local plant diversity in the area of Maejo University-Phrae Chalermprakiet in honor of His Majesty the King has organized 3 sub-activities, which are projects that promote and

support the conservation of local plant species and the transfer activities to the community and youth as follows:

- Activity 1: Cultivate local seedlings to conserve plant genetics, carry out activities in nursery plots by collecting seeds from plant saplings and cultivating rubber trees, 6,000 seedlings, Payom 2,000 seedlings, 1,500 seedlings, Wah 1,500 seedlings, Takhianthong 3,000 seedlings, Siao 500 seedlings and planting in 7 local plant test plots, namely Takhianthong, Yang Na, Phayom, Macha Mong, Yang Pluang, Rang and Yang. Hiang, total number of 245 trees.

- Activity 2: Management of fang planting plots in the area of Maejo University-Phrae Chalermprakiet, activities such as as weed control, fire prevention line, pet protection fence.

- Activity 3: Caring for and restoring forest plots in a degraded deciduous dipterocarp forest area of 3 rai in the conservation area of Maejo University-Phrae Chalermprakiet.






2. Conservation and Prototyping of Makiang Products in Maejo-Phrae Chalermprakiet University Area.



Picture 1 : Conservation and Prototyping activities Makiang Products in Maejo-Phrae Chalermprakiet University



Picture 2 : Activities of knowledge transfer of plant genetic diversity to youth

3. Maejo-Chumphon University, Chumphon Province

1. The Cultivation and Conservation Project, focusing on the conservation of the *Tetragonula pegdeni* Schwarz was intended to conserve the stingless bee in Maejo University- Chumphon area and to pass on the knowledge on raising and conserve the stingless bee (*Tetragonula pegdeni* Schwarz) and its products. which is a species that exists locally in the south.



2. Conservation and breeding project for sustainable conservation in Maejo University-Chumphon area and conserved forest area plant genetic conservation project of Maejo University – Chumphon



3. The project to collect local medicinal plants in the form of seeds, fruits, branches, tubers, roots for tissue culture can collect 40 types of herbs such as ginger, *Aeginetia indica*, Tiger orchid, Philodendron, Paphiopedilum, Butterfly Pea, Karanda, Sweet Pepper, Cape Gooseberry, etc



4. Sargassum *C. Agardh* Brown Algae Conservation Project, Maejo-Chumphon University

[2] Energy and Climate Change (EC)

Energy efficient appliances usage are replacing conventional

One of Maejo University's most essential policies is to encourage the use of energy-efficient appliances in the university leading to Eco University. As a result of COVID – 19, The university has not undergone any actions to install or replace new energy-efficient appliances in the university's buildings this year. However, the university's physical system and environment division has surveyed additional appliances: computers, monitors, printers, televisions, and Refrigerators. Maejo University also provided significant additional appliances with an emphasis on the energy star symbol and number five label, which is the label, in Thailand, displaying it is an energy–saving appliance. The percentage of energy-efficient appliances that have been observed over the previous year was nearly 56 percent. The number of appliances that were surveyed is depicted in Table 2.1. Appendix 1 demonstrates the number of appliances categorized by factors.

Table 2.1 Number and percentage of energy-efficient appliances compared to all appliances on the campus.

Number of Lighting Appliances	Number of total light bulb	Number of Energy Efficient Appliances (LED)	Percentage of Energy Efficient Lighting Appliances
	62,885	31,674	50.37%
Number of Air Conditioners	Number of total A/C	Number of Energy Efficient Inverter A/C	Percentage of Energy Efficient A/C
	2,881	454	15.76%

Number of Monitors and Computers	Number of total monitors	Number of Energy - Saving certified monitors	Percentage of Energy Efficient Monitors
	2,868	2,638	91.81%
Number of Printers	Number of total printers	Number of Energy- Saving certified printers	Percentage of Energy Efficient printers
	388	136	35.05%
Number of TVs	Number of total TVs	Number of Energy – Saving certified TVs	Percentage of Energy Efficient TVs
	87	80	91.95%
Number of Refrigerators	Number of total Refrigerators	Number of Energy – Saving certified Refrigerators	Percentage of Energy Efficient Refrigerators
	81	39	48.15%
		Average Percentage	**55.50%**

Total main campus smart building area (m^2)

Main requirements of smart buildings are

- Automation
  - BMS
  - APP
- Safety
  - Intruder Alarm System
  - Fire-Fighting
  - Video Surveillance
  - Anti - Flooding
- Energy
  - Monitoring
  - Management
- Water
  - Monitoring
  - Recovery
- Indoor Environment
  - Thermal comfort
  - Air quality
  - Real-Time
  - Passive System

- Lighting
    - LEDs
    - Sensors
    - Shielding
    - Natural light

To be considered a smart building, the building needs to acquire at least 5 features.

This year, Table 2.1 demonstrates that forty-three buildings are classified as smart buildings from 115 buildings that have been examined and the total area of all smart buildings is 302,856.44 m^2. Appendix 2 contains a list of all Maejo buildings that have been observed by the division of physical systems and environment. Fig 2.1 displays the pictures of smart buildings at Maejo University.

Table 2.2 List of Smart Buildings in MJU

Order	Building's Name	Area of the building (m^2)	Automation		S. Safety				E. Energy		A. Water		I. Indoor Environment				L. Lighting			
			B1	B2	S1	S2	S3	S4	E1	E2	A1	A2	I1	I2	I3	I4	L1	L2	L3	L4
1	70th year Maejo building	13,422.00				/	/		/								/	/		
2	80th year Maejo building	10,200.00				/	/		/								/	/		
3	Wiphat Boonsri Wangsai Building	10,377.55			/	/	/		/			/					/	/		/
4	60th year Maejo Building	18,500.00				/	/		/								/	/		
5	Yangyong Sitthichai Building	4,880.00				/	/		/								/	/		
6	75th year Maejo Building	5,562.50				/	/		/								/	/		
7	Engineering Laboratory Building Classroom	17,175.00				/	/		/								/	/		
8	Renewable Energy Classroom Building	11,360.59				/	/		/	/		/					/	/	/	/
10	Renewable Energy Comphehensive Knowledge Center	1,071.56				/	/		/	/		/					/			/
11	Maejo University Gymnasium Zone A	18,700.00				/	/		/			/					/	/		/
12	Maejo University Gymnasium Zone B	5,859.50				/	/		/			/					/	/		/
13	President’s Office 1	893.00				/	/					/					/	/	/	/
14	President’s Office 2	6,646.00				/	/					/					/	/	/	/
15	President’s Office 3	1,496.00				/	/					/					/	/	/	/

16	Umuay Yotsuk Building	16,262.60			/	/	/					/				/	/	/		/
17	Ubonratana Rajakanya Swimmimg Pool	4,180.60				/	/										/	/		/
18	International Students Dormitory	1,048.40			/		/					/					/			/
19	Male Dormitory 2	5,968.00			/		/					/					/			/
20	Male Dormitory 3	1,200.00			/		/					/					/			/
21	Male Dormitory 4	3,854.00			/		/					/					/			/
22	Male Dormitory 5	1,160.00			/		/					/					/			/
23	Female dormitory 6	3,854.00			/		/					/					/			/
24	Female dormitory 7	3,854.00			/		/					/					/			/
25	Female dormitory 8	6,651.00			/		/					/					/	/		/
26	Female dormitory 9	6,651.00			/		/					/					/	/		/
27	Female dormitory 10	7,175.00			/	/	/					/					/			/
28	Female dormitory 11	14,500.00			/	/	/					/					/			/
29	Fishery Technology Building	3,661.64				/	/									/	/			/
30	Fishery Technology Laboratory Building	2,390.00				/	/									/	/			/
31	Permpool Building	10,723.00			/	/	/					/					/			/
32	Princess Maha Chakri Sirindhorn Building	12,637.25				/	/		/		/	/		/		/	/	/		/
33	Thep Sat Sathit Building	2,803.5					/									/	/	/		/
34	Ruean Dhamma Building	607.25							/		/			/		/	/			/

35	Wutthakard Building	631.00					/		/		/			/		/	/	/		/
36	25th year of Faculty of Business Administration Building	4,042.00				/	/									/	/			/
37	Phitthayalongkorn Building	2,976.97				/	/									/	/			/
38	Patthanavisaitad Building	3,463.80				/	/									/	/			/
39	Chulabhorn Building	9,146.00			/	/										/	/			/
40	Smithanon Building	9,739.66					/		/							/	/			/
41	Prasert Na Nakorn Building	7,639.41					/		/							/	/			/
42	Architecture and Environmental Design Building (New)	5,022.50				/	/		/							/	/			/
43	Princess Mother Memorial Building	6,853.56			/	/			/							/	/			/
44	International Education and Training Center	7,128.51				/	/		/							/	/			/
	Sum of smart buildings area (m^2)	302,856.44																		

Fig 2.1 Smart Buildings in Maejo University

70th year Maejo University	80th year Maejo University
	
Wiphat Boonsri Wangsai Building	60th year Maejo Building
	
Yangyong Sitthichai Building	75th year Maejo Building
	

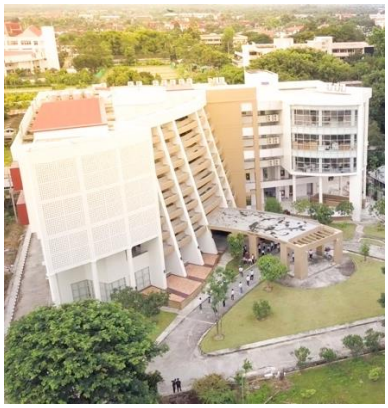
Engineering Laboratory Building Classroom	Renewable Energy Classroom Building
	
Renewable Energy Comphehensive Knowledge Center	
	
Maejo University Gymnasium Zone A	Maejo University Gymnasium Zone B
	

President's Office 1	President's Office 2
	
President's Office 3	Umuay Yotsuk Building
	
Ubonratana Rajakanya Swimmimg Pool	International Students Dormitory
	

Male Dormitory 2	Male Dormitory 3
	
Male Dormitory 4	Male Dormitory 5
	
Female dormitory 6	Female dormitory 7
	

Female dormitory 8	Female dormitory 9
	
Female dormitory 10	Female dormitory 11
	
Fishery Technology Laboratory Building	Permpool Building
	

Princess Maha Chakri Sirindhorn Building	
	
Thep Sat Sathit Building	Ruean Dhamma Building
	
Wutthakard Building	25th year of Faculty of Business Administration Building
	

Phitthayalongkorn Building	Patthanavisaitad Building
	
Chulabhorn Building	Smithanon Building
	
Prasert Na Nakorn Building	Architecture and Environmental Design Building (New)
	

Princess Mother Memorial Building	International Education and Training Center
	

Smart Building implementation

According to Table 2.1, The area of the smart buildings in Maejo University which has qualified at least 5 features is 302,856.44 m^2 of the area of smart buildings. Compared to all building areas in Maejo University, the percentage of smart building implementation is 81.19 percent approximately.

- The area of smart buildings in Table 2.1 is about 302,856.44 m^2
- The total building area of Maejo University in Appendix 2 is 373,025.77 m^2
- The percentage of smart building implementation = (302,856.44 /373,025.77) x 100
  = 81.19 % of total building area of Maejo University.

Number of renewable energy sources on campus

Maejo University has eventually pushed the use of renewable energy as an atonement energy source to generate both electricity and heat, Following the university's Green University and Green Office goals. Over the course of a decade, the university's renewable energy-producing capacity has steadily expanded. The University now uses five renewable energy sources such as.

- Solar Power
- Biogas
- Biodiesel
- Biomass
- Wind Power

Solar power (Solar rooftop and Solar Collectors) is the primary renewable energy source on campus. Solar rooftop and solar collectors have been put in the offices and student dormitories to reduce energy consumption from daily activities. The solar rooftop panels were installed at

- The Office of President => 110 kW
- School of Renewable Energy => 660 kW
- Udomslip Female Dormitory => 80 kW
- Faculty of Economics => 20 kW
- Intanin Stadium Stands => 40 kW

This year, The university completed the installation of a 300 kW solar rooftop plant at Umnuay Yodsuk building, which was finished in July.

In addition, the solar collector panels are installed at

- All dormitories => 1,331 m^2
- International Education and Training Center => 85 m^2

Maejo University has also used biogas as renewable energy. the Faculty of Animal Science (650 m^3) has established a biogas plant, which utilizes livestock byproducts to generate electricity, while the School of Renewable Energy (3 m^3) has installed a biogas facility that uses residential raw waste to generate heat.

Biodiesel is another renewable energy source that Maejo University has used to manufacture oil from leftover cooking oil. The oil waste delivered from the canteen and cookery shop is converted by transesterification from the biodiesel station, 150-liter production capacity, that is located at the School of Renewable Energy; The biodiesel is used for trucks and tractors at the institution.

Furthermore, Maejo University has implanted the biomass and ORC (Organic Rankine Cycle) plants, each producing 20 kW of electricity, using refuse-derived fuel (RDF) as a fuel. Gases from biomass plant's gasification process are used to generate electricity, which is subsequently sent to a gas generator. The ORC plant, on the other hand, generates electricity by boiling water into superheated steam and operating steam turbine.

Finally, at the School of Renewable Energy, wind power is clean energy that is used for street lights and generates electricity. In the case of street lights, the wind turbine on the street light, which is powered by the wind, generates power for the battery. On the other hand, the wind turbine (16.5 kW) generates power for the buildings of the School of Renewable Energy, reducing energy consumption from the primary source.

Fig. 2.1 The renewable energy sources at Maejo University.

- ## Biogas

Faculty of Animal Science	**School of Renewable Energy**
 Biogas production system with the capacity of 650 m^3 for electricity generation	 Biogas production system with the capacity of 3 m^3

- **Biodiesel**

School of Renewable Energy
  Biodiesel plant with a 150-liter-per-batch capacity made from cooking oil waste and oil plants. The plant has been operated twice a month.

- **Biomass and ORC**

School of Renewable Energy
 Biomass plant  ORC plant The biomass and ORC power plant with a 20 kW capacity have been built.

- **Solar Power**

<table>
<tr><td colspan="2">President’s Office</td></tr>
<tr><td colspan="2"> 
Solar rooftop with a 110-kW installed capacity</td></tr>
<tr><td colspan="2">School of Renewable Energy</td></tr>
<tr><td> 
Solar rooftop with a 40 kW installed capacity at a parking lot</td><td> 
Solar rooftop with a 300-kW capacity on a renewable energy classroom building</td></tr>
<tr><td> 
Solar panels on the roof of the School of Renewable Energy have a capacity of 660 kW.</td><td> 
A solar tracking station with a capacity of 20 kW has been erected.</td></tr>
</table>

Udomslip Female Dormitory (11th Dorm)
 Solar rooftop with 80-kW installed capacity
Faculty of Economics
 Solar panels with 20-kW installed capacity at a parking lot.
Inthanin Stadium’s Stand
 Solar panels with 40-kW installed capacity at the stand

Umnuay Yodsuk
 Solar panels with 300-kW installed capacity on the roof

- **Solar Collectors**

All Student Dormitories
  tanks atop the students' dorm and solar collectors with a 1331 m^2 installed capacity
International Education and Training Center
 The International Education and Training Center's roof is covered with solar collectors and an installed capacity of 84 m^2 tanks.

- **Wind Power**

<table>
<tr><th colspan="2">School of Renewable Energy</th></tr>
<tr><td colspan="2"> 
For street lighting, 35 units of hybrid system of solar and wind turbines are used.</td></tr>
<tr><td> 
For street lighting, 35 units of hybrid system of solar and wind turbines are used. (cont.)</td><td> 
On the school of renewable energy, wind turbines with a total capacity of 16.5 kW generate electricity.</td></tr>
</table>

Renewable energy produced on campus per year

The production of renewable energy

Table 2.3 illustrates the productions of renewable energy compared in kWh/year. Biogas production systems with 653 m^3 capacity compensate 2,517.90 kWh/year electricity usage. as well as biomass and ORC power plant can replace 144,000 kWh/year. To consider the biodiesel production system, it has produced 3,132 liters of biodiesel/year which can secure 24,114.52 kWh/year electricity usage. Solar sources including solar power systems and solar collector systems are the most amount of the electricity production generating at 2,232,927.05 kWh/year. Furthermore, Wind power systems produce 11,869.80 kWh/year generating electricity and light. Therefore, the summarize of the renewable energy produced on campus is around 2,415,429.27 kWh/year. Table 2.4 shows the electricity production of solar power annually from September 2020 to August 2021. Appendix 3

eventually depicts the energy compensation calculation of the renewable energy sources on the campus.

Table 2.3 Electricity Compensation from renewable energy sources at Maejo University in 2021

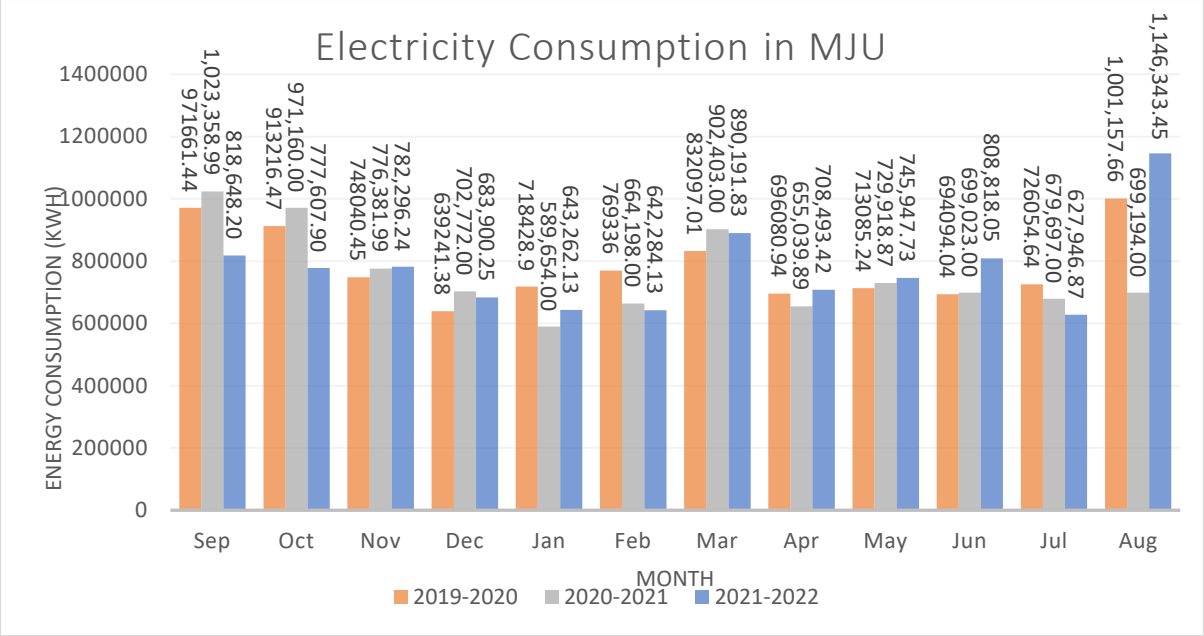
Sources	Place(s) where the system is installed	Capacity of the system(s)	Electricity Compensation in kWh/year
Biogas	Biogas production system at the Faculty of Animal Science	650 m^3	1,751.40
	Biogas production system at School of Renewable Energy	3 m^3	766.50
	Total	653 m^3	2,517.90
Biodiesel	Biodiesel production system at School of Renewable Energy	150 Liters	24,114.52
Biomass and ORC	Biomass Power Plant at School of Renewable Energy	20 kW	57,600.00
	ORC Power Plant at School of Renewable Energy	20 kW	86,400.00
	Total	40 kW	144,000.00
Solar Power	President's Office	110 kW	116,860.00
	Inthanin Stadium's Stand	40 kW	36,601.00
	Solar Tracking Station at School of Renewable Energy	660 kW	618,736.00
	Udomslip Female Dormitory (11th Dorm)	80 kW	75,524.00
	Faculty of Economics	20 kW	18,409.00
	Umnuay Yodsuk	300 kW	388,684
	Total	1,210 kW	1,254,814.00

Solar Collector	**All dormitories**	**1,313 sq.m.**	**910.779.72**
	International Education and Training Center	**84.60 sq.m.**	**58,683.33**
	Total	**1,397 sq.m.**	**969,463.05**
Wind Power	**Street Light system at School of Renewable Energy**	**35 x 100 w**	**10,731.00**
	Wind Power Plant	**10 x 1 kW**	**1,051.20**
	Wind Power Plant	**1 x3 kW**	**87.60**
	Total	**16.5 kW**	**11,869.80**
Sum of Total			**2,406,778.82**

Electricity usage per year (in kilo watt hour)

Maejo University's annual electricity consumption is 9,275,740.20 kWh (from September 2021 to August 2022), which is approximately 3.5 percent more than the previous year (9,092,800.74 kWh). Maejo University opens trimester every year. The first term begins in early August and concludes in October. The second term embarks in late November and finishes in March and the Summer term, when the number of students is less than the first and second term, starts in mid-April and ends in June. Due to the COVID-19 pandemic, although most of the educational activities this year have been conducted online following Thailand's ministry of public health measurements, all of the buildings in Maejo University have still opened to support educational activities such as laboratories and offices. However, Thailand's authority has started permitting all institutions and schools to have educational activities in July 2022.

Figure 1 depicts the three-year electricity use at MJU (2019-2020, 2020-2021, and 2021-2022). There was a fluctuation in energy use from September 2021 to August 2022. When compared to September 2021, there was a considerable decrease of 176,364.07 kWh in February 2022. In March 2022, the use increased to 890,193 kWh before falling by 20% the following month. The minimal modifications occurred between April 2022 and July 2022. After then, it suddenly increased by about 85%, reaching 1,146,343.45 kWh in August.



The total electricity usage divided by total campus population (kWh per person)

In this section, it is desired to determine the amount of electricity used on a yearly basis per person working and studying inside the campus. The total electricity consumption divided by the total campus population is equal to 561.99 kWh/person.

- Electricity usage per year of MJU in 2022. = 9,275,740.20 kWh/year
- Campus population = 16,505 persons
- The total electricity usage divided by the campus population
  = 561.99 kWh/person

Ratio of renewable energy produce/production towards total energy usage per year

In 2022, Total electricity consumption is 9,275,740.20 kWh/year, and total renewable energy output is 2,406,778.82 kWh/year, or 20.60 percent of total electricity consumption. However, compared to the last year, the ratio of renewable energy production to total energy usage per year decreased by about 0.3 %

- The total renewable energy production in MJU = 2,406,778.82 kWh/year
- Electricity usage per year of MJU in 2021 = 9,275,740.20 kWh/year
- Ratio of renewable energy produce/production towards total energy usage per year

= 2,406,778.82 / (2,406,778.82 + 9,275,740.20) x 100

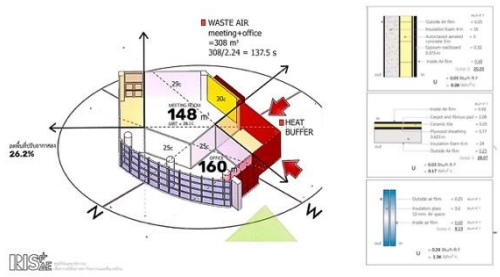
= (0.2060 x 100) = 20.60 %

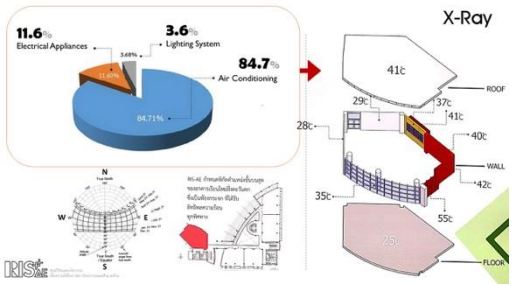
Elements of green building implementation as reflected in all construction and renovation policy

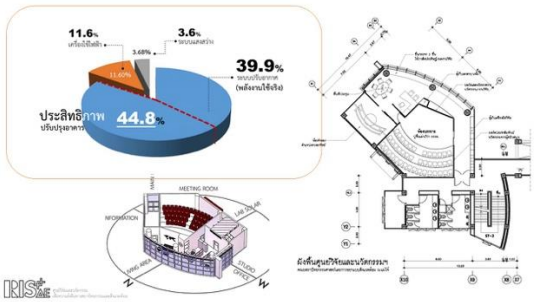
The athletic complex was built throughout the past year. This year, the Thammasakmontri building underwent renovation using a green building strategy. The construction is ongoing, nevertheless. The idea behind the design is to provide all-day solar lighting for employees and students as well as very effective insulators that keep heat out of the building.

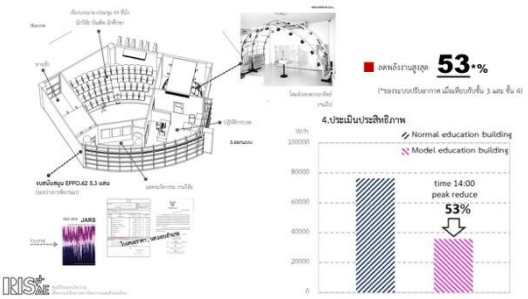
In addition, a vacant library room has been converted into a coworking area. To use less electrical lighting, the design idea is to allow for natural light.

The Architecture and Environmental Design Classroom has also undergone energy-saving renovations. The previous design, which is responsible for 65 percent of the total energy used for air conditioning, has been improved using low heat-transfer insulators and an architectural concept design that places a heavy emphasis on the number of users in the building and the time of use. As a result, compared to the previous design, the air conditioning load significantly lowered by 54%.

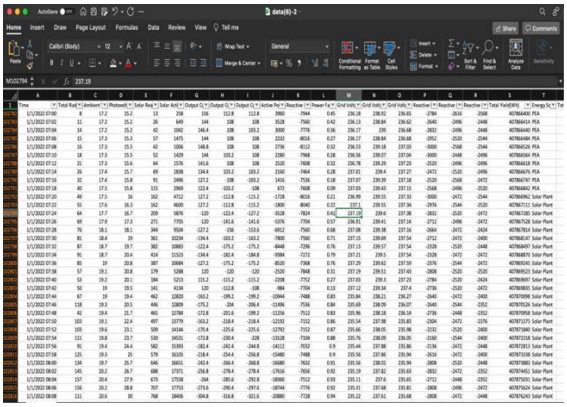








A new database created by the School of Renewable Energy collects information from the solar plant's inverter and power meter. This program can show the system's status in almost real-time. To study the data from solar plants and the system's power usage, its system can also download the information into an excel file.



Greenhouse gas emission reduction program

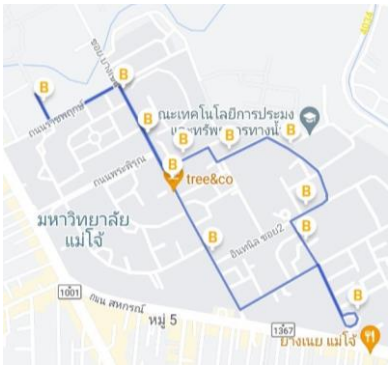
Maejo University is a comprehensive agricultural university. So that the greenhouse gas emission programs taking care of the environment are very essential for both the university and nearby communities. Maejo University has willingly proceeded with the completed program throughout the year categorized by greenhouse gas emission sources into 3 scopes.

Scope 1:

- Mobile Combustion
    - Car Free Day: Maejo University has continued to promote the Car Free Day project, which encourages students and staffs to utilize bicycles as an alternative mode of transportation for short distances in all departments. In addition, bike lanes have been created around the campus, and the university has offered bicycles for staffs in using around the campus as a supplement to minimize air pollution.

- Electric Vehicle for Transportations: Maejo University has provided electric shuttle buses, in which the university embarks educational activities, for internal transportation in the university for students and staff. There are 2 routes, red and blue, that the buses go through the university.

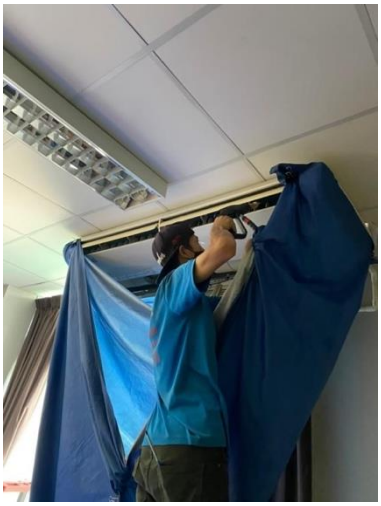
- Encouraging bicycle use on campus: Maejo University has a collaboration agreement with Anywheel Co., Ltd to enable students, faculty, and staff to operate more bikes on campus.

Fugitive Emissions

- Inspecting the condition of air comfort system: The university has proceeded to observe the condition of air comfort system annually which maximizes the system's efficiency and saves energy. The university hired a third party to inspect and clean air conditioners at the university.

Scope 2 :

- Purchased Electricity
  - Cleaning Air conditioners: Washing the university's air conditioners is an action that Maejo University has proceeded with annually. The university also hired a third party to clean air conditioners throughout the campus this year.

- Raising energy-saving awareness: The staff at Maejo University participates in a campaign to raise awareness of the importance of energy conservation on campus.

Scope 3:

- Waste
  - Making organic fertilizers from organic wastes: is a project that Maejo University has been working on for the previous year to minimize organic waste incineration. The main ingredient that creates fertilizer from non–rotating fertilizer piles is organic waste. This concept applies a layer fertilizer pile with debris like as leaves and small branches, then inserting pipes to distribute air throughout the pile. The process produces very little methane, a greenhouse gas. The fertilizer, on the other hand, creates a fund for the university, allowing it to earn another kind of revenue.

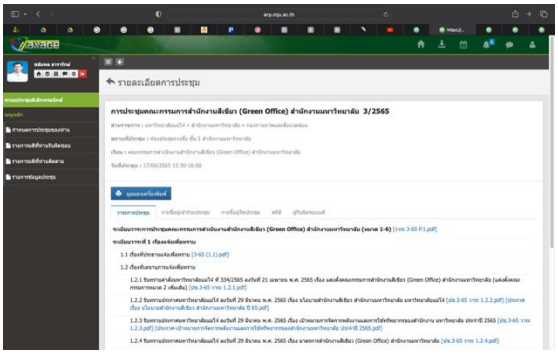
Making organic Fertilizer from organic wastes

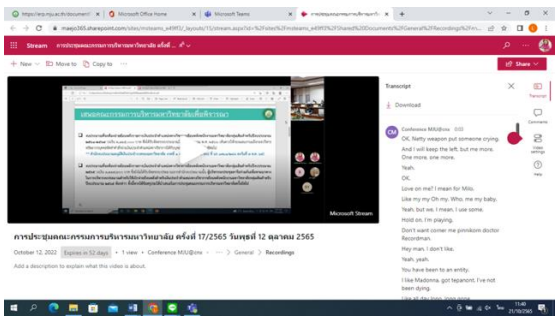
- Purchased Waste
  - Condensed water from air conditioners watering plants: Water is collected in Maejo University's offices from condensed water from air conditioning units. The water is used to water the plants around the offices.

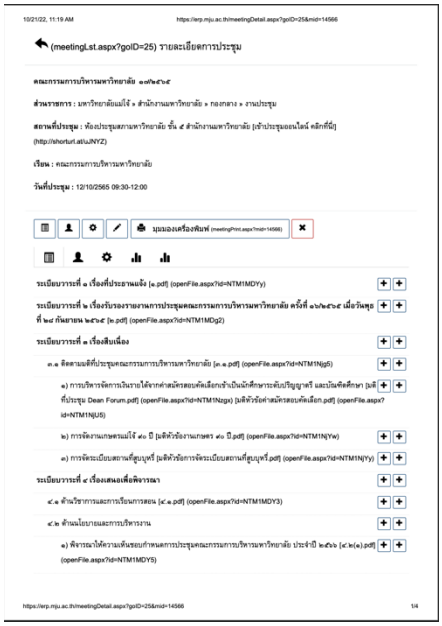
- Commuting

    - **<u>Providing bicycles to students and personnel</u>:** In accordance with the agreement between Maejo University and Anywheel Co. Ltd., bicycles are provided at the stop sign over the university at a special price for students.

    - **<u>Online Meeting</u>** : Online meeting is one of the policies that Maejo University has utterly pushed for less commuting in on-site meetings at the university. Maejo University's online meeting system has supported personnel to appoint the meetings, add the agenda of the meetings, and attach the documents for the meetings.







Total carbon footprint (CO^2 emission in the last 12 months, in metric tons)

Data : - Electricity usage per year = 9,275,740.20 kWh/year
- Number of cars entering university = 1,278 cars/day
- Number of shuttle bus in the university = 0
- Number of motorcycles entering university = 1,787 motorcycles/day
- Number of trips for shuttle bus service each day = 0
- Approximate travel distance of vehicle each day inside the campus (car) = 0.80 km/day
- Approximate travel distance of vehicle each day inside the campus (shuttle bus) = 0 km/day
- Approximate travel distance of vehicle each day inside the campus (motorcycle) = 0.80 km/day

- **Electricity Usage Per Year**

  CO_2 emission from electricity
  = (9,275,740.20 / 1000) x 0.84
  = 7,791.62 metric ton

- **Transportation per year (Car)**

  CO_2 emission from car
  = (Number of cars entering your University * 2 * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100) * 0.02
  = (1,278 x 2 x 0.80 x 240/100) x 0.02
  = 98.15 metric ton

- **Transportation per year (shuttle bus)**

  CO_2 emission from shuttle bus.
  = (Number of shuttle bus in your University * 2 * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100) * 0.01
  = (0 x 2 x 0 x 240/100) x 0.01
  = 0 metric ton

- **Transportation per year (Motorcycle)**

  CO_2 emission from motorcycle
  = (Number of motorcycles entering your University * 2 * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100) * 0.01
  = (1,787 x 2 x 0.80 x 240/100) x 0.01
  = 68.62 metric ton

Total Emission per year = 7,791.62 **+ 98.15 + 0 + 68.62 = 7,958.39 metric ton**

The total carbon footprint divided by total campus population (metric ton per person)

The result from 2.11 that was calculated total carbon footprint per population of 0.48 metric ton / person.

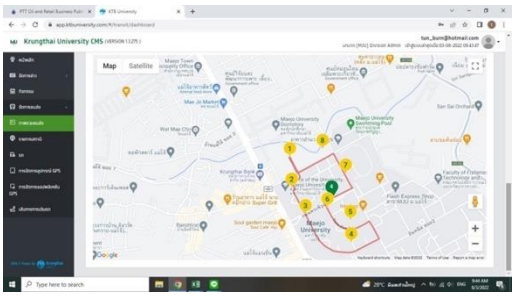
Carbon Footprint Per Year
Total emissions divided total people

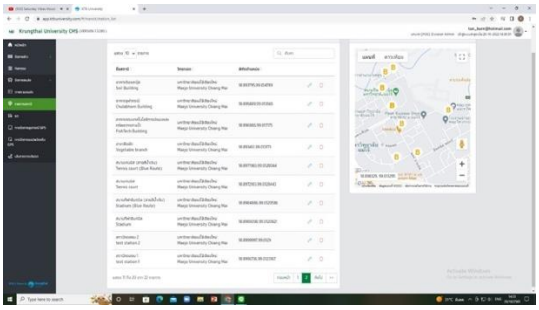
Data : - Population in MJU = 16,505 persons
- Total Emission per year = 7,958.39 metric ton

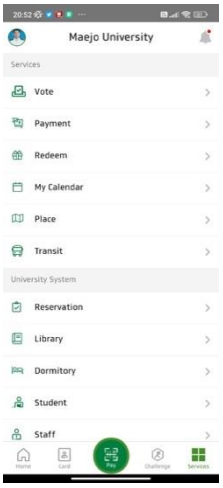
Total Carbon footprint per population = 0.48 metric ton / person

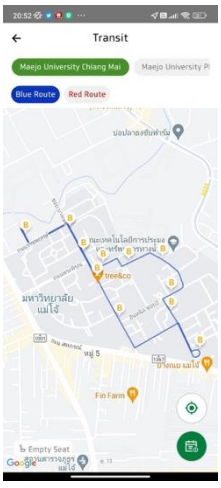
Number of innovative program(s) in energy and climate change

Maejo University has launched a web and mobile application for transportation at the university. It consists of the route of the shuttle buses, the real-time location of the shuttle buses, and the bus stops' location.









Additionally, the university library has advertised its "Book Drop" service, which enables instructors and students to return books they've checked out without physically going to the library. The boxes have been positioned in each of Maejo University's faculties.

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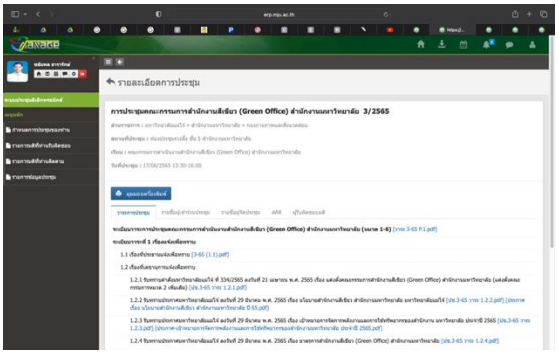
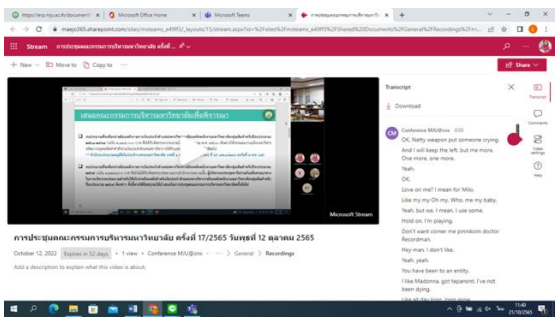
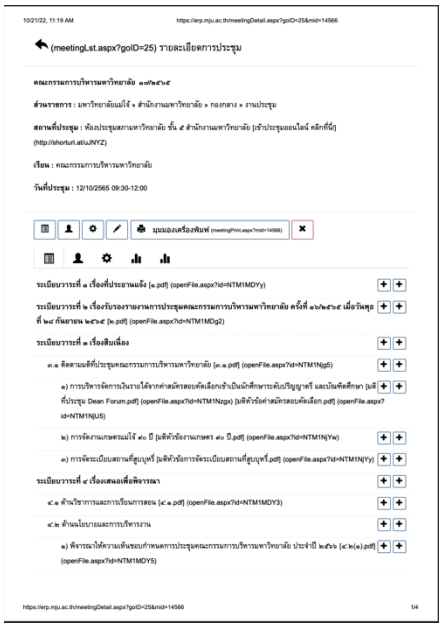
Additionally, every bicycle parking place includes a system for determining the location of the bicycles after customers have completed using them, according to an agreement between Maejo University and Anywheel Co. Ltd. Additionally, it keeps track of how many bicycles are parked in each space to identify whether they are accessible for usage.

While the COVID-19 pandemic situation has gotten better in 2022, Maejo University has also placed a strong emphasis on online meetings and courses to minimize travel time, particularly for international conferences.







Impactful university program(s) on climate change

Community

Big Cleaning Day

The staff at the President's Office carried out the Big Cleaning Day in accordance with Maejo University's Green University policy. This task entailed cleaning up the working space and providing garbage education.

Providing Education About Bamboo Coal

Dr. Bonnslip Jittaprapun and Asst. Prof. Chundaroung Thongsan from Maejo University conducted an educational activity in Chumporn's Tuan-tako region about how coal is made from bamboo.

National

Green Office Award

Maejo University awarded Green Office Award, which is the award for each faculty or office that pays attention to conserving the environment. There are 3 awards that Maejo University awarded.

- Gold Symbol: Faculty of Economics and Student Development Division.
- Bronze Symbol: School of Renewable Energy.

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TALA Student Design Competition

Mr.Thanathorn Chamnan and Ms. Rungtawan Boonprompt, junior students at the Faculty of Architecture and Environmental Design, were awarded the winner prize at the TALA Student Design Competition on April 30, 2022. " Green Infrastructures Green City " is the notion.

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International

Sustainable solid waste management and policies

The University joins SWAP Project (Sustainable solid waste management and policies), which is collaborated with partners in Vietnam and Cambodia. The project has been doing educational activities to aware the topic of waste management to teachers and staffs, who teach the awareness of waste management especially children and teenagers. The activities of SWAP Project which the institution has cooperated is in the link

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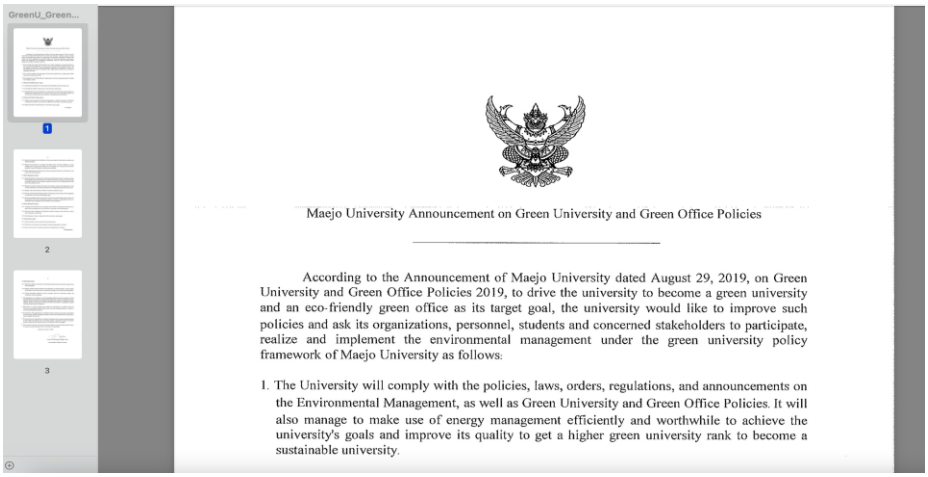
Collaborations between Maejo University and Laos PDR

The President of Maejo University (Assoc. Prof. Dr. Weerapon Thongma), and Associate Dean of Maejo University International College (Dr. Winitra Leelapattana), send trainees from Laos PDR in the just concluded TICA sponsored training program on "Application of the Circular Economy Model and the Sustainable Development of Highland Agriculture" to the airport for departure to their countries.

[3] Waste (WS)

[3.1] Recycling Program For University Waste (WS.1)



Maejo University Announcement on Green University and Green Office Policies

According to the Announcement of Maejo University dated August 29, 2019, on Green University and Green Office Policies 2019, to drive the university to become a green university and an eco-friendly green office as its target goal, the university would like to improve such policies and ask its organizations, personnel, students and concerned stakeholders to participate, realize and implement the environmental management under the green university policy framework of Maejo University as follows:

1. The University will comply with the policies, laws, orders, regulations, and announcements on the Environmental Management, as well as Green University and Green Office Policies. It will also manage to make use of energy management efficiently and worthwhile to achieve the university's goals and improve its quality to get a higher green university rank to become a sustainable university.

Green University and Green Office Policies

SUN THAILAND Sustainable University Network

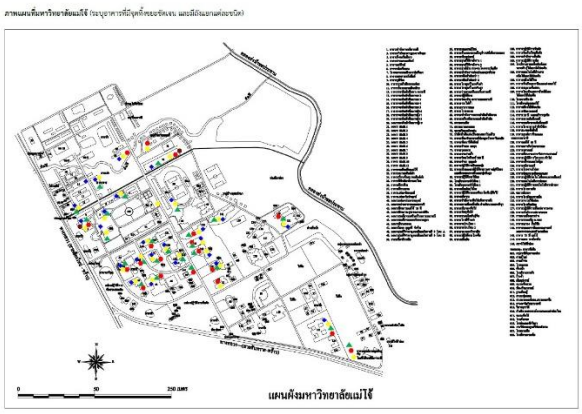
SWAP Sustainable solid WAste management and Policies

SDGs MJU

SCD Maejo University

GREEN OFFICE

MJU GREEN LIBRARY
MJU GREEN LIBRARY



Map for sorting and recycling bins on the campus

Examples of sorting bins for general waste, recycled waste, organic waste, hazardous waste, and small buckets for ice and liquid

Sorting and Collecting used paper for recycling

Paper shredding to be sold to local recycling companies for recycling

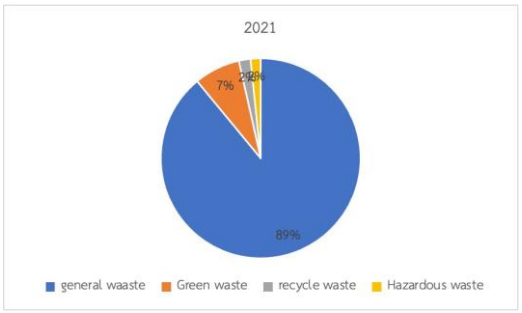
Amount of recycle waste generated and sorted in 2022

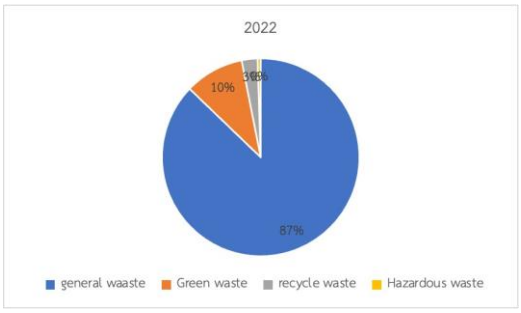
Aerated static composting systems for yard waste management on the campus

Flowchart of organic waste management. Food waste was separated and treated by black soldier fly cultivation

Black soldier fly cultivation for food waste treatment project has been launched and developed for future MJU solid waste management and recycling center

There are many forms of campaign media; such as live streams, tik tok, short VDO, Youtube, and Facebook to raise awareness and build participation among students and staff for waste sorting and solid waste management





The comparasion of waste generation between year 2021 and 2022

Description: Recycling Program For University Waste

Since 2018, Maejo waste management teams, who have been assigned and supported by the university management board, have driven and carried out waste management activities for Maejo university, Chaing Mai campus. In recent years, MJU's solid waste policy for Green university (https://green.mju.ac.th/) and the Green office (https://maejo.link?L=656j) were updated, announced, and acted. In order to steer the direction of waste management in the university, MJU also joined several projects such as SUN(Sustainable University Network)Thailand

(https://sunthailand.net/),SWAP(Sustainable solid Waste management and Policies) (https://www.swap-eplus.org/),SDGs(Sustainable Development Goals) (https://sdg.mju.ac.th/MainPage.aspx),SCD(Sustainable Community Development) (https://sdg.mju.ac.th/MainSCD.aspx) and Green Library (https://library.mju.ac.th/greenlibrary/)

Regarding solid waste management strategy and recycling program, we targeted waste reduction especially, foam (food container) and single-used plastics and waste sorting and recycling.

We not only plastics and recycling materials but also aimed for food waste separation and treatment. Since last year (2021), students were not allowed to study onsite due to the COVID-19 pandemic and came back to be onsite in the year 2022, this is very challenging. In 2022, our waste management team has been intensely promoting all relevant waste policies and activities. There were many activities and campaigns have been launched to encourage staff and students to waste sorting, waste reduce, and recycle. Here are summaries;

1. All Faculties through the dean's meeting have committed to join and act for green office regulation where the solid waste management is one of the key indicators.

2. Apart from each building, MJU has installed sorting and separation bins for collecting 4 types of waste; general waste, organic waste, recycling and hazardous waste in the public area as shown in the map (https://maejo.link?L=nc48)

3. The amount of recycled waste generated in 2022 was 12250 kg which was more than last year (5931 kg in 2021) when students studied from home during the second wave of the Covid pandemic.

4. Regarding organic waste recycling and management, 100% of yard waste from buildings and landscape management was collected and sent for aerated static composting systems. The compost products were used for soil amendments in the university area and packed in the bag for staff distribution. 100% of food waste generated from main canteens was utilized and treated. 70% of food waste were collected for animal feeding, while 5% and 25 % were collected for vermiculture farm and new project on black soldier fly cultivation project, respectively. This new project has been launched and developed for future MJU solid waste management and recycling center as it shown high potential in terms of protein source and compost products.

5. There are many platforms of campaign media; such as live stream, tik tok, short VDO, Youtube and Facebook to give knowledge, to raise awareness and to build participation among students and staff for waste sorting and solid waste management (https://youtu.be/xLWFSaFsGZo), (https://fb.watch/g3yiGFvGuL/,https://fb.watch/g54sU3iEAN/)
https://www.facebook.com/MJUChiangmai/videos/627190205690289/

In conclusion, we successfully achieved in waste recycling program in 2022 so far. Comparing to last year, our results of waste generation analysis showed that 2% of general waste and 1% of hazardous waste has been decreased and less than last year, while 3% of organic waste and 1% of recycling waste has increased and they were separated from general bin. This means that we can reduce the amount of general waste that needs to dispose of in the landfill.

[3] Waste (WS)

Program to Reduce the Use of Papers and Plastics on Campus (WS.2)

<table>
<tr><td> 
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<tr><td>MJU Zero Waste project to encourage staff and students to plastic waste reduction</td><td>Plastic waste reduction campaigns such as

launching the MJU tote bags project for students and staff to stop using plastic bags.</td></tr>
<tr><td>  </td><td> 
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<tr><td colspan="2">Launching “MJU say no to plastic bags ” by the Student Union.</td></tr>
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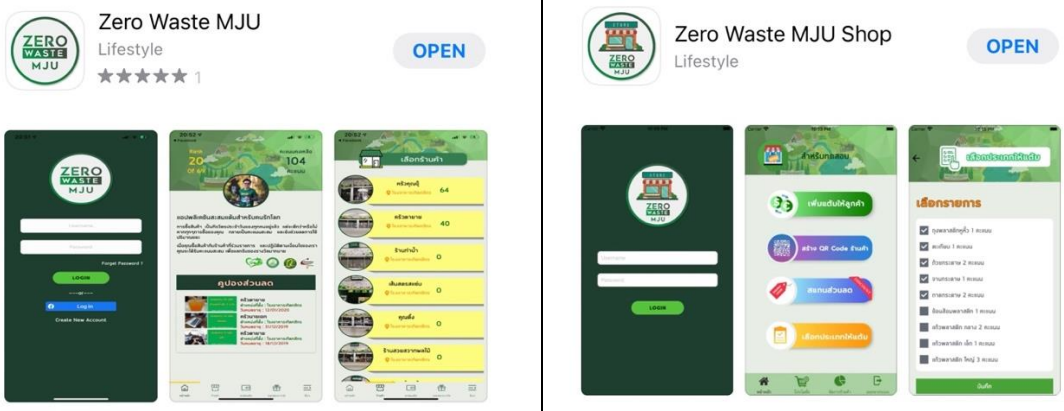
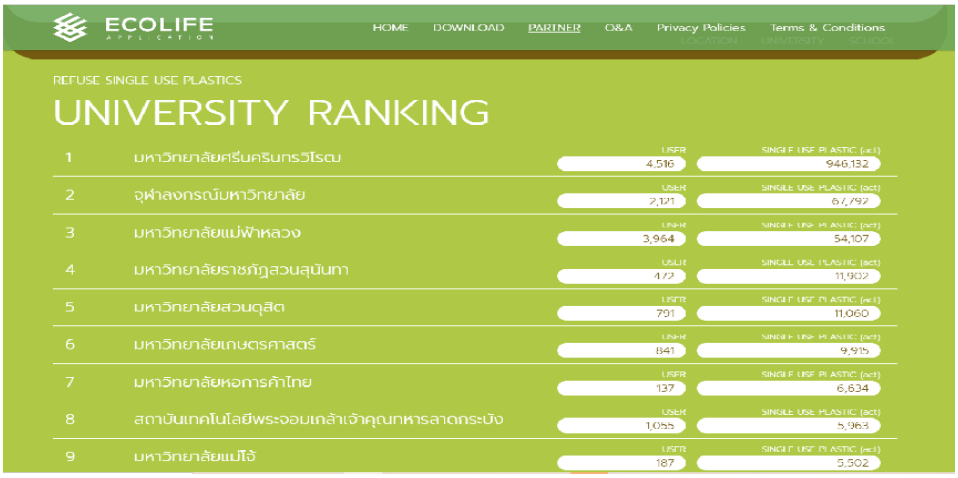
Campaign for the reduction of plastic cups and bottles by bringing your own bottles	
	
Rewards and discounts from a coffee shop on the campus for bringing your own mugs and bottles	New design for MJU bottles for plastic waste reduction campaign

	
Reused paper, paper reduction campaign, using electronic documents and meetings and central printing station for paper reduction program	
	
	

Launching the hybrid seminar on Driven MJU towards zero waste community

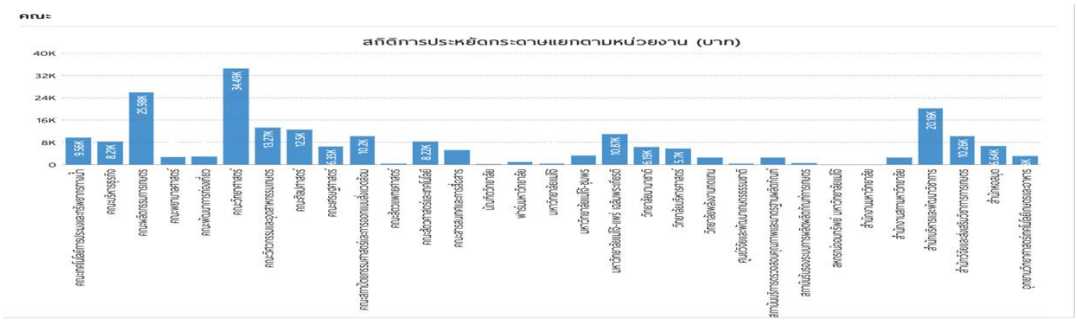


MJU zero waste application



MJU has joined single used plastic reduction project with the Ministry of Higher Education, Science, Research and Innovation and the ECO life application

MJU has encouraged staff from all faculties to use electronic documents for e-meetings and other official documents to reduce paper use and create a paperless community. This shows the number of paper costs and paper reduction for MJU



This shows the number of paper reduction cost for MJU

MJU no plastic project on world environmental day

Description: Program to Reduce The Use of Paper and Plastic in Campus (WS.2)

In 2022, Maejo University launched, promoted, and proceeded with policies and activities for paper and plastic usage reductions to decrease paper and plastic consumption on campus. Here are the details;

1. Maejo University and MJU Student Union have launched the "Say No to Plastic Bag Project" "MJU Zero Waste project" and other plastic waste reduction campaigns to encourage staff and students to plastic waste reduction. For example, the MJU tote bags project was launched

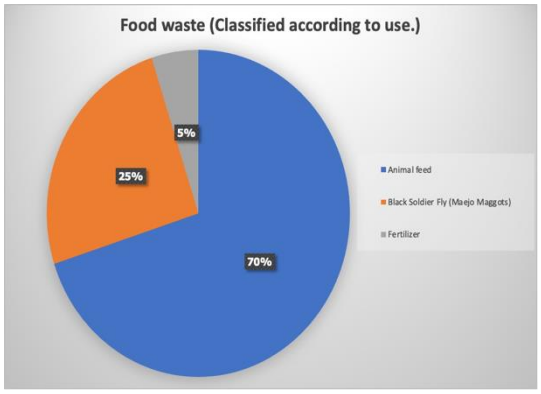
for students and staff to stop using plastic bags at university shops and the MJU organic market. This project has been conducted continuously since 2018.

2. The campaign and activities of plastic waste reduction in the coffee shop have been promoted and conducted such as bringing your mug and containers and getting discount promotions for food and drinks. Moreover, a new design of MJU bottles was developed for students and staff. This project has been conducted continuously since 2018.
3. On 24th August 2022, the MJU waste management team organized the hybrid seminar on Driven MJU towards zero waste community. Two invited speakers; Mr.Varoon Varanyanon and Mr. Prem Pruektayanon also joined this event. There were a total of more than 100 participants of students and staff attending this seminar.
   https://erp.mju.ac.th/informationDetail.aspx?newsId=4697&lang
   Link: https://apps.apple.com/ca/app/zero-waste-mju/id1491921237
   https://play.google.com/store/apps/details?id=th.ac.mju.zerowaste&hl=th&gl=US
4. Plastic waste reduction campaign and activity on world environmental day organized by the Student Union.
5. Maejo University has set the policy and programs for paper reduction such as using electronic documents, using electronic meetings for all faculties and organizations, using the centered printer to reduce the amount of paper used, printing 2 sides papers, and using reused papers. Moreover, the amount of paper reduction, as well as the reduction of paper costs from each, have been reported on the MJU website. In the year 2022, MJU can save the paper cost of up to 10.5 million baht. https://erp.mju.ac.th/documentRptChart2.aspx
6. Maejo has launched MJU Zero Waste Mobile Application for every shop at the MJU canteen. Once plastics have been refused and reduced by students and staff who have registered this application, they can collect some reward points for the discount of buying food and drinks. https://green.mju.ac.th/?p=3799&lang=en
7. MJU has joined single used plastic reduction project with the Ministry of Higher Education, Science, Research and Innovation and ECO life application (kid-kid company). There are 20 ECO life application QR code checkpoints at the canteen, coffee shops, and food and drink stores for students and staff to use. More than 3,000 kg of single-use plastics was reduced by MJU (ranking no.13)
   https://www.ecolifeapp.com/partner_details_organize.php?section=67&organization=1&num=13

[3] Waste (WS)

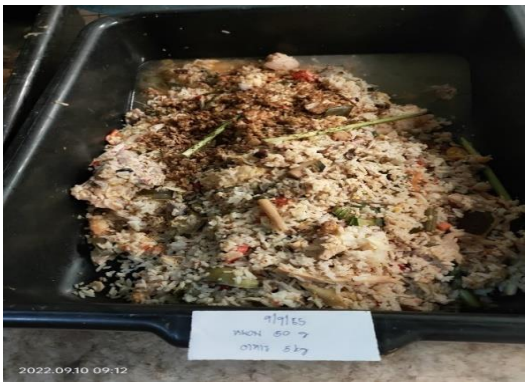
Organic Waste Treatment (WS.3)

MJU waste management team has installed “Green cone” for food scraps from each faculty.

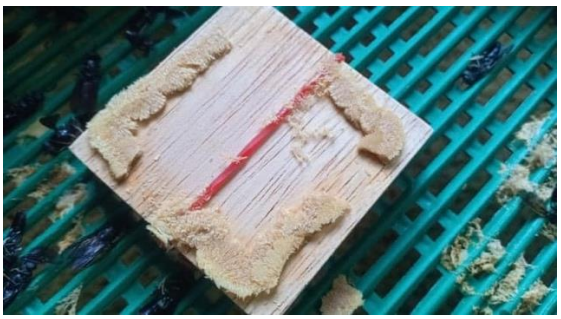


Food waste treatment processes and its applications

70 % of food waste is used for animal feeding



Black soldier fly cultivation for food waste treatment project has been launched and developed for future MJU solid waste management and recycling center. This project was conducted at MJU economic insect center. Up to 25% of food waste from the MJU canteen was sent to this project.



Black soldier fly eggs

Larva of Black soldier flies	Compost obtained from Black soldier fly cultivation
	
Maejo natural centre	Earthworms for food treatment
	
Food waste collection and management using vermicomposting	Vermicomposting at Maejo Natural centre

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<tr><td colspan="2">Organic fertilizers and products obtained from vermicomposting of food waste</td></tr>
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สำนักงานมหาวิทยาลัย
ตุลาคม 2564 – กันยายน 2565

- ปริมาณทั้งสิ้น ประมาณ 2500 กิโลกรัม
- มีแผนนำไปตากและโม่เพื่อทำเป็นวัสดุปรับปรุงดินในเดือน พฤศจิกายน 2565
- ส่งตรวจวิเคราะห์คุณภาพในเดือน พฤศจิกายน 2565

  </td></tr>
<tr><td colspan="2">Composting from yard waste</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Composting quality and characteristics</td><td>Composting from yard waste was used for soil amendments and landscape management in the compus</td></tr>
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Brochure for publication of How to do composting from yard waste for staff, students and others

MJU research team received an outstanding work from SUN Thailand on innovative packaging that saves the world. They developed eco-friendly containers from leaves, fibers and agricultural waste

Innovation of eco-friendly packaging products from organic waste

Material innovation research team organized a project to develop green packaging from agricultural waste residues and the products obtained will be used on the campus.

Description: Organic Waste Treatment

1. Green Cone Project was conducted to encourage staff and students from each faculty to separate food waste from general waste. A total of 10 green cones were installed at 10 faculties. Food waste (100%) that was separated each day from the office and classroom (organic bins) was then added and treated by this green cone which was set nearby each building.
2. For the food waste generated from the canteens on the campus, 100% (total of 45630 kg in year 2022) of food waste, that was separated and collected from each canteen and food shop, was well managed and treated. Nearly 70% of food waste was collected for animal feeding, while 25% was used for black soldier fly cultivation for protein source production and compost. This project was conducted at MJU economic insect center and this project will be

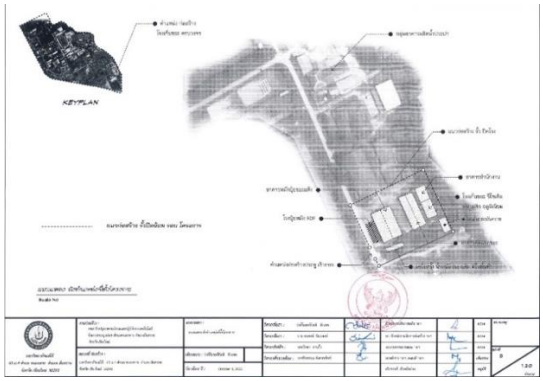
further developed for future MJU solid waste management and recycling center. Within 40 days of operation, 200 kg of worms and 100 kg of compost were obtained from treating 400 kg of food waste (75% waste removal).
https://www.facebook.com/profile.php?id=100066567011803

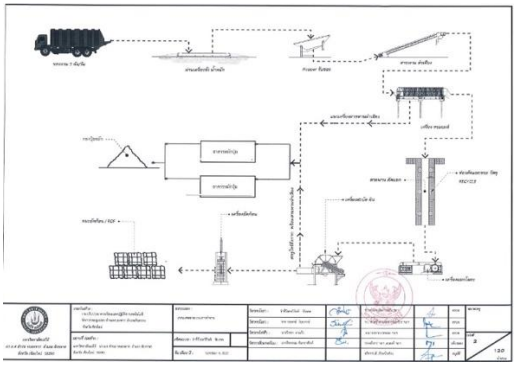
The rest of the food waste was then transferred to vermicomposting area for fertilizer production which was pioneered by Prof. Dr. Arnat Tancho from MJU Naturing Center https://www.facebook.com/maejonaturalfarming/

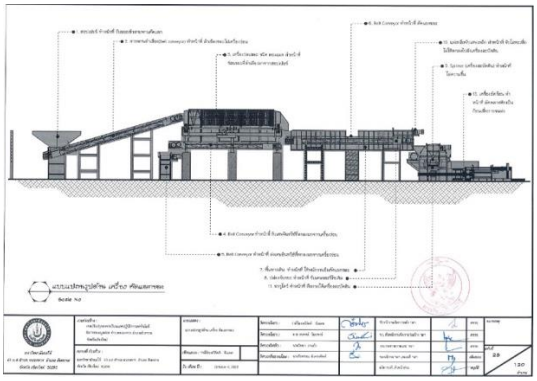
3. Leaves and trees from landscape management (trimming and cutting) from the campus area were collected and transferred to MJU composting area. Yard waste was then biodegraded using the aerated static pile composting process that has been initiated and developed by Associated Professor Teerapong Sawangpunyangul and his teams. In 2022, nearly 30 tons of composts were produced with 26.1% organic matter, 1.3% total nitrogen, 1.68% total phosphorus, and 0.26% total potassium. The compost products were then used for landscape management on the campus area and distributed to MJU staff members. https://maejo.link?L=mRa8, https://maejo.link?L=cQ9S)
4. MJU research teams have developed innovations in eco-packaging products from leaves and agricultural waste. Some of the products such as trays made from leaves were used for the snack sets in the staff meeting. In the future, all products will be launched and used on the campus as a replacement for plastic plates for food containers. Moreover, this year MJU research team received outstanding work from the SUN Thailand meeting on innovative packaging that saves the world. They developed eco-friendly containers from leaves, fibers, and agricultural waste.

[3] Waste (WS)

Inorganic Waste Treatment (WS.4)



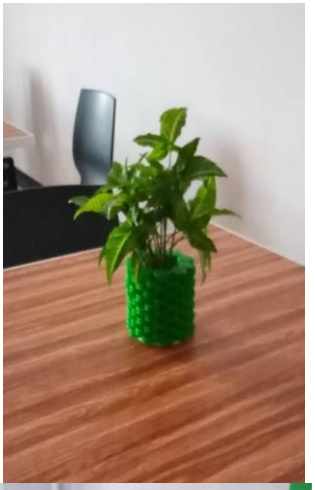




The master plan and the construction update of MJU solid waste management and recycling center


MJU organized the training for the upcycling plastic waste project; Making coasters from plastic lids collected from recycling bins


MJU organized the training for the upcycling paper waste project; Making hand made books from used A4 paper collected by staff and students



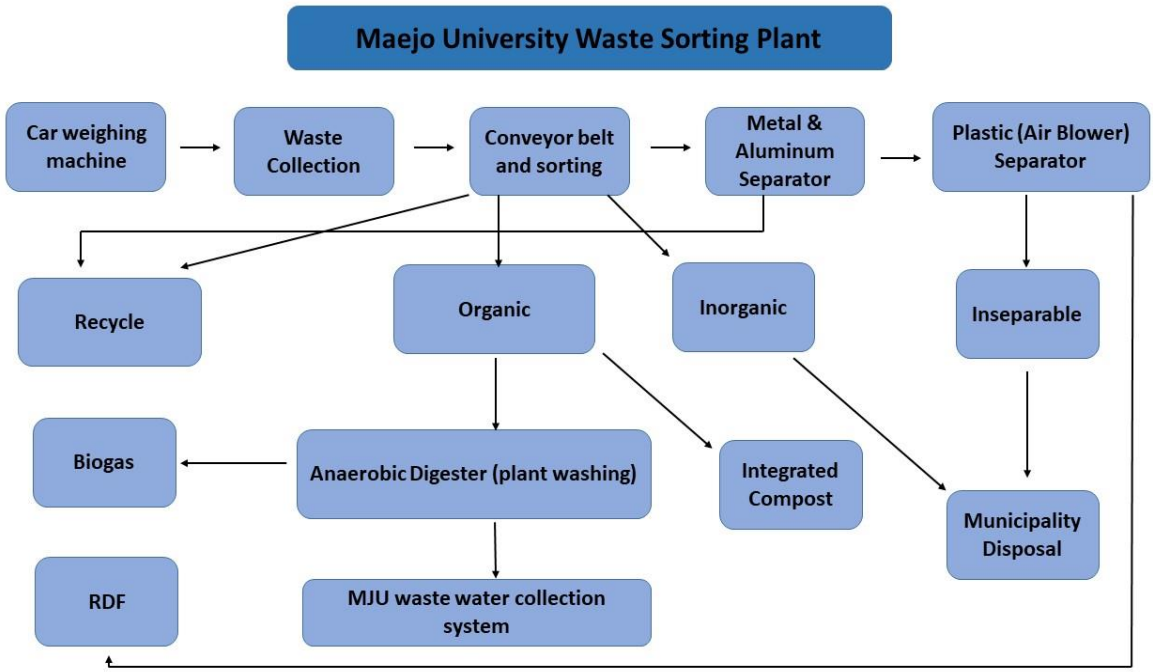
Plastic waste recycle activities from MJU Green office action; DIY a vase from plastic waste, and plant pots from plastic waste

MJU aluminum waste and stocking collection point donation to the Prostheses Foundation of H.R.H the Princess' Mother

MJU receipt waste collection point for donations to make books for the Greenway project

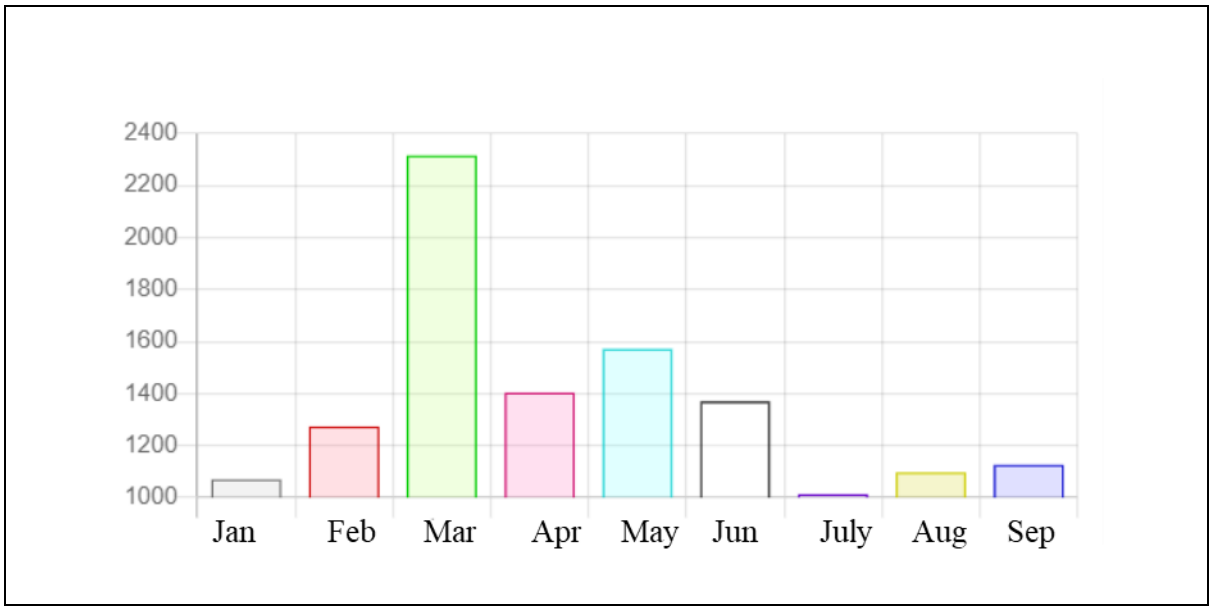
MJU inorganic waste management

Since 2019, the MJU waste management team who has been working under the green university committee has set the strategy for inorganic waste handling at Maejo University. For the long-term strategy, we aimed to develop MJU solid waste management and recycling center. This aims to increase the efficiency of MJU solid waste management, while waste sorting and waste minimization are a priority. In the end, the waste will be used for energy recovery. Last year (2021), MJU bought the waste conveyor and the automatic scale, and this year (2022), we have got the budget to start the construction as can be seen from the picture above. The master plan and sorting flow diagram are shown below.



MJU waste sorting concept

In the meantime, MJU also carried out actions and launched activities for inorganic waste handling such as 3Rs and big cleaning projects. Also, green office policies and actions have been driven for every faculty and building on the campus. This includes waste management strategy, the amount of waste generated and recycled, and relevant activities. The graph shows the amount of recycling generated and separated from total solid waste in the year 2022. The majority of inorganic waste generated from the campus was paper followed by other recycling waste such as plastic and aluminum cans that were collected from the recycled bins. In 2022, a total of 12250 kg. of recycled waste, which was higher than last year (5931 kg.) was sorted and separated from its source. All of them (100%) were sent for recycling and MJU had less amount of general waste to be disposed of and managed.



For the paper reduction, electronic documents and electronic meetings were encouraged. In the year 2022, MJU can save the paper cost of up to 10.5 million baht.

Here is the link; https://erp.mju.ac.th/documentRptChart2.aspx.

Moreover, each organization has a policy of using reused paper or two sides printing according to green office procedures. After that, all the used papers were separated, collected, shredded, and sold for recycling by the local recycling companies. The money obtained was further used for waste management in the organization. In addition, the rest of the paper was used for MJU upcycling paper waste project by making the handmade book from one-sided used A4 paper. This project encouraged staff and students to join. After the event, we produced 200 books from xxx kg of paper waste.

For plastic waste, many activities were struck to recycle 100% of plastic waste from MJU. The first one is sorting and collecting plastic waste from recycling bins to send for the recycling process. MJU also had a collection point for thin plastic waste which was sent to the green road project. We also organized upcycling plastic waste projects such as making coasters from plastic lids, and plastic pots for plantation and office decoration. This aims to encourage and raise awareness among staff and students for plastic waste recycling.

For milk cartons, aluminum rings, and used stockings, MJU central library was a host for these waste collections for donation. In 2022, almost 25 kg of aluminum rings, 15.8 kg of milk cartons, and 1 kg of used stockings were collected.

[3] Waste (WS)

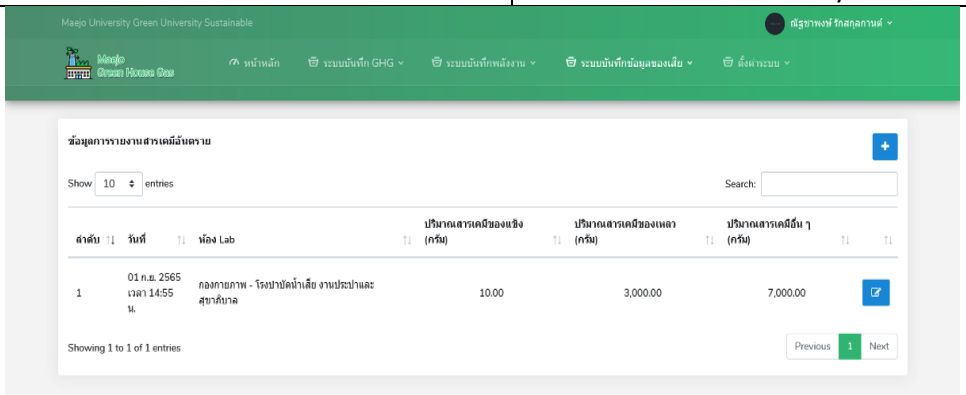
Toxic Waste Handled (WS.5)

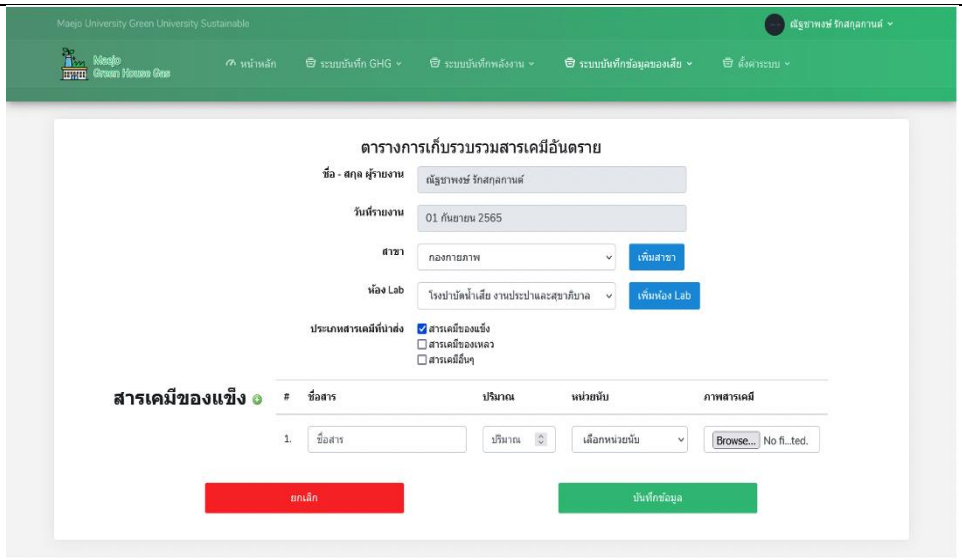
	
Household hazardous waste collection points	Household hazardous waste collection bin.

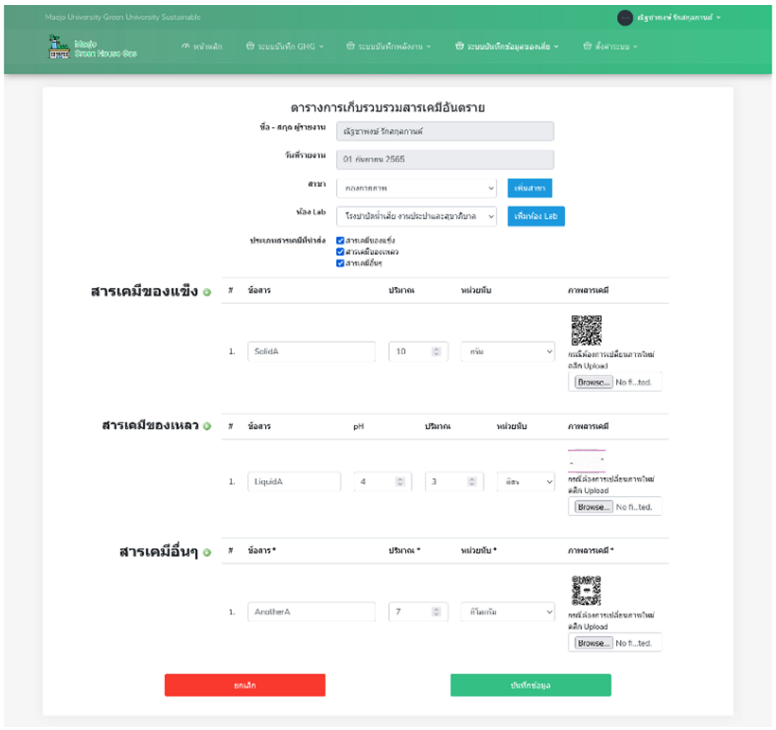
MJU E-waste sorting and collecting campaign to promote e-waste management during national science week

Maejo joins the project with AIS for E-waste bin collections and disposal

MJU E-waste collection points on the campus E-waste collection from each faculty was collected and sent to the E-waste recycling industry

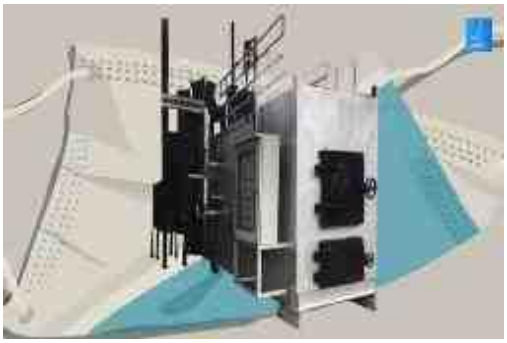


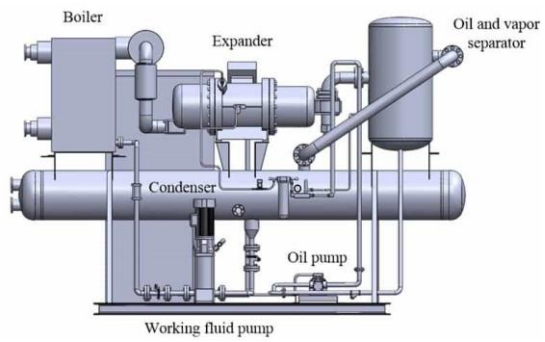




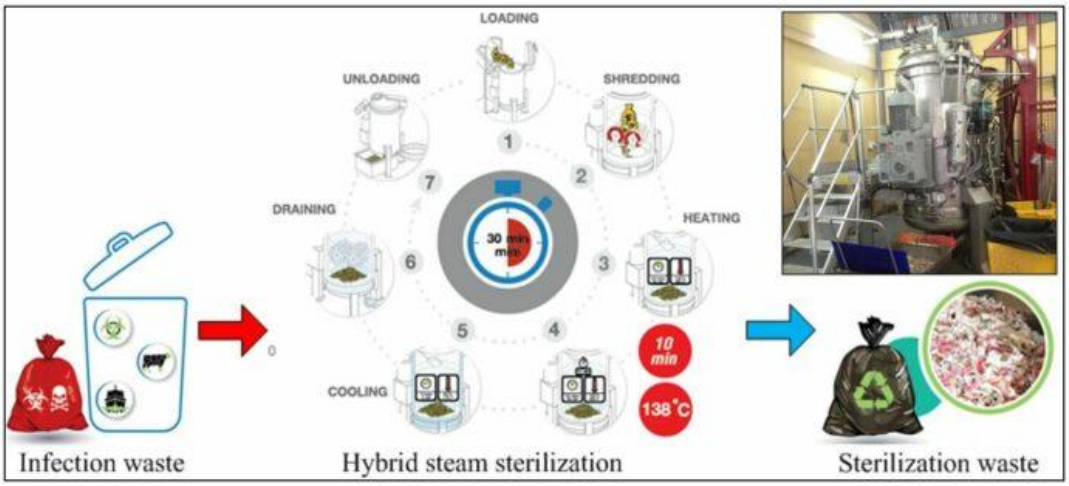
MJU waste management team developed MJU hazardous waste database for laboratory waste management.

Handling of chemically contaminated waste and chemical containers from laboratories. Collection from each building by MJU-certified lab technicians. Then all hazardous waste was transported, treated, and disposed of by the certified hazardous waste company- Recycle Engineering Co., Ltd.





MJU infectious waste was sent to dispose of and treat using the hybrid incineration system developed by Assoc. Prof. Dr.Nattaporn Chaiyat at the School of Renewable Energy.



Flow chart of MJU infectious waste management

DesHazardous waste disposal and management at Maejo University.

Maejo University has generated a broad range of hazardous waste such as chemical contaminated waste, broken glasses, sharp items, chemical containers, spray bottles, electronics devices, batteries, and fluorescence light bulbs. To manage and dispose of these items efficiently and to promote environmental-friendly waste management, many policies and several procedures have been conducted. The budgets for handling these hazardous wastes were set and approved. Also, trained staff were assigned for waste collection and control. In the year 2022, 100% of MJU hazardous waste was efficiently and well managed by authorized persons according to law and regulations. Here are the details;

There are 10 household hazardous waste collection points located on the Maejo campus where students and staff can get rid of all hazardous wastes such as light bulbs, broken glasses, spray bottles/cans, batteries, and other household hazardous wastes. These household hazardous wastes were collected and transported to be handled by Maejo municipality for disposal at Wongpanit Recycle Company (a certified contract company). In 2022, approximately 2000 kg of household hazardous waste was generated and sent for disposal.

Since 2020, Maejo has signed a collaboration with AIS for the installation of E-waste bins on campus. This aimed to collect all the used and broken electronic devices including mobile phones and accessories and IT items for disposal and management. In 2022, approximately 2.5 kg. of used mobile phones and batteries, 0.4 kg. of headphones and accessories, and 0.5 kg. of other electronic appliances were collected. This E-waste was collected by MJU waste management staff to pack and send to the post office for recycling at an E-waste recycling company (under an AIS contract). MJU also promotes e- waste management campaign via the university website and poster during national science week 18th-20th August 2022, on a hybrid seminar on moving MJU towards zero waste community and MJU social platform.

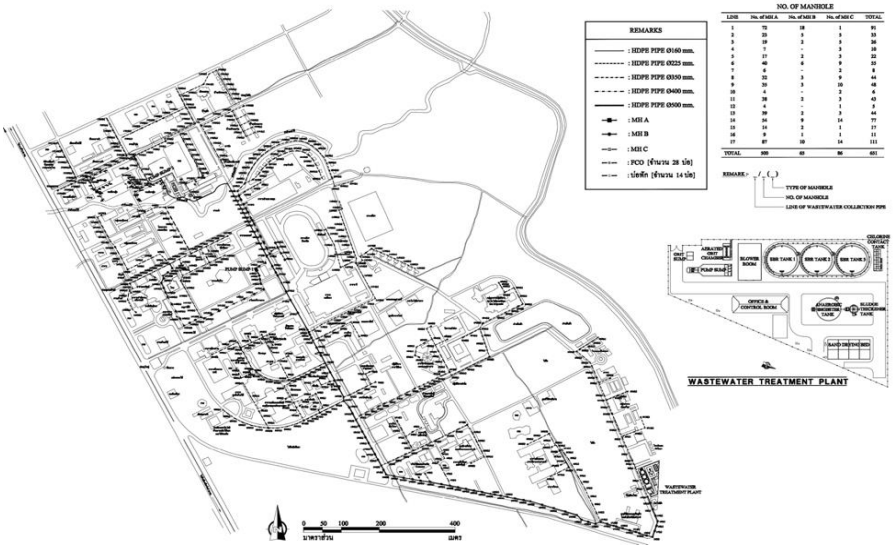
For chemicals contaminated waste, used chemicals, and chemical containers from laboratories and research sections, only trained lab technicians who got a certificate in waste management are responsible for handling and setting the procedure of collection and storage of this waste before disposal. In the beginning, all waste will be checked and weighed, labeled, and recorded. Some types of waste are pretreated before storage. All the waste is placed and stored in a safe and isolated area before transferring to dispose of by a certified contracted company each year. In the year 2022, the amount of hazardous waste collected and sent for disposal by the Recycle engineering company, a certified company, was 2215.9 kg. which is less than last year. All the waste items were listed, recorded and treated details are in the link below: https://maejo.link?L=a8Tj In the year 2022, moreover, MJU waste management team developed MJU hazardous waste database for better laboratory waste management. Technicians from each faculty that generated hazardous waste have responsible to fill in all information relevant to hazardous waste both quality and quantity. All the waste will be safely handled from its source before being transferred to the central hazardous waste collection before disposal.

During the COVID-19 pandemic, the MJU waste management team has set up a waste collection bin for infectious waste (red bin) on the campus for staff and students to dispose of their used masks. Each month, this disinfected waste was transferred to dispose of at the School of Renewable Energy for electricity production using a hybrid incineration system developed by Assoc.

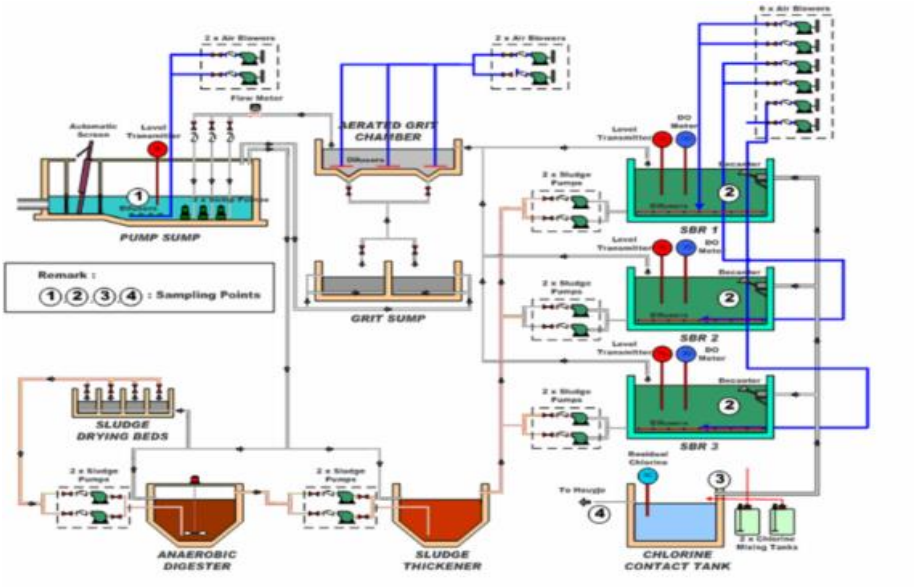
Prof. Dr. Nattaporn Chaiyat. The electricity obtained after waste treatment was about 20 kWh. The link for the information on the hybrid incineration system is shown below; https://erp.mju.ac.th/openFile.aspx?id=NDc2OTYz&method=inline

[3] Waste (WS)

Sewerage Disposal (WS.6)

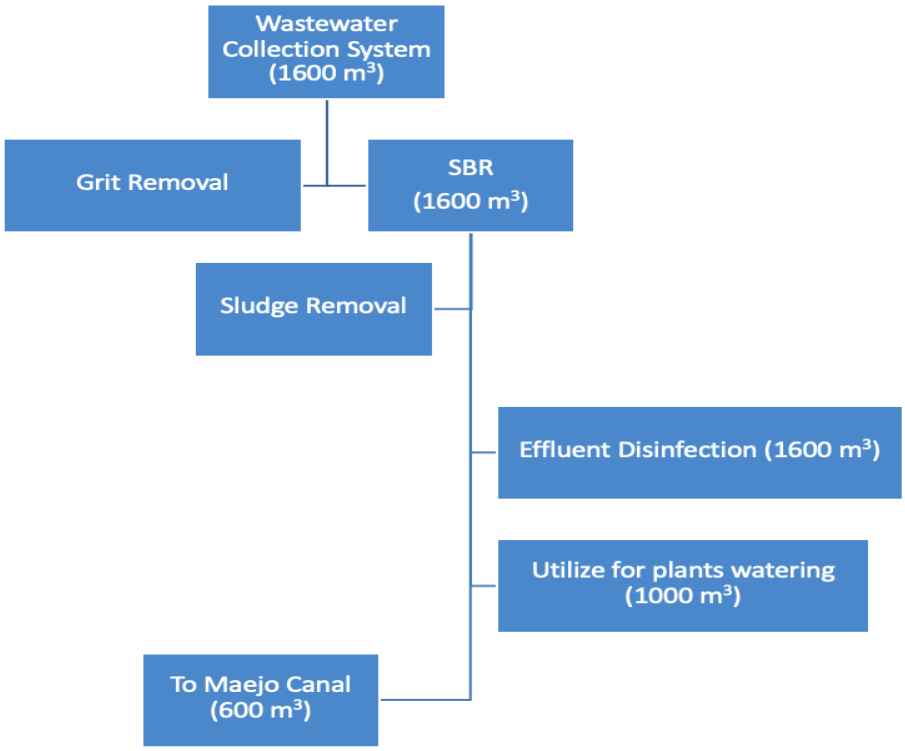


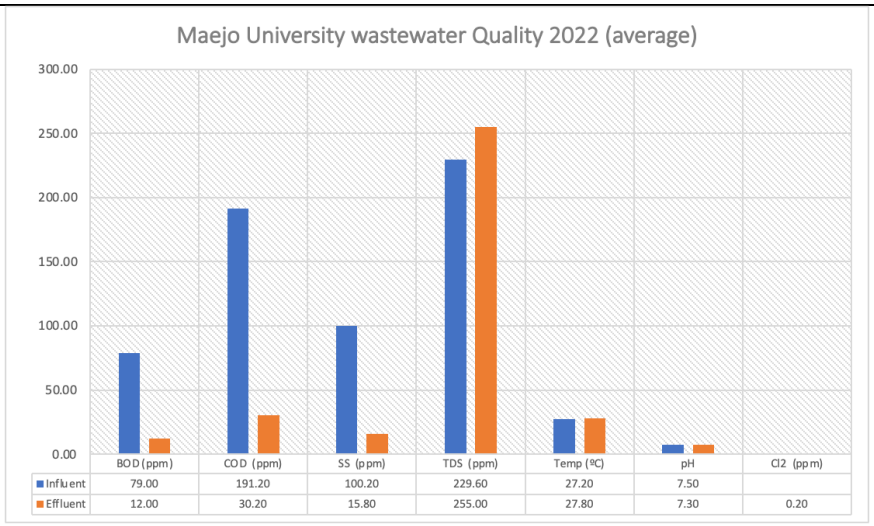
Wastewater Collection System



Maejo University Wastewater treatment diagram (SBR)

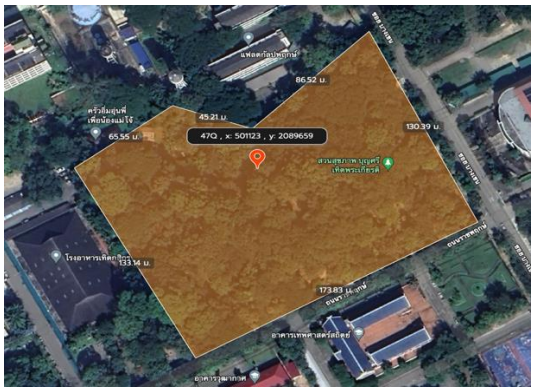
SBR reactor tank (Full capacity 2400 M3. / day)



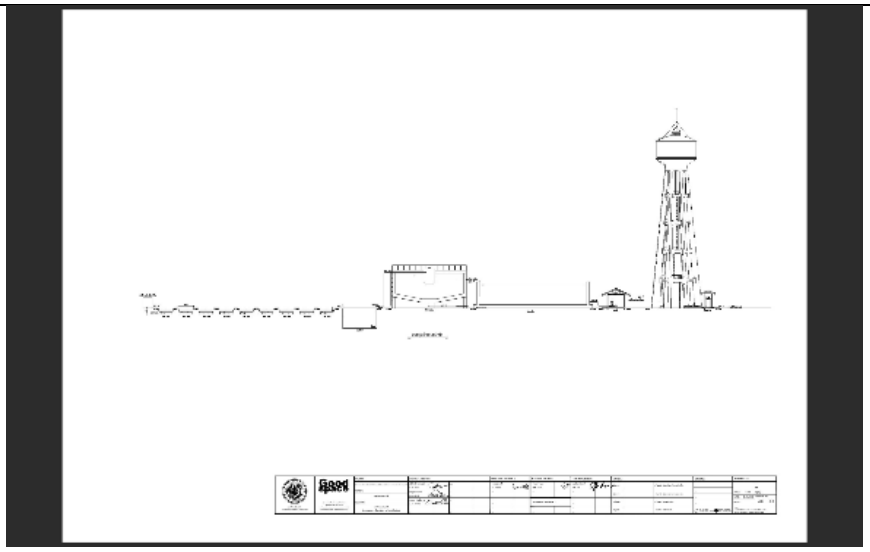


Wastewater Quality in year 2022

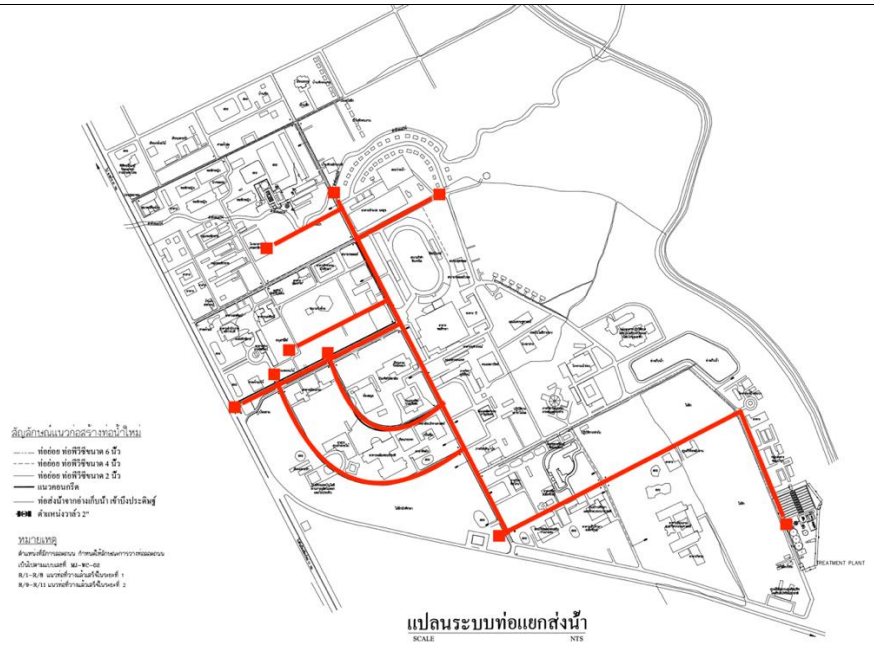
The Ecological Sanitation Project for reusing greywater for irrigation and landscape management on the campus.



The development of the piping system of treated water to be used for irrigation at Boonsri Botanic garden with the area of 16691.2 m^2 or 10.43 rai



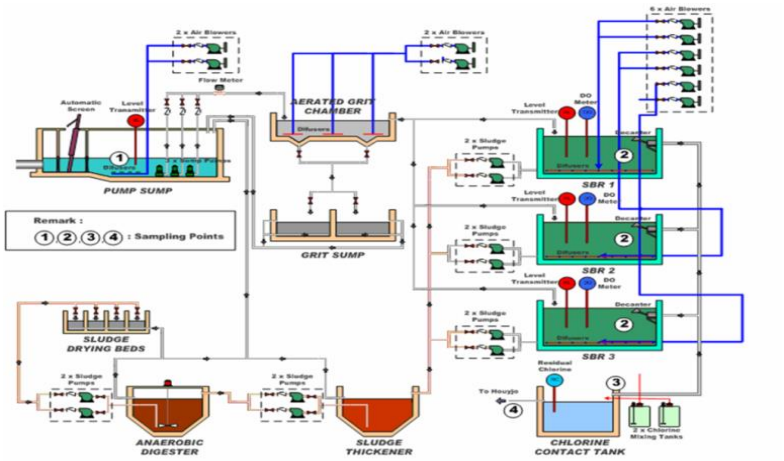
The system of recycle treated wastewater to be used as water supply for irrigation of landscape management and agricultural area on Maejo campus



Water piping line for recycle treated wastewater in Maejo campus

Sewage disposal system and wastewater recycling program

Wastewater from all buildings on the Maejo University campus are collected using the separated sewer system and transported through a piping system to treat at the MJU Wastewater Treatment Plant. For the wastewater treatment system, Sequencing Batch Reactors (SBR) was used to treat approximately 1600 m3 / d. The flow diagram of a wastewater treatment plant and piping system is shown in the picture and link https://erp.mju.ac.th/openFile.aspx?id=NDc3MDM1&method=inline:



All routine treatment parameters such as BOD, COD, pH, DO, TKN, SS, etc. were sampled and analyzed by technicians. Also, the results of treatment performances were confirmed by a certified laboratory. High performance of WWTP was achieved with a treatment efficiency of more than 80%, which is safe to release to the environment. The results of wastewater analysis are reported as followed; https://maejo.link?L=WL2C. However, MJU green university board management had announced the policy for water conservation and resources recovery. The effluent from the wastewater treatment plant is further improved, reused for landscape irrigation and agricultural purposes and upcycled for storage as water resource for MJU campus. Approximately 1600 m3 / d. of the effluent or 438266 m3/year was recycled by transferring through the piping system to treat and storage before using as source of water supply. This storage recycled water was used for landscape irrigation and horticulture crop during the dry season on the campus through the PVC piping system. Moreover, this treated water also used for the irrigation system for Boon Sri botanic garden with the total area of 16691.2 m2 or 10.43 rai. Sludge from the treatment plant was stabilized and dried before using as a soil amendment for agricultural and landscape purposes on the campus.

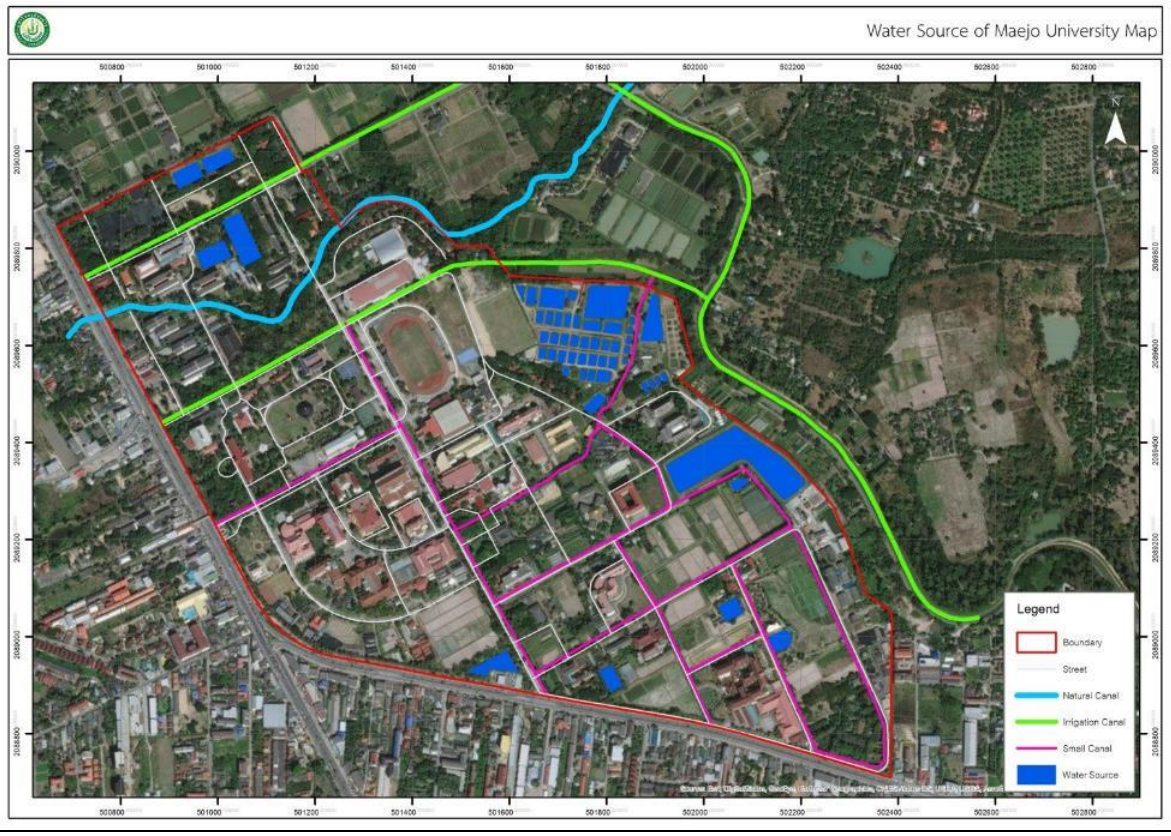
Since the year 2020, MJU has launched a new project of the upcycling water treatment plant to upgrade the effluent from the current wastewater treatment plant with a budget of 18 million baht. It is now in the process of 50% construction which will start up the system by next year. This project aims to upcycle 100% of the effluent for water conservation and agriculture production process.

Moreover, the ecological sanitation or "ecosan" was installed with a total amount of 303 toilets. These covered 7 main buildings including the main canteen, sports complex, the 70-year study center, the 80-year study center, Agricultural Faculty, swimming pool, and Chootiwat Building. Nearly 50 m3 of urinate was safely reused through piping systems with 5 main springer points for landscape management within the campus.

[4] Water (WR)

[4.1] Water Conservation Program Implementation

Maejo University has a 75,000-cubic meter raw water pond that supplies water for water supply Plant 1; a 20,000-cubic meter pond that provides water for water supply Plant 2; a 32,200-cubic meter pond that supplies water for water supply Plant3; a 60,000-cubic meter pond that is used for agricultural purposes; as well as the Mae Faek-Mae Ngat Somboonshon Operation and Maintenance Project and natural canals running through the university campus. There are sufficient surface water sources for the water supply system and agriculture.



Water source in Maejo University map

Raw water pond that supplies water for water supply Plant 3

Weir in the natural canal

Water source of Maejo university

No.	Position	Volume (m^3)
1	Lanna agriculture learning center	4,335
2	New theory agriculture learning center	4,470
3	Engineering Laboratory Building Classroom	1,196
4	Thummasakmontri Building 1	2,900
5	PTT Oil Station 1	2,912
6	PTT Oil Station 2	1,372
7	Thummasakmontri Building 2	740
8	Water supply pond	7,560
9	Agricultural area	1,196
10	water supply plant	1,475
11	Fishery Thchnology Laboratory Building	4,302
12	Smithanon Building	73
13	Mekong giant catfish learning center 1	39,495
14	Mekong giant catfish learning center 2	22,824
15	Mekong giant catfish learning center 3	5,902
16	Mekong giant catfish learning center 4	1,528
17	Rest home	1,431
18	70th year maejo building 1	2,457
19	70th year maejo building 2	1,579
20	Production of Ornamental Plants Technology	832
21	Dean office 1	420
22	Dean office 2	800
23	Maejo shirne	240
24	Kaset sanahn pool 1	2,850
25	Kaset sanahn pool 2	2,850
26	Female dormitory 8	9,720
27	Female dormitory 8	17,124
28	Faculty of Animal Science and Technology 1	1,050
29	Faculty of Animal Science and Technology 2	900
30	Faculty of Animal Science and Technology 3	1,350
31	School of Renewable Energy 1	147
32	School of Renewable Energy 2	4,870
33	Cow farm	36,300
Total		**187,200**



Raw water pond at fishery technology laboratory building

Raw water pond at an engineering laboratory building

Raw water pond at Kaset-sanarn pools 1 and 2

Water Recycling Program Implementation

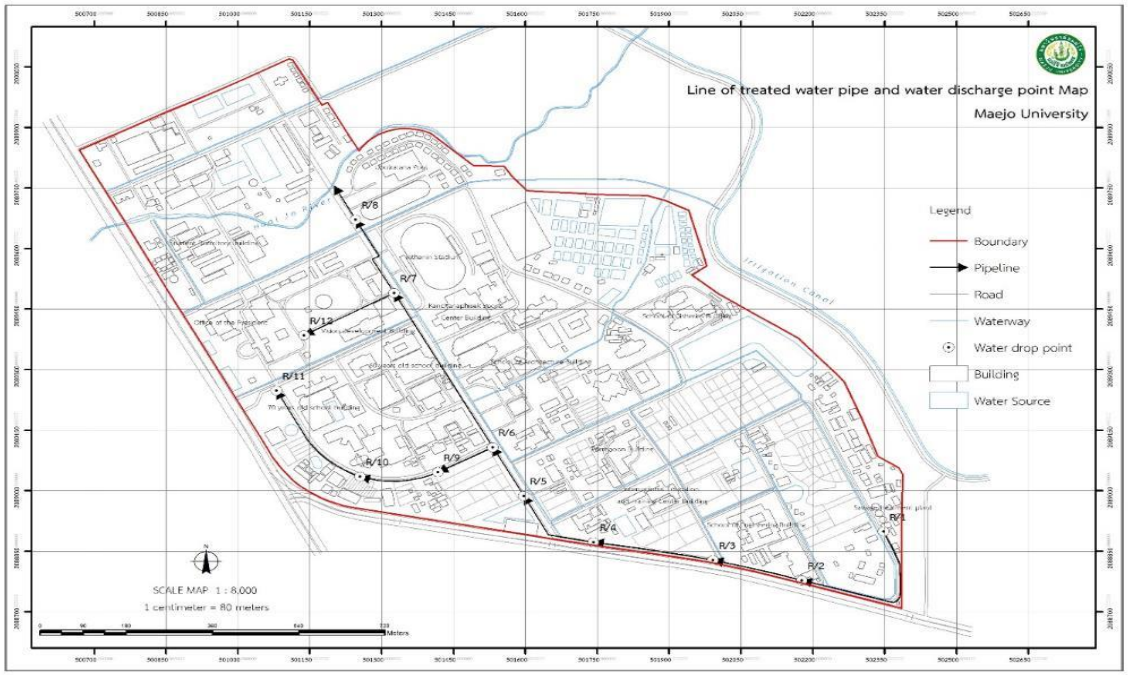
Maejo University has a pipe system that sends wastewater from all buildings to treatment plants and subsequently sends the treated water to 12 distribution points as illustrated by the R1-R12 dots on the map. Three of the distribution points further move the water to ponds for agricultural reserve, seven points supply water for usage in glass field agriculture, the university forest garden, and one additional point flows to a natural canal.

The treated water of Maejo University between October **202**1 to September **202**2 has a total volume of 438,262 m^3. All treated water was supplied into pile lines for agricultural use, such as landscape vegetable and rice planting, and tractor washing.

The data of treated water in Maejo University**.**

Month - Year	**Treated water (m^3)**
Oct-21	37,350
Nov-21	35,098
Dec-21	35,405
Jan-22	33,718
Feb-22	32,503
Mar-22	37,695
Apr-22	32,045
May-22	37,409
Jun-22	37,654
Jul-22	39,642
Aug-22	40,500
Sep-22	39,243
Total	438,262

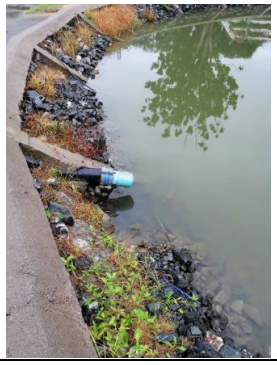
Maejo University wastewater treatment plants



The map shows the point of treated wastewater release (R1 – R12)

Treated wastewater released to the pond for agricultural on flower cultivated area.

Treated wastewater released to the glass field

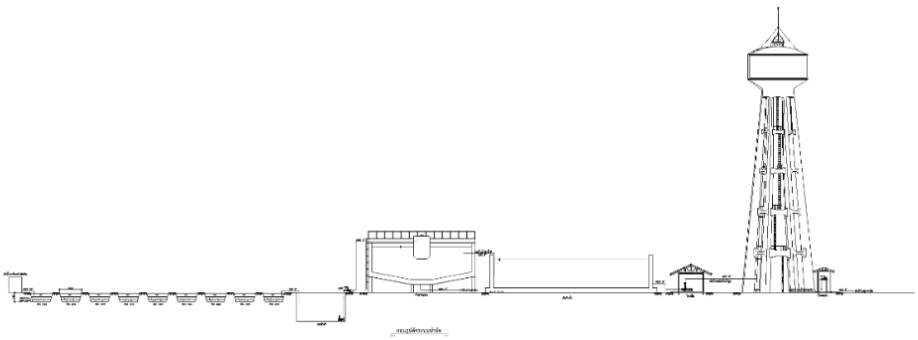


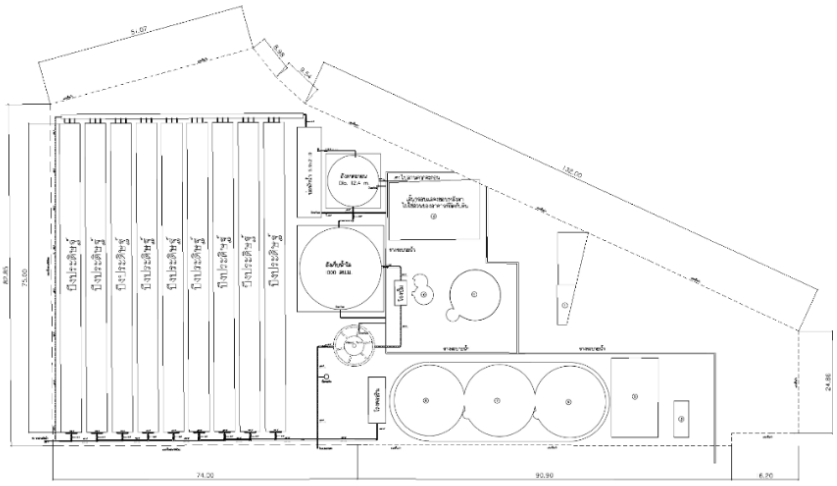
reated wastewater is released to the pond to make a fountain

Laying Treated wastewater pipes into the garden

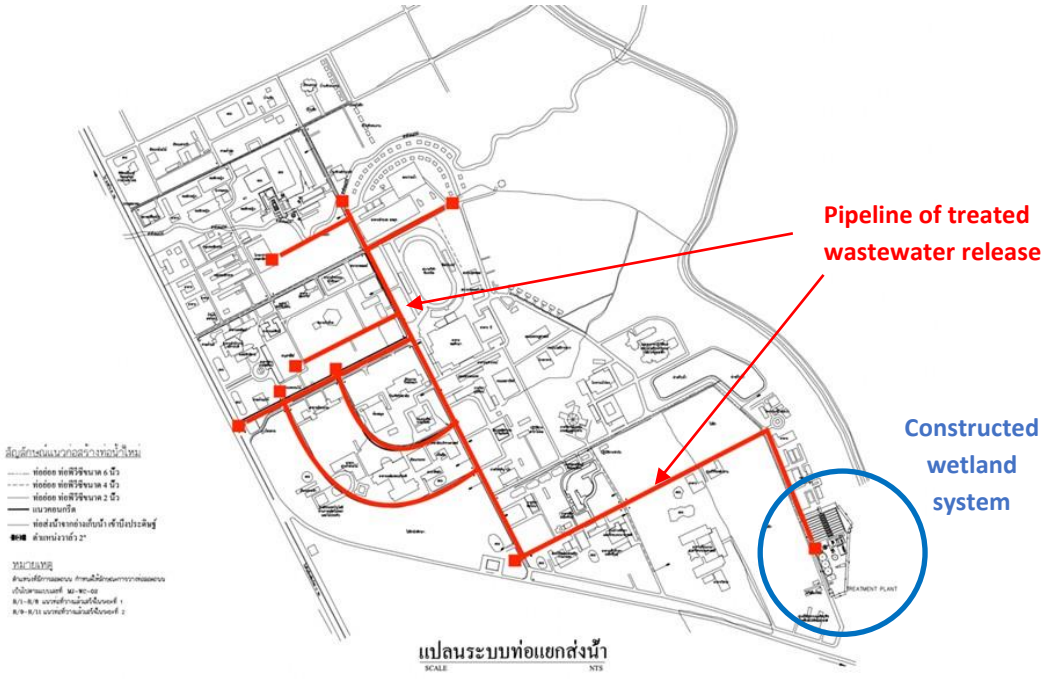
Boonsri Health Forest Park uses the treated wastewater source
for watering plants about 12.5 hectare

At present, Maejo University is in the process of constructing a sewage treatment system for treated water by constructing a wetland system. The budget of this project is $486,300. The system can treat water at 1,800 m^3/day. After that, the treated water will be used throughout the university.





Sewage treatment system for treated water by constructed wetland system



The map shows the point of a constructed wetland system and pipelines of treated wastewater release for agriculture

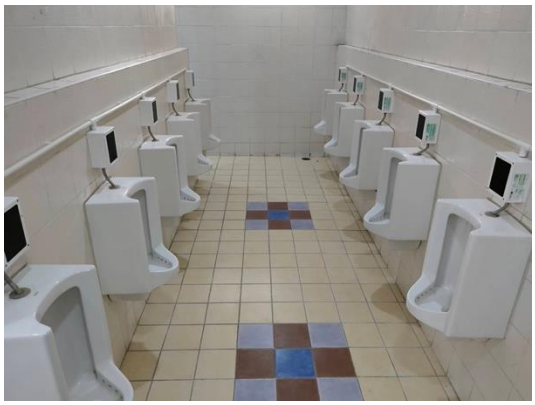
Construction of sewage treatment and wetland system (in progress)

Water Efficient Appliances Usage (e.g. hand washing taps, toilet flush, etc.)

Maejo University has a policy to save water. By requiring each unit to change the equipment to save water. When the original device is damaged will change to a new one that saves water.

Water-saving devices installed in the university such as low flow tap, automatic taps, waterless urinals, automatic urinals, and low flush tank toilet.

low flow taps and automatic taps

waterless urinals and automatic urinals


Low flush tank toilet

The quantity of appliances of each unit

Quantity												
Faculty of Agricultural Production												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	10	72	97	36	19	65	139	6	6	118	0	6
Sum	82		133		19	210			124		6	
Faculty of Science												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	0	157	51	0	132	125	0	66	41	12	2
Sum	0		208		0	257			107		14	
Faculty of Business Administration												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	80	0	1	0	0	0	66	0	27	11	0	0
Sum	80		1		0	66			38		0	

Faculty of Fisheries Technology and Aquatic Resources												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	10	0	5	27	0	0	52	0	4	16	0	1
Sum	10		32		0	52			20		1	

School of Tourism Development												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	15	0	0	6	0	0	23	0	7	3	0	0
Sum	15		6		0	23			10		0	

Faculty of Architecture and Environmental Design												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	0	0	95	0	0	92	0	0	36	0	5
Sum	0		95		0	92			36		5	

School of Administrative Studies												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	25	0	0	25	0	58	0	0	13	18	0	0
Sum	25		25		0	58			31		0	

School of Renewable Energy												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	0	0	122	0	0	148	0	0	4	21	35
Sum	0		122		0	148			4		56	

Faculty of Engineering and Agro-Industry												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	1	132	92	7	4	170	1	0	39	3	90
Sum	1		224		7	175			39		93	

Faculty of Economics												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	44	0	0	0	0	0	53	0	26	0	0	2
Sum	44		0		0	53			26		2	

Faculty of Liberal Arts												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	0	15	40	1	10	43	0	0	6	0	19
Sum	0		55		1	53			6		19	

Faculty of Information and Communication Maejo University												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	22	0	0	0	30	0	0	0	18	0	0	0
Sum	22		0		30	0			18		0	

Faculty of Animal Science and Technology													
Type	Handle Basin Faucet				Toilet				Urinal				
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type		
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level	pail flush
	109	0	6	6	0	97	4	3	35	20	2	6	23
Sum	109		12		0	104			55		31		

Maejo Farm												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	0	9	31	6	0	29	3	0	2	0	12
Sum	0		40		6	32			2		12	

Administrative building												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	347	0	61	103	36	19	523	0	244	51	2	15
Sum	347		164		36	542			295		17	

Maejo dormitory												
Type	Handle Basin Faucet				Toilet				Urinal			
	saving type		non-saving type		saving type	non-saving type			saving type		non-saving type	
	sensor	Press pop-up	cross	single level	double flush	flush valve	single flush	pail flush	sensor	Press pop-up	cross	single level
	0	3	285	611	0	188	314	159	0	60	0	0
Sum	3		896		0	661			60		0	

The number of appliance and percentage of water efficient appliance

Appliance	Total Number	Total number water efficient appliance	Percentage
Handle Basin Faucet	2,581	738	28.6%
Urinal	1,118	862	77.1%
Flush toilet	2,520	99	3.9%
		Average Percentage	**36.5%**

As shown in the table found that the average percentage of water efficient appliance was 36.5%

Consumption of treated water

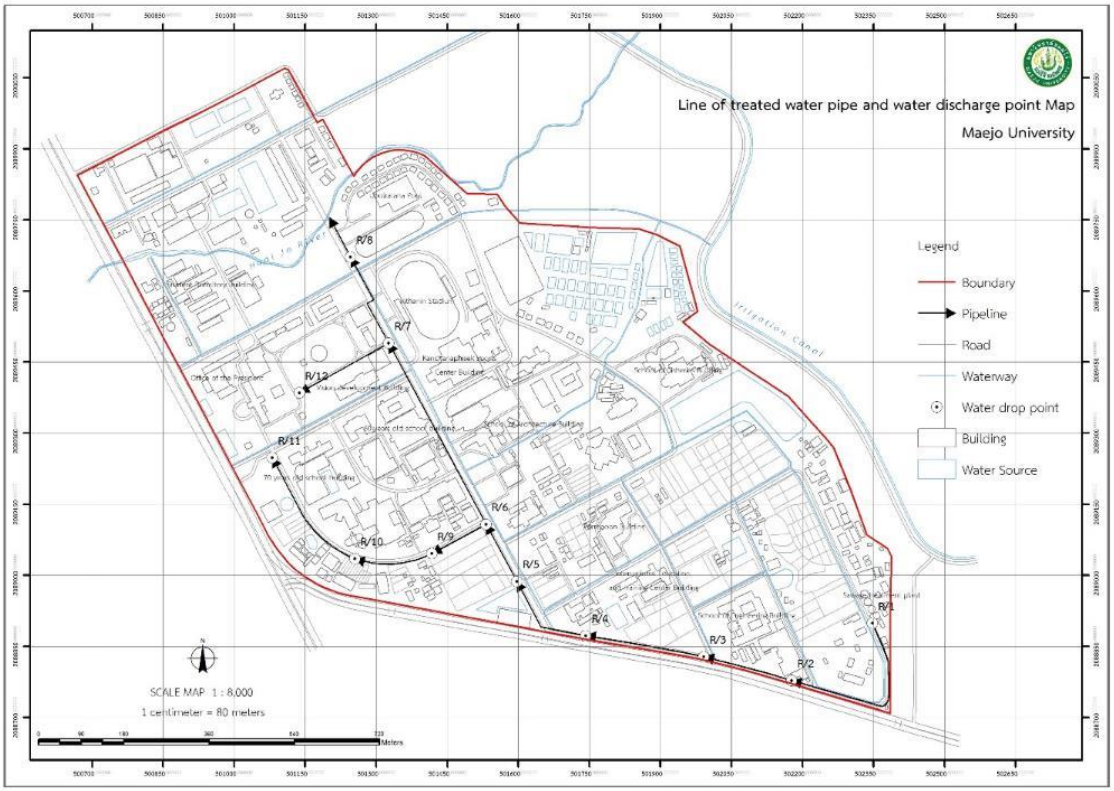
Maejo University has a 75,000-cubic meter raw water pond that supplies water for water supply Plant 1; a 20,000-cubic meter pond that provides water for water supply Plant 2; a 32,200-cubic meter pond that supplies water for water supply Plant3; a 60,000-cubic meter pond that is used for agricultural purposes. Altogether, the total amount of surface water is 187,200 cubic meters. Meanwhile, Maejo University is using a building water supply of 856,989 cubic meters this year.

The percentage of treated water consumed from water system treatment compared to all water sources was 42 %, as shown in the equation below. The treated water of Maejo University between October 2021 to September 2022 has a total volume of 417,4544 m^3. All treated water was supplied into a pile line to the 12 points of treated wastewater released throughout the university area for utilization.

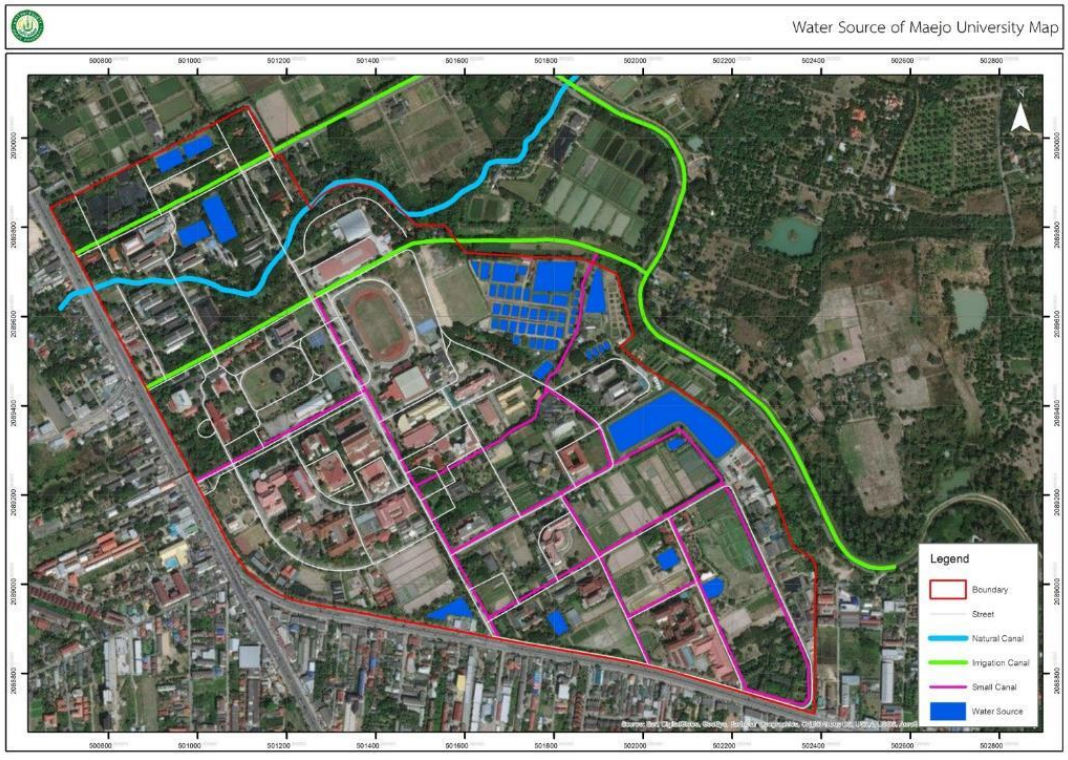
$$\frac{An\ amount\ of\ treated\ water\ consumed\ (438{,}262\ m^3)}{An\ Amount\ of\ tap\ water\ supply\ (856{,}989\ m^3) + \ surface - water\ sources\ (187{,}200\ m^3)}$$

The data of tap water supply and treated water in Maejo University**.**

Month - Year	Building water supply (m^3)	Treated water (m^3)
Month - Year	**Building water supply (m^3)**	**Treated water (m^3)**
Oct-20	68,220	37,350
Nov-20	66,168	35,098
Dec-20	72,743	35,405
Jan-21	68,155	33,718
Feb-21	62,315	32,503
Mar-21	74,219	37,695
Apr-21	56,772	32,045
May-21	56,191	37,409
Jun-21	55,722	37,642
Aug-21	98,678	40,500
Sep-21	89,678	39,243
Total	**856,989**	**438,262**



The map shows the point of treated wastewater release (R1 – R12)

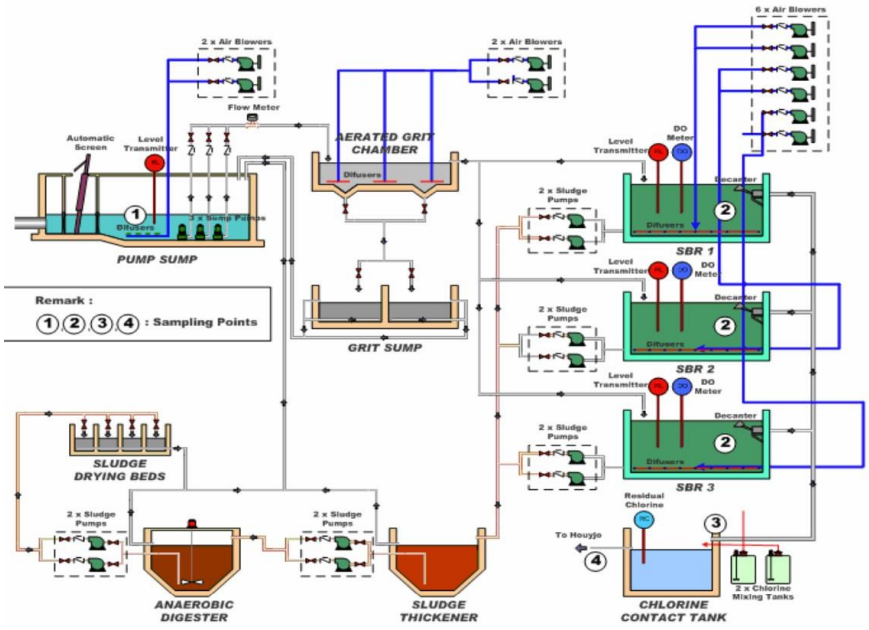


Water source of Maejo Unversity map

Water pollution control in campus area

Maejo University has a policy on water quality control after treatment. By referring to the quality of treated water with the standards of the Pollution Control Department. The sewage treatment system is Sequencing Batch Reactor (SBR) is a wastewater treatment system that uses aeration tanks. This system serves both aeration to decompose organic matter and serves to separate sludge by sedimentation within a single tank.

The treated wastewater system has the capacity to treat **2**,**000** cubic meters per day. The water after treatment will be sent to the pipes to agriculture such as lawns, trees, etc. The system operation is controlled by recording the controls daily and prepare a monthly performance report.



Schematic of the wastewater treatment system

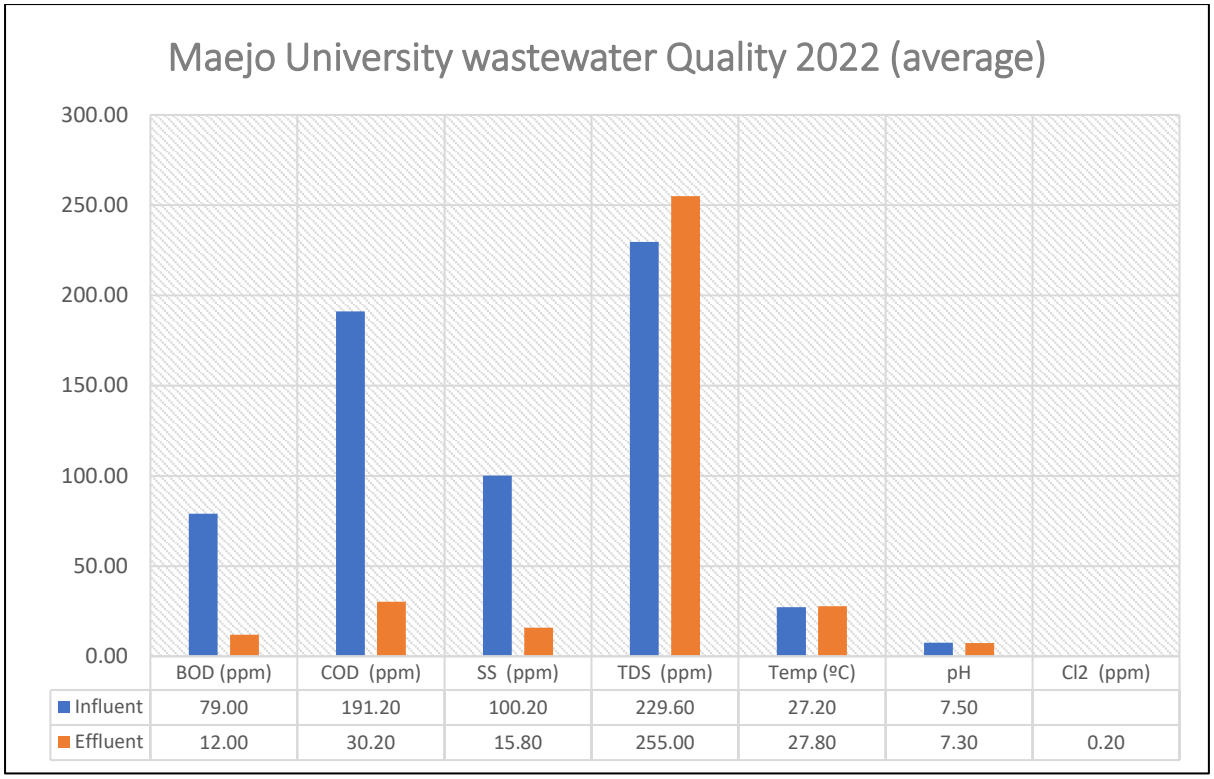
Maejo university wastewater treatment plant

Wastewater treatment plant control room

Collecting samples of wastewater for testing

Example of collecting the quality of wastewater and treated wastewater

DATE	Wastewater into the system						Treated wastewater (*Strandard)							Performance
	BOD	COD	SS	TDS	Temp	pH	BOD	COD	SS	TDS	Temp	pH	Cl_2	of system
							20*	120*	30*	500*	40*	5.0-9.0*	0.3*	(%)
5/1/08	63	241	126	214	26.4	7.88	11	25.6	18	239	25.9	7.54	0.22	82.54
7/1/08	74	210.8	98	196	26.9	8.01	9	27	12	231	28.5	7.41	0.21	87.84
12/1/08	81	213	96	226	27.6	7.31	12	19.2	12	259	26.7	7.51	0.25	85.19
14/1/08	68	196	86	267	26.4	7.51	10	22.6	7	284	28.1	7.48	0.23	85.29
19/1/08	72	147	64	207	28.3	7.19	11	29	17	217	26.3	7.83	0.27	84.72
21/1/08	78	227	12	282	28.9	7.06	11	83	8	290	27.9	7.45	0.23	85.90
26/1/08	91	184	72	261	26	7	13	21.3	13	243	28.4	6.94	0.18	85.71
28/1/08	80	210.8	98	196	26.9	8.01	13	27	12	231	28.5	7.41	0.21	83.75
2/2/08	73	213	135	214	27.6	7.31	11	36	25	296	26.4	7.51	0.21	84.93
4/2/08	68	194.6	96	173	25.8	7.81	10	28	18	241	25.9	7.41	0.21	85.29
9/2/08	81	135	82	206	27.9	7.81	11	28	18	225	26.7	7.48	0.25	86.42
11/2/08	82	197	98	196	26.9	8.01	9	27	12	231	27.1	7.41	0.22	89.02
15/2/08	72	184	86	214	28.2	7.51	12	25	15	241	26.9	7.63	0.19	83.33
18/2/08	83	213	96	226	27.6	7.31	14	36	12	259	26.9	7.51	0.22	83.13
23/2/08	76	198	69	265	27.1	7.81	11	42	11	284	27.8	7.48	0.25	85.53
25/2/08	73	286	103	226	28.1	7.63	11	21	9	259	27.3	7.72	0.19	84.93
2/3/08	72	196	86	214	28.2	7.51	10	25	15	241	26.4	7.63	0.18	86.11
4/3/08	81	129	86	242	27.3	7.1	11	26	21	225	28.6	7.13	0.17	86.42
9/3/08	70	108	92	231	25.6	7.29	13	17.5	18	253	31.3	7.82	0.25	81.43
11/3/08	67	194.6	96	173	25.8	7.81	9	28	18	241	25.9	7.41	0.25	86.57
16/3/08	71	255	184	261	26.7	7.87	12	22.6	17	284	24.7	7.48	0.19	83.10
18/3/08	72	196	86	214	28.2	7.51	10	25	15	241	26.4	7.63	0.18	86.11
23/3/08	78	210.8	98	215	26.9	8.01	11	27	12	241	28.5	6.4	0.21	85.90
25/3/08	76	255	184	261	26.7	7.87	14	22.6	17	284	28.7	7.48	0.19	81.58
30/3/08	84	213	96	226	27.6	7.31	10	19.2	12	259	26.7	6.9	0.25	88.10
1/4/08	76	129	86	242	27.3	7.1	13	26	21	225	28.6	7.13	0.25	82.89
5/4/08	68	213	102	263	27.1	7.45	11	41	25	294	29.8	7.46	0.21	83.82
8/4/08	87	137	61	176	27.8	7.68	13	19.4	18	214	30.1	7.29	0.19	85.06
12/4/08	84	121	129	229	28.1	7.69	14	48	8	257	25.9	7.41	0.24	83.33
20/4/08	79	87	14	238	29.1	7.31	9	24	9	294	29.9	7.24	0.21	88.61
22/4/08	69	293.2	131	207	26.3	7.44	12	41.5	14	231	30.1	7.61	0.19	82.61
27/4/08	87	184	72	261	26	7	10	21.3	13	243	28.4	6.94	0.22	88.51
29/4/08	83	215	214	214	26.1	7.87	15	28.1	14	251	30.2	7.59	0.21	81.93
30/4/08	93	186	172	247	26.3	7.28	11	22.6	15	263	30.4	7.48	0.15	88.17



	BOD (ppm)	COD (ppm)	SS (ppm)	TDS (ppm)	Temp (ºC)	pH	Cl2 (ppm)
Influent	79.00	191.20	100.20	229.60	27.20	7.50	
Effluent	12.00	30.20	15.80	255.00	27.80	7.30	0.20

TEST REPORT

Date of Issue August 10, 2022
Report No. TRCM65/20702
Page (s) 01/01

ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว - 139

Customer Name & Address (provided by customer): MAEJO UNIVERSITY, 63 M.4, T. Nongharn, A. Sansai, Chiangmai 50290

Sample Description (provided by customer): น้ำทิ้งผ่านการบำบัดแล้ว (Water Effluent)

Sample Code: CM65/07896-001

Sample Condition: Sample type: Waste Water
Packaging : glass bottle and plastic gallon, tightly sealed.
Quantity : 1 bottle and 1 gallon, Weight/Volume : 1 L./bottle and 5 L./gallon
Receipt condition : chilled, normal condition.

Date of sample received: August 01, 2022

Date of analysis: August 01, 2022 - August 10, 2022

RESULT (S)

Test Item	Result	Standard	Unit	LOD	Reference Method
Oil and Grease	3.24	≤ 20	mg/L	-	APHA - AWWA (2017)
Total Kjeldahl Nitrogen	26.46	≤ 35	mg/L	-	APHA - AWWA (2017)
BOD	10.00	≤ 30	mg/L	-	APHA - AWWA (2017)
pH	6.10	5 - 9	-	-	APHA - AWWA (2017)
Settleable Solids *	< 0.2	≤ 0.5	mL/L	-	APHA - AWWA (2017)
Sulfide	< 1.0	≤ 1.0	mg/L	-	APHA - AWWA (2017)
Suspended Solids (SS)	< 5.0	≤ 40	mg/L	-	APHA - AWWA (2017)
Total Dissolved Solids	466.00	≤ 500	mg/L	-	APHA - AWWA (2017) 2540C

Note : Sample was collected by customer.
: Standard : Notification of the Ministry of Science, Technology and Environment issued under the National Environmental Quality Act B.E. 2535 (1992)
Re : Building Effluent Standards for Specific sources Types of Building Defined as Pollution sources (Hotels type B)
* : Marked tests are not accredited by DIW.

~End of Report~

(Ms. Nutsinee Meesorn) (ว-139-จ-4314)

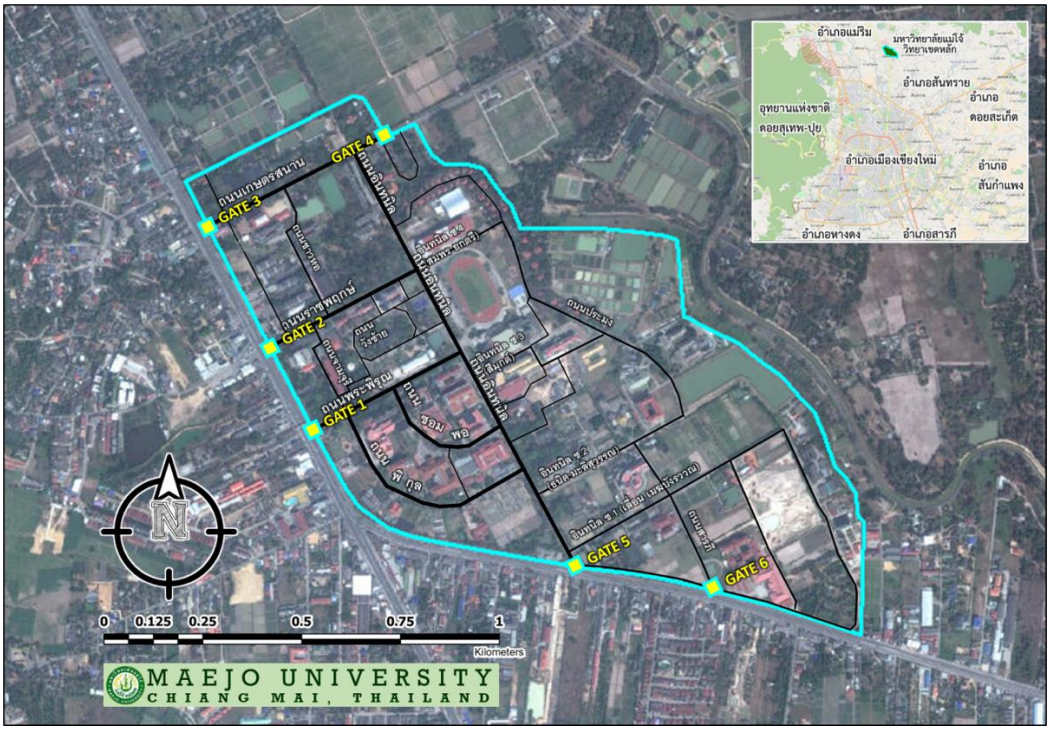
(Mr. Somsak Tharatha) (ว-139-ก-2852)

(Ms. Orapan Jantarangsri)
Approved Signatory
Central Laboratory (Thailand) Co., Ltd. (Chiangmai Branch)
CERTIFIED

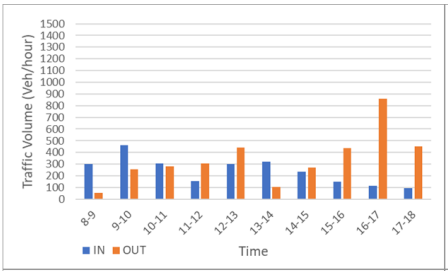
[5] Transportation (TR)

Number of cars actively used and managed by University

Number of cars actively used and managed by University = 89 vehicles



GATE 1



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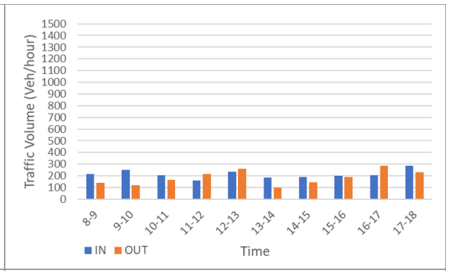
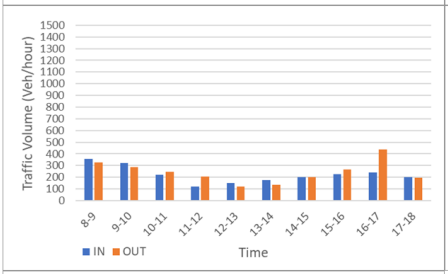
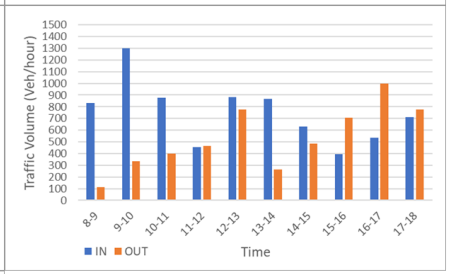


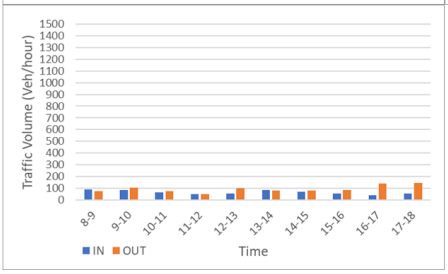
GATE 2



GATE 5



GATE 3



GATE 6
CLOSED

[5.2] Number of cars entering the university daily

ADT = 1,254 PCUs per day (Motorbike = 0.33, Personal Car = 1.00, Bus/Truck = 1.50)

Number of cars = 963 cars

[5.3] Number of motorcycles entering the university daily

ADT = 1,254 PCUs per day (Motorbike = 0.33, Personal Car = 1.00, Bus/Truck = 1.50)

Number of motorcycles = 883 motorcycles

[5.4] The ratio of total vehicles (cars and motorcycles) divided by total campus population (TR.1)

(89+963+883) / 10,916 = 0.177

[3] < 0.5 – 0.125

Shuttle service

[5] Shuttle service is provided by the university, regular, and zero emission vehicle.

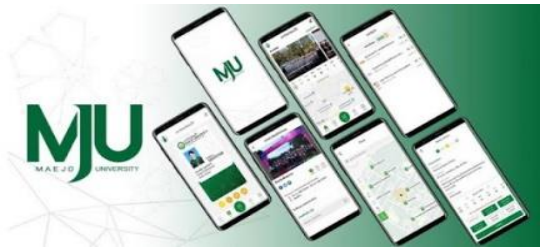
Our EV shuttles were first operated since 2019 and the formal operation started on 12 May 2021.
Cost: FREE Service
See more: https://erp.mju.ac.th/informationDetail.aspx?newsId=3618

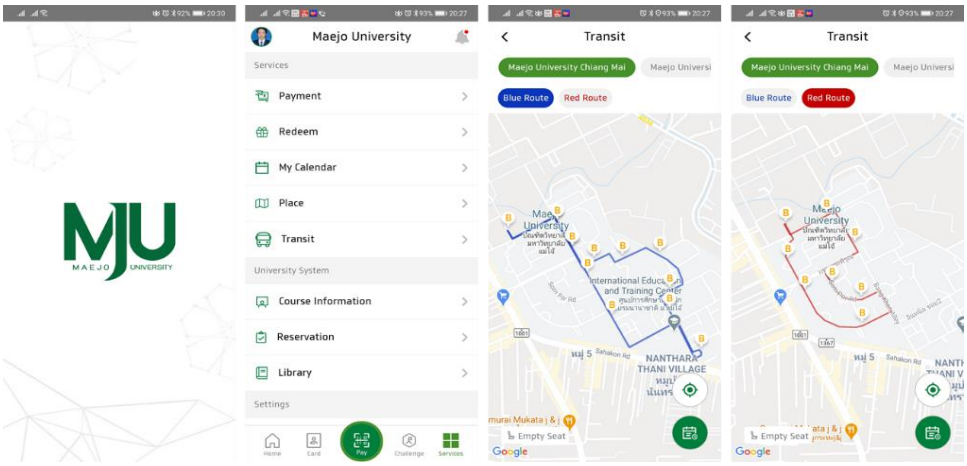
[5.6] Number of shuttles operated in your university
Number of shuttles = 4 Electric Vehicles (2-18 seats EVs and 2-12 seats EVs)

[5.7] Average number of passengers of each shuttle
Average number of passengers of each shuttle = 8

[5.8] Total trips of shuttle services each day
Total trips of shuttle services each day = 126 km

Our EV shuttle services, and timetable are displayed on MJU Mobile application (Android and iOS)





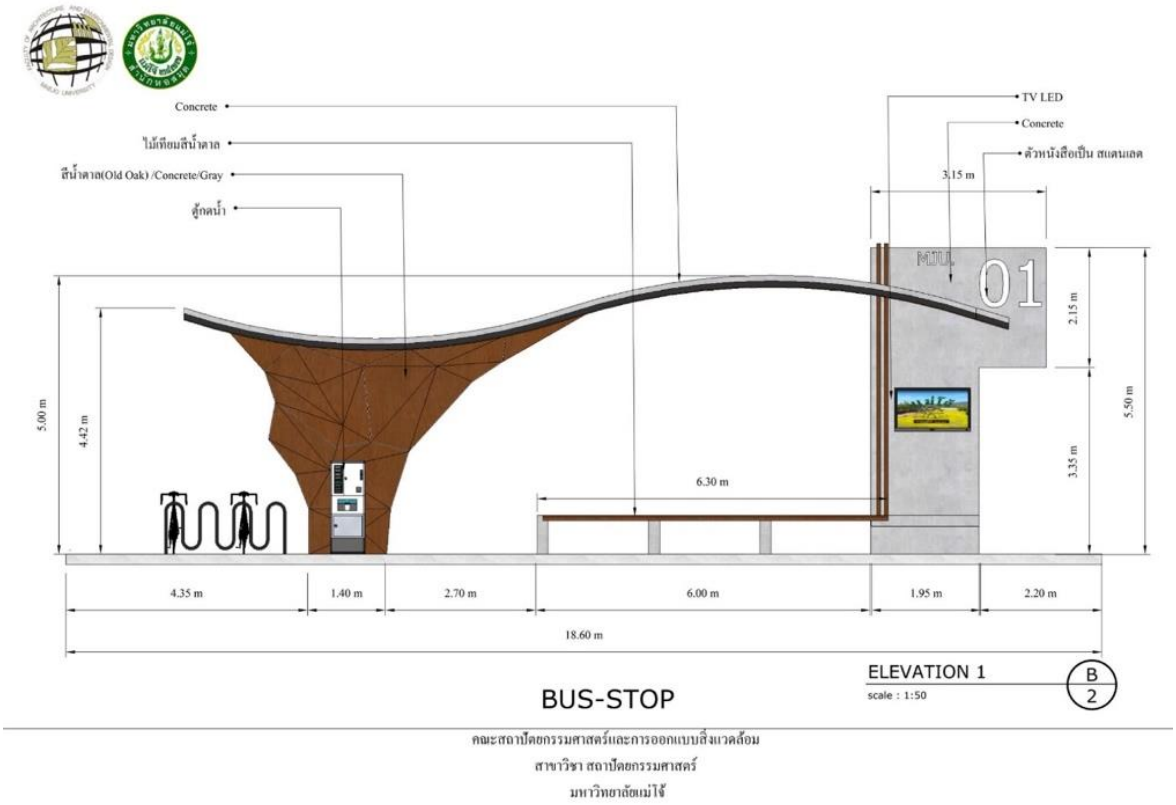
Peak Hour Operation (8:00-10:00, 1200:-13:00, and 15:00-16:00)

Route	Description	Trip	Route Dist (km)	round Trip	Head Way (min)	Travel Speed (km/hr)	Require Bus for Operation		Spare Bus	Total bus
1	ประตูบางเขน-บริหารศาสตร์-ชูติวัตน์-แฟลตอาจารย์	ไป-กลับ	1.2	2.4	10	10	1.4	= 2	1	3
2	ประตูบางเขน-เรียนรวม 70 ปี-วิสัยทัศน์-จุฬาภรณ์ฯ-ประมง-วิศวะ-ประตูบางเขน	ทางเดียว	3.2	3.2	5	10	3.8	= 4	1	5
						Summary		6		8

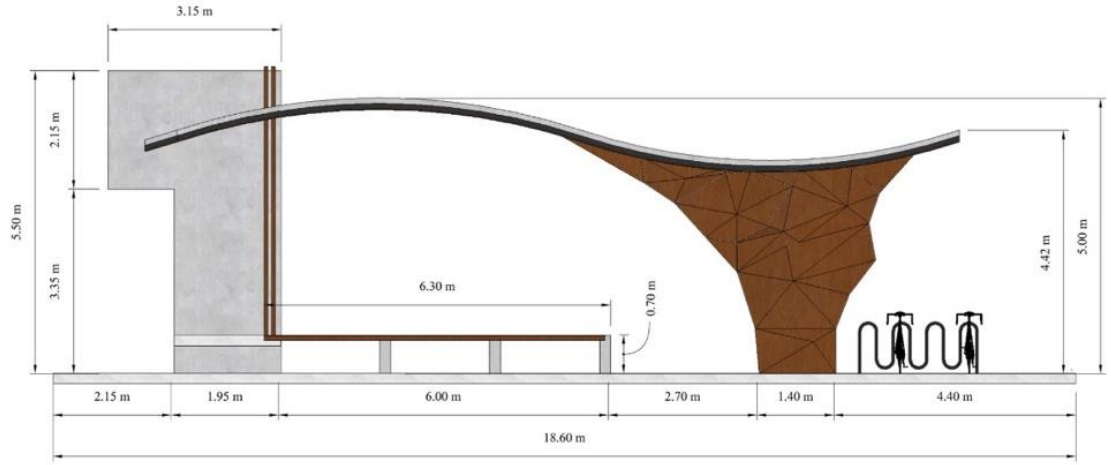
Off-Peak Hour Operation (8:00-10:00, 1200:-13:00, and 15:00-16:00)

Route	Description	Trip	Route Dist (km)	round Trip	Head Way (min)	Travel Speed (km/hr)	Require Bus for Operation		Spare Bus	Total bus
1	ประตูบางเขน-บริหารศาสตร์-ชูติวัตน์-แฟลตอาจารย์	ไป-กลับ	1.2	2.4	15	10	1.0	= 1	1	2
2	ประตูบางเขน-เรียนรวม 70 ปี-วิสัยทัศน์-จุฬาภรณ์ฯ-ประมง-วิศวะ-ประตูบางเขน	ทางเดียว	3.2	3.2	15	10	1.3	= 2	1	3
						Summary		3		5

Bus Station Design Proposal in Maejo University (By Faculty of Architecture and Environmental Design



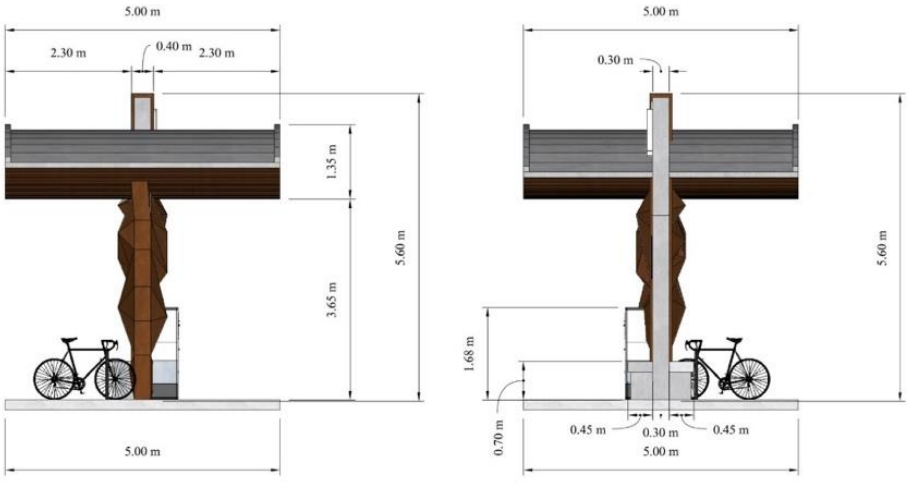
คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม
สาขาวิชา สถาปัตยกรรมศาสตร์
มหาวิทยาลัยแม่โจ้



ELEVATION 2
scale : 1:50
B
3

BUS-STOP

คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม
สาขาวิชา สถาปัตยกรรมศาสตร์
มหาวิทยาลัยแม่โจ้



ELEVATION 3
scale : 1:50
B
4

BUS-STOP

ELEVATION 4
scale : 1:50
B
5

คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม
สาขาวิชา สถาปัตยกรรมศาสตร์
มหาวิทยาลัยแม่โจ้

[5.9] Zero Emission Vehicles (ZEV) policy on campus (TR.3)

[5] Zero Emission Vehicles are available and provided by the university free.

Maejo university still provided the free bicycles subsided and operated by own

- In 2020, the university provides new **180** bicycles for free service and distributes to the faculties and offices
- Maejo University plan to provide more free bicycles in the next year
- In addition, the Division of physical systems and Environment also trying to contact the other shared-bicycle service providers that interested to join in the university

[5.10] Average number of Zero Emission Vehicles (ZEV) on campus per day
Average number of ZEVs = 186 ZEVs per day

- 186 ZEVs (free bicycles) operated by the university

[5.11] The rotio of Zero Emission Vehicles (ZEV) divided by total campus population (TR.4)
(186) / (10,916) = 0.0170
[4] > 0.008 to <= 0.02

[5.12] Total parking area (m^2)
Total parking area = 32,041.60 m^2

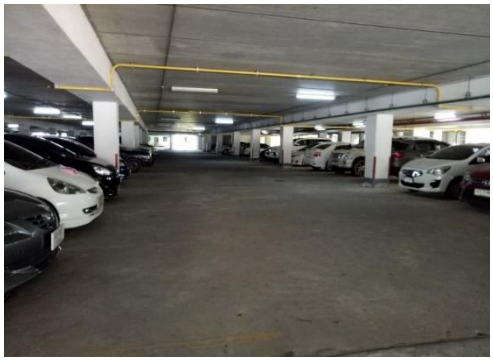
Parking Types	Area (sq.m.)
1. Softscape with Compacted Soil	1,435.02
2. Softscape with Concrete Block	2,869.13
3. Hardscape with Asphalt Pavement	300.00
4. Hardscape with Concrete Pavement	10,144.20
5. In Building Parking or Structure	17,293.25
Total Parking	**32,041.60**


Softscape Parking with Compacted Soil


Softscape Parking with Concrete Block


Hardscape Parking with Asphalt Pavement


Hardscape Parking with Concrete Pavement




In Building Parking or Structure

[5.13] Ratio of parking area to total campus area (TR.5)

(32,041.60) / (3,374,680.54) * 100% = 0.9495 %

[5] < 1%

[5.14] Transportation program designed to limit or decrease parking area on campus over the last 3 years (from 2018 to 2021) (TR.6)

[5] Program resulting in more than 30% decrease in parking area on campus between 2020-2022

Total Restrict Parking Area from 2018-2021 = 42.32% decreased parking area on campus

The committees of Maejo university master plan (2018-2020) approved the parking restriction area around the Office of President as following;

- 2018, The parking area ① in the south of the Office of President reduced : 1,200 m^2 (approx. = 3.54%)
- 2020, The parking area ② in the south of the Office of President reduced : 2,800 m^2 (approx. = 8.27%)
- 2019, The parking area ③ in the south of the Office of President reduced : 1,200 m^2 (approx. = 3.25%)

The restrict parking area (2018-2020)

The committees of Maejo university master plan (2021) approved the parking restriction area around the Office of President as following;

- 2021, The parking area ④ in the east of the Main Stadium reduced : 1,800 m^2 (approx. = 4.88%)

The committees of Maejo university master plan (2021) approved the parking restriction area around the Office of President as following;

- 2021, The parking area ⑤ in the east of the Main Stadium reduced : 1,820 m^2 (approx. = 4.93%)
- 2021, The parking area ⑥ in the east of the Main Stadium reduced : 1,440 m^2 (approx. = 3.90%)

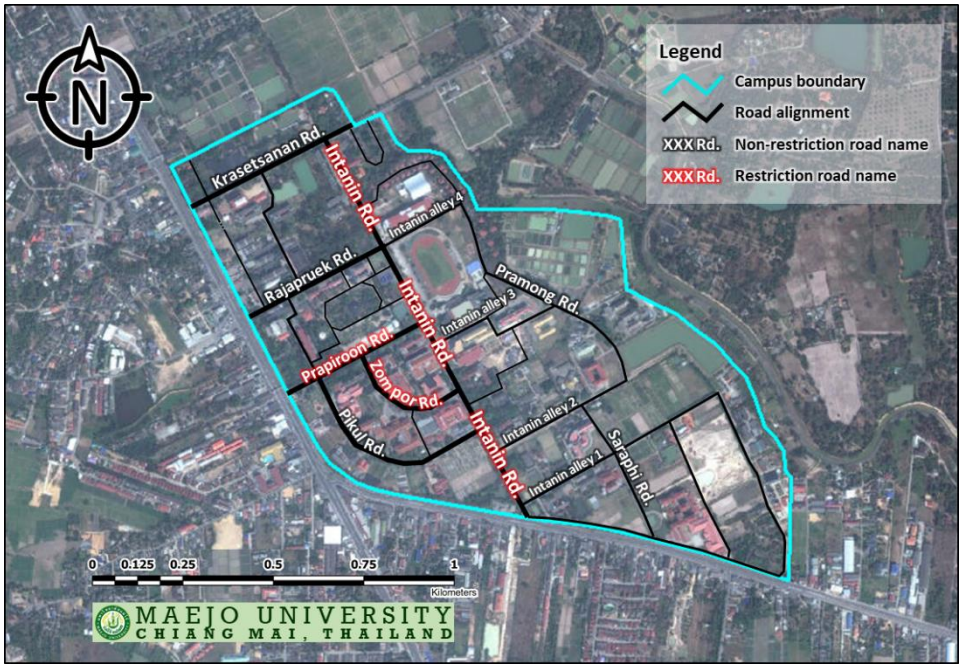
The committees of Maejo university master plan (2022) approved the parking restriction area around the Office of President as following;

- 2022, The parking area ⑦ in the east of the Main Stadium reduced : 5,700 m^2 (approx. = 17.78%)

On-street parking area restriction policy

From 2018, The committees of Maejo university master plan approved the traffic and parking restriction area to control the number of motor-vehicles traveling in the campus and to reduce the previous on-street parking in Intanin road, Prapiroon road, and Zompor road as shown below;

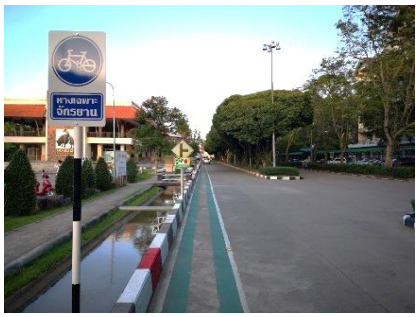
- The result found that the present parking area reduced : 40,902.43 m^2 to 34,744.03 m^2 (approx. = 15.06%)



Maejo university on-street parking restriction area

On-street parking restriction on Zompor Rd.


On-street parking restriction in front of the main library building and the central academic building

On-street parking restriction on Intanin Rd.

[5.15] Number of transportation initiatives to decrease private vehicles on campus (TR.7)

[5] > 3 initiatives comprising
Result = 6 transportation initiatives + 3 planning initiatives to decrease private vehicles on campus

(1) free bike service operated and subsidized by the university as detailed in [5.9] and restricted bicycle lane in the main road network in the university

(2) parking restriction area around the Office of President (2018-2020) and parking restriction on on-street parking as detailed in [5.14] aim to reduce vehicle entering to in the central of university (Education Zone)

(3) MJU Transit operated for free inside the university area aim to change travel behavior from private vehicle to public transit in the campus

See more: http://www.green.mju.ac.th/?p=2443 and http://www.green.mju.ac.th/?page_id=2492

(4) MJU Car Free Day (23 September 2021)

See more: http://www.green.mju.ac.th/?p=1539

(5) MJU Cycling Club (MJUCC) : the community club of cycling society in the university

The previous activities and details as following

https://www.facebook.com/pg/MJU-Cycling-Club-MJUCC-190221161338516/about/?ref=page_internal


MJUCC
เปิดเทอม ปั่นจักรยาน กับเราป่ะ
MAEJO
GO GREEN
#ชมรมจักรยานมหาวิทยาลัยแม่โจ้


MJU Corporate Communication Center


MAEJO
GO ECO
UNIVERSITY
MJU Corporate Communication Center

(6) Gate Restriction and Control under COVID-19 situation (2020 – 2021)

(7) Smart Gate Project for Traffic Restriction and Control (preparing for 2022)

(8) Smart Parking Project for Traffic Restriction and Control (preparing for 2022)

(9) Smart Bicycle Project for Traffic Restriction and Control (preparing for 2022)

[5.16] Pedestrain path policy on campus (TR.8)

[5] Pedestrian paths are available, designed for safety, convenience, and in some parts provided with disabled-friendly features.

The pedestrian path on the main road of the campus (Intanin Rd.) has separated from road, leveling up platform, enough space, channelized control at intersection, in some path provided with disabled-friendly features, and surrounding with nature.





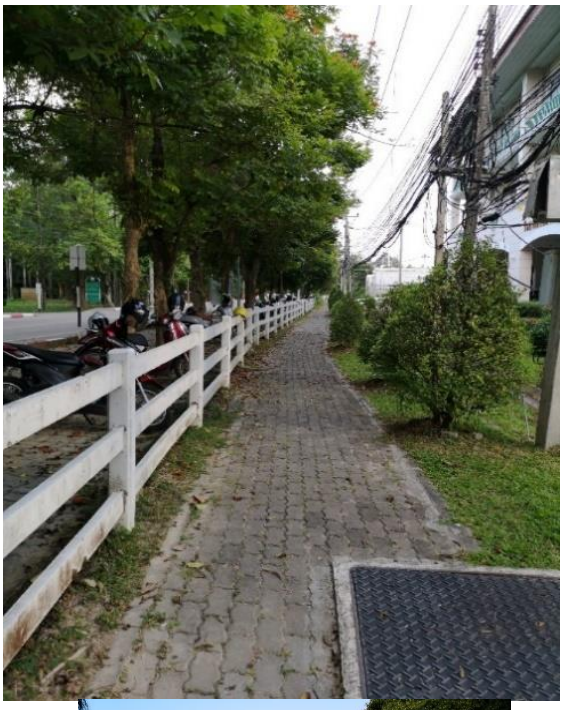


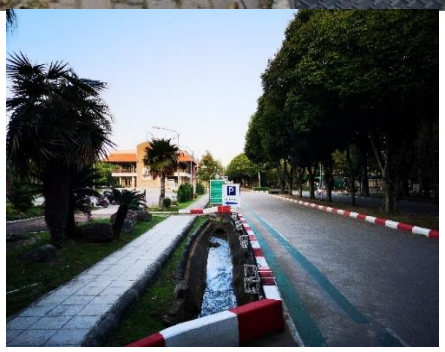
The most path, Ramps are provided with disabled-friendly features



The most path, Ramps are provided with disabled-friendly features

The pedestrian path on the minor road of the campus has separated from road, leveling up platform, enough space, covered by metal sheet roof structure, and surrounding with nature





The pedestrian path on some area has separated from road with guard rail

Information, direction signs and map installed at major activites area and intersection

[5.17] Approximate daily travel distance of vehicle inside campus only

Approximate VKT in the university = 1,478.90 km/day

Approximate daily travel distance of vehicle (VKT) inside campus was calculated from transportation 4-step model and calibrated with traffic surveying data as following;

Vehicle type	Vehicle Kilometer of Travel (VKT)
Motorbike	707.53 km/day
Personal Car	771.37 km/day
Bus and Truck	0 km/day
Total	**1,478.90 km/day**

[6] Education and research (ED)

[6.1] Number of Courses/Subjects Related to Sustainability Offered

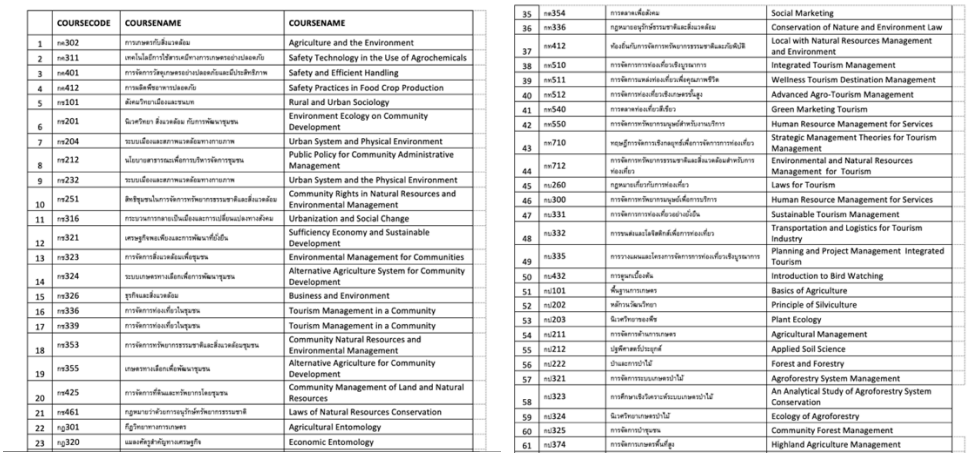




Sample of activities in many courses related to green and sustainability

Number of courses/modules related to environment and sustainability offered in 2022 = **822** courses Number of total course in 2022 = **3624** ;
(http://www.education.mju.ac.th/www/programStructure)

The ratio of sustainability courses to total courses/subjects = $\frac{822 \times 100}{3624}$ = 22.68 %



	COURSECODE	COURSENAME	COURSENAME
1	กษ302	การเกษตรกับสิ่งแวดล้อม	Agriculture and the Environment
2	กษ311	เทคโนโลยีการใช้สารเคมีทางการเกษตรอย่างปลอดภัย	Safety Technology in the Use of Agrochemicals
3	กษ401	การจัดการวัสดุการเกษตรอย่างปลอดภัยและมีประสิทธิภาพ	Safety and Efficient Handling
4	กษ412	การผลิตพืชอาหารปลอดภัย	Safety Practices in Food Crop Production
5	กส101	สังคมวิทยาเมืองและชนบท	Rural and Urban Sociology
6	กส201	นิเวศวิทยา สิ่งแวดล้อม กับการพัฒนาชุมชน	Environment Ecology on Community Development
7	กส204	ระบบเมืองและสภาพแวดล้อมทางกายภาพ	Urban System and Physical Environment
8	กส212	นโยบายสาธารณะเพื่อการบริหารจัดการชุมชน	Public Policy for Community Administrative Management
9	กส232	ระบบเมืองและสภาพแวดล้อมทางกายภาพ	Urban System and the Physical Environment
10	กส251	สิทธิชุมชนในการจัดการทรัพยากรธรรมชาติและสิ่งแวดล้อม	Community Rights in Natural Resources and Environmental Management
11	กส316	กระบวนการกลายเป็นเมืองและการปรับตัวของประชากรในสังคม	Urbanization and Social Change
12	กส321	เศรษฐกิจพอเพียงและการพัฒนาที่ยั่งยืน	Sufficiency Economy and Sustainable Development
13	กส323	การจัดการสิ่งแวดล้อมเพื่อชุมชน	Environmental Management for Communities
14	กส324	ระบบเกษตรทางเลือกเพื่อการพัฒนาชุมชน	Alternative Agriculture System for Community Development
15	กส326	ธุรกิจและสิ่งแวดล้อม	Business and Environment
16	กส336	การจัดการท่องเที่ยวในชุมชน	Tourism Management in a Community
17	กส339	การจัดการท่องเที่ยวในชุมชน	Tourism Management in a Community
18	กส353	การจัดการทรัพยากรธรรมชาติและสิ่งแวดล้อมชุมชน	Community Natural Resources and Environmental Management
19	กส355	เกษตรทางเลือกเพื่อพัฒนาชุมชน	Alternative Agriculture for Community Development
20	กส425	การจัดการที่ดินและทรัพยากรโดยชุมชน	Community Management of Land and Natural Resources
21	กส461	กฎหมายว่าด้วยการอนุรักษ์ทรัพยากรธรรมชาติ	Laws of Natural Resources Conservation
22	กฎ301	กีฏวิทยาทางการเกษตร	Agricultural Entomology
23	กฎ320	แมลงศัตรูสำคัญทางเศรษฐกิจ	Economic Entomology

35	กส354	การตลาดเพื่อสังคม	Social Marketing
36	กส336	กฎหมายอนุรักษ์ธรรมชาติและสิ่งแวดล้อม	Conservation of Nature and Environment Law
37	กส412	ท้องถิ่นกับการจัดการทรัพยากรธรรมชาติและภัยพิบัติ	Local with Natural Resources Management and Environment
38	กส510	การจัดการการท่องเที่ยวเชิงบูรณาการ	Integrated Tourism Management
39	กส511	การจัดการแหล่งท่องเที่ยวเพื่อคุณภาพชีวิต	Wellness Tourism Destination Management
40	กส512	การจัดการท่องเที่ยวเชิงเกษตรขั้นสูง	Advanced Agro-Tourism Management
41	กส540	การตลาดท่องเที่ยวสีเขียว	Green Marketing Tourism
42	กส550	การจัดการทรัพยากรมนุษย์สำหรับงานบริการ	Human Resource Management for Services
43	กส710	หลักยุทธ์การจัดการเชิงกลยุทธ์เพื่อการจัดการการท่องเที่ยว	Strategic Management Theories for Tourism Management
44	กส712	การจัดการทรัพยากรธรรมชาติและสิ่งแวดล้อมสำหรับการท่องเที่ยว	Environmental and Natural Resources Management for Tourism
45	กฎ260	กฎหมายเกี่ยวกับการท่องเที่ยว	Laws for Tourism
46	กส300	การจัดการทรัพยากรมนุษย์เพื่อการบริการ	Human Resource Management for Services
47	กส331	การจัดการการท่องเที่ยวอย่างยั่งยืน	Sustainable Tourism Management
48	กส332	การขนส่งและโลจิสติกส์เพื่อการท่องเที่ยว	Transportation and Logistics for Tourism Industry
49	กส335	การวางแผนและโครงการจัดการการท่องเที่ยวเชิงบูรณาการ	Planning and Project Management Integrated Tourism
50	กส432	การดูนกเบื้องต้น	Introduction to Bird Watching
51	กป101	พื้นฐานการเกษตร	Basics of Agriculture
52	กป202	หลักวนวัฒนวิทยา	Principle of Silviculture
53	กป203	นิเวศวิทยาของพืช	Plant Ecology
54	กป211	การจัดการด้านการเกษตร	Agricultural Management
55	กป212	ปฐพีศาสตร์ประยุกต์	Applied Soil Science
56	กป222	ป่าและการป่าไม้	Forest and Forestry
57	กป321	การจัดการระบบเกษตรป่าไม้	Agroforestry System Management
58	กป323	การศึกษาเชิงวิเคราะห์ระบบเกษตรป่าไม้	An Analytical Study of Agroforestry System Conservation
59	กป324	นิเวศวิทยาเกษตรป่าไม้	Ecology of Agroforestry
60	กป325	การจัดการป่าชุมชน	Community Forest Management
61	กป374	การจัดการเกษตรพื้นที่สูง	Highland Agriculture Management

Some of sustainable course offered in 2022

The ratio of sustainability research funding to total research funding

Total research funds dedicated to sustainability research (in US Dollars)

Research fund	**Total research fund** (USD)	**Total research fund dedicated to sustainability research** (USD)
2020	4,629,135.05	1,753,419.53
2021	4,700,822.50	3,335,958.71
2022	2,360,585.88	1,297,045.17
Averaged last 3 years of research fund	**3,896,847.81**	**2,128,807.80**

**1 USD = 31.247 baht (6 October 2020) for 2020*

**1 USD = 33.375 baht, (27 October 2021) for 2021*

**1 USD = 38.276 baht, (20 October 2022) for 2022*

We attend to be green, organic, and eco university; therefore, the strategies of research and academic service trend to be in these lines. The keywords for this are green, sustainable, eco-, ecology, climate change, waste, energy, environment, 2and organic that found in both titles and keywords of the research. Thus, the ratio of sustainability research funding to total research funding in the last 3 years (2020-2022) is 54.63%.

The ratio of sustainability research funding to total research funding

= (2,128,807.80/3,896,847.81) x 100

= 54.63%.

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<tr>
<td colspan="2">The Office of Agricultural Research and Extension Maejo University on https://rae.mju.ac.th/wtms_index.aspx?&lang=th-TH</td>
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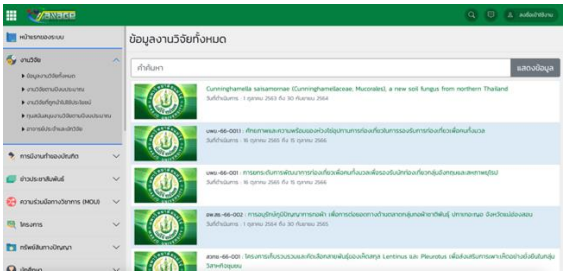
<td> 
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<tr>
<td colspan="2">Lists of all research and the budget are available on https://erp.mju.ac.th/researchIndex.aspx</td>
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</table>

The titles of green and sustainable research from 2020-2022 are represented as follows;

No.	Title of research (2020)	Budget (USD)
1	A Study on the Production Costs and Economic Returns of Insect Natural Enemy Production under the Value Chain System for Commercial Biological Control	16,530.57
2	Comparison of Arthrospira platensis and Wolffia globosa mix feed to produce field crab (Somanniathelphusa spp.) food safety for economic development of upper Northern Community and environment aspect	19,307.70

No.	Title of research (2020)	Budget (USD)
3	Developing of Advanced Materials for Agriculture and Alternative Energy Development	122,094.75
4	Developing of Advanced Materials for Agriculture and Alternative Energy Development	11,571.40
5	Development and Improvement of Crab Chili Paste Processing for Food Safety	7,075.08
6	Development of Communities Enterprise Toward Organic Tilapia (Oreochromis niloticus) Aquaculture Practices : Case Study Tilapia Farmers at Maekat, Parpai, Sansai, Chiang Mai, Thailand	16,927.30
7	Development of Modular Pilot Plant of the Insect Natural Enemies for Commercial Biological Control	151,419.98
8	Development of Modular Pilot Plant of the Insect Natural Enemies for Commercial Biological Control	105,795.62
9	Development of Monitoring and Evaluation System Management, Marketing and Services for Mass Production of the Insect Natural Enemies for Organic Agriculture	12,893.84
10	Development of pharmaceutical product from essential oils to eliminate lice and mite in indigenous chicken	6,281.61
11	Development of pharmaceutical product from essential oils to eliminate tick in cattle	11,571.40
12	Development of smart farm prototype using IoT for high density sea bass farming in closed systems for environmentally-friendly and sustainable	39,673.36
13	Development of waste removal in red tilapia (Oreochromis spp.) biofloc culture ponds by aquaponic system	19,836.68
14	Environment design and Potential development of urban area	85,443.18
15	Estimating species richness under the zero truncated mixed poisson distribution	7,600.75
16	Field crab, Arthrospira, Food safety, Organic, environment Crab chili paste giant freshwater prawn fresh coconut meal long pang kao mak performance fish polyculture aquaponics Fishery Management, Fishery Resource, Kew Lom Dam, Fishing Community, Community Enterprise.	139,846.56

No.	Title of research (2020)	Budget (USD)
17	Growing Media Production from Biochar by using Maize Residues in Community	10,810.99
18	Growth, Yield and Species Diversity of Teak (Tectona grandis Linn.) Plantation Under Different Age In Khun Mae Khum Mee Plantation, Phrae Province	21,489.73
19	Isolation of rice pathogens and rice endophytic bacteria from organic and chemical rice farms in northern part of Thailand for biological control of organic rice diseases	369,515.19
20	Master Plan Design and Planning of Building and Structure from Heat Radiation Impact to Micro-climate for Energy and Environmental Sustainability: A Case Study of Maejo University	11,573.71
21	Master Plan Design and Planning of Green area Surrounding a Building for Climate Control that is suitable for the Human Comfort : A Case Study of Maejo University	11,521.80
22	Master Plan Design and Planning of Green, Eco, and Smart University for Energy and Environmental Sustainability: A Case Study of Maejo University	51,866.96
23	Master Plan Design and Planning of Smart Transportation for Energy and Environmental Sustainability : A Case Study of Maejo University / Master Plan Design and Planning of Green, Eco, and Smart University for Energy and Environmental Sustainability : A Case Study of Maejo University	11,571.40
24	Pharmaceutics from essential oil for killing ectoparasites on dogs	13,812.94
25	Potential of Thai herbs and probiotics on growth and nonspecific immune response in organic Tilapia culture system	12,926.90
26	Potential Survey and Geo-Informatics System Development of Ancient city in the Chiang mai – Lumphun Basin for Spatial Smart City and Sustainable Tourism	15,393.26
27	Production and Health Management of Tilapia to Cope with Climate Uncertainties for Prosperous and Sustainable Business	12,067.31
28	Promoting Public Consciousness of People Utilizing Forest Recources in Khun Mae Kham Mee Plantation, Phrae Province	11,571.40
29	Removal of Odor in Longan after Sulfur Dioxide Fumigation by Activated Carbon from Agricultural Residue by using Microwave-Assisted Method	15,409.13

No.	Title of research (2020)	Budget (USD)
30	Strategy of local aquatic animal co-culture tilapia sustainable model under aquaponics system for organic communities enterprise developing supports.	32,135.42
31	Study of Efficacy of Garlic Extract Adding Feed in Nile Tilapia Culture for Production of Food Safety	24,233.81
32	Suitable use of fermented fish by-product and snail in diets for fish in aquaponics system to organic aquaculture	239,110.16
33	Suitable use of fermented fish by-product and snail in diets for fish in aquaponics system to organic aquaculture	32,466.03
34	Sustainable management of Teak Plantation in Khun Mae Kham Mee Plantation, Phrae Province	69,028.33
35	The supplemented extract from papaya peel and pineapple peels to increase the productivity of commercial sea bass and channel catfish	19,836.68
36	Using plant functional trait for evaluate carbon storage in Khun Mae Khum Mee Plantation, Phrae province	26,713.39
37	Utilization of the Insect Natural Enemies and their Beneficial Value for Biological Control of Insect Pests: the Case Study of insect pests in Organic Paddy Fields and Cruciferous Crops	12,893.84
38	Wastewater Treatment of Mohom Textile Industry Using Consortia of Microorganism	11,571.40
	Total sustainable research fund 2020	**1,451,998.27**

No.	Title of research (2021)	Budget (USD)
	Government source	
1	Enhancement of Thai Herbs Drying by using the Rotary Microwave Dryer System for the community Enterprise	39595.51
2	Adding value of the northern herbs of Ma-Kwaen (Zanthozylum limonella Alston) to the economic plants and the pharmaceutical products development	107865.17
	Project management	8988.76

No.	Title of research (2021)	Budget (USD)
4	Management and upgrading oil palm biomass as renewable energy for sustainable agricultural and environmental	131044.19
	Project management	6531.84
6	The Bamboo management in Phrae Province	113857.68
	Project management	20074.91
8	Integrative tourism promotion for Chumphon community-based tourism enlargement	128874.91
	Project management	22098.73
9	Product Development and Value-Added Economic Crops in Chumphon Province	74906.37
	Project management	7490.64
10	*Vigna unguiculata* spp. *sesquipedalis*) for Sustainable Organic Agriculture System	74906.37
	Project management	299.63
11	The prototype innovation of agricultural products and tourism service from community based by local wisdom based to the value added of consumer market for upper northern province sector 1	59925.09
	Project management	16479.40
12	Assessing the Potential of Building and Environment on the use of the Elderly in Chiang Mai Thammapakorn Elder Aid Centre	7490.64
13	Local Resources Management by Tourism Innovation for Sustainability of Community Based Tourism	66811.84
	Project management	3890.49
14	Caesalpinia sappan and Aloe vera - Derived Teat Sealant as Therapeutic for Mastitis in Dairy Cows	20044.19
	Other sources	
15	Developing a prototype for strawberry production in a closed crop system	11,008.24

No.	Title of research (2021)	Budget (USD)
16	A small plant for orchid culture, bottling to promote career and conservation of bottling orchids to promote career and orchid conservation of Ban Pong Krai community.	2,397.00
17	Enhancing Green Community in Smart Fish Farming in Chiang Mai Province	113,857.68
18	Technology transfer of Smart NPK application in combination with a portable soil analyzer for soil and fertilizer management for large crops	50,202.25
19	The process of developing innovative media (Production based) to enhance skills in preparing young people for careers in digital communication (Media Lab)	47,211.45
20	Biocatalytic reduction of carbonyl compounds by violet plants	7,490.64
21	Explore creative business information in Chiang Mai area	8,988.76
22	Research and development of antagonistic microorganisms for root rot and leaf spot control of fresh vegetables and technology transfer for biological pest management applications	89,737.83
23	Diversity of aquatic animals, plankton and water quality in Mae Chang Reservoir and Mae Kham Reservoir, EGAT Mae Moh, Lampang Province	63,768.15
24	Water management for the development of model communities and clean energy power generation Upper Mae Pae Basin, Ban Pae Subdistrict, Chom Thong District, Chiang Mai Province	100,553.26
25	Prototype production of personal protective clothing for medical personnel to have antimicrobial properties.	8,305.62
26	Improving of Different Factors Affecting on Growth and Quality of Some Ornamental Plants	4,495.10
27	Cucumber seed production in greenhouses using stingless bees (*Tetragonula laevicep*) as a pollinator	13,573.03
28	Development of planting process and natural dyeing with bio-innovation in Phrae Province	25,378.28
29	Low Cost Temporary Submerged Bioreactor Control System for Small Operators	7,490.64

No.	Title of research (2021)	Budget (USD)
30	Microcapsule antibacterial and insecticidal textile manufacturing process	7,490.64
31	Development of essential oil products to suppress bee mites using atmospheric pressure plasma technology.	7,490.64
32	Intelligent Live Aquatic Movement System	11,835.21
33	Community planning to maintain green areas in the city	104,868.91
34	Water management for the development of model communities and clean energy power generation Upper Mae Pae Basin, Ban Pae Subdistrict, Chom Thong District, Chiang Mai Province	100,553.26
35	Developing a model for food security through innovative aquaculture, crops and solar energy to support future climate change	102,067.66
36	Community business development through agricultural production supply chains To add value to the community economy in the highlands	104,492.04
37	The Effects of Responsible Tourism Management for Businesses, Communities and Visitors	80,299.63
38	Construction of a greenhouse solar drying greenhouse for dried banana blossoms	20,029.06
39	Production of fabrics for medical materials containing keratin from chicken feathers to be waterproof and antibacterial.	17,198.50
40	Sustainable Solid Waste Management and Policies (SWAP)	100,360.29
41	A study of the distribution of pollution by height and its application for the design of a vegetation barrier for environmental quality management	7,490.64
42	Project to promote and transfer technology, innovation, economic crop cultivation together with mycorrhiza mushroom cultivation for sustainable development of community economy.	38,451.06
43	Technology development and management for cultivating spirulina with a smart closed tank system	47,672.66
44	A study of industrial vetiver grass production system using transient sinking bioreactor as raw material for product development for root knot nematode control	16,746.04

No.	Title of research (2021)	Budget (USD)
45	Oxidative stress study as a tool for assessing environmental risks	17,977.53
46	Climate Change Risk Analysis and Success Factors of Climate Index Insurance for Thailand Rice Production	8,988.76
47	Formulation of an integrated science plan Research and Innovation for Sustainable Development in Northern Region	35,655.43
48	Development of a solar incubator with an automatic controlled supplement heating system with IoT technology	52,733.78
49	A study of the reduction of PM2.5 from the reduction of agricultural burning on the hills in the North with an alternative model that creates sustainability and is acceptable to agriculture	2,208.24
50	Cultural capital management in Phrae City to increase the competitiveness of cultural enterprise entrepreneurs	44,943.82
51	Restoration of the degraded watershed areas by planting mixed crops according to the ecological characteristics by cooperating with the local people in a spatial integration	8,988.76
52	Young Smart Farmer 4.0 (YSF 4.0) and modifying the university to create YSE 4.0	898.88
53	The research and development projects to increase the efficiency of hydrangea production, the Royal Project Foundation. Sub-project 5, the study of optimal timing for inducing hydrangea bud formation with potassium chlorate and gibberellic acid	1,836.70
54	Big Data Storage, Analysis and Access System (BIGDATA) Project Kit of the Royal Project Foundation Sub-project 3, Environmental and Agricultural Database Management, Royal Project	29,430.41
55	Persistent and Emerging Contaminants in the water Resources of the Ping River Catchment in Northern Thailand	62,545.65
56	A prototype of the development of a water production system for agriculture from the air by using ground cooling and solar energy	30,741.57
57	A small plant factory for cultivating orchids, launches bottles to promote career and orchid conservation, release bottles to promote careers and orchid conservation of Ban Pong Krai community	2,696.63
58	Survey of energy potential and living conditions for sustainable development in Ban Manora Community, Thung Yao Sub-district, Pai District, Mae Hong Son Province (to develop into a model village for tourism for education and renewable energy)	2,996.25

No.	Title of research (2021)	Budget (USD)
59	Development of ecotourism potential for conservation of upstream forest resources in the upstream reservoir area of the Royal Initiated Reservoir Project, Ban Phu Din, Mae Ho Phra Subdistrict, Chiang Mai Province	3,295.88
60	Approaches to the use of biotechnology and smart farms in farm management for safe and stable tilapia-tilapia production	2,247.19
61	Application of natural mechanism techniques to improve school environment to cope with the problem of fine dust (PM 2.5)	32,659.18
62	A prototype of the development of a water production system for agriculture from the air by using ground cooling and solar energy	30,741.57
63	Survey of energy potential and living conditions for sustainable development in Ban Manora Community, Thung Yao Sub-district, Pai District, Mae Hong Son Province (to develop into a model village for tourism for education and renewable energy)	2,996.25
64	Development of ecotourism potential for conservation of upstream forest resources in the upstream reservoir area of the Royal Initiated Reservoir Project, Ban Phu Din, Mae Ho Phra Subdistrict, Chiang Mai Province	3,295.88
65	Approaches to the use of biotechnology and smart farms in farm management for safe and stable tilapia-tilapia production	2,247.19
66	Mae Chaem Safe Nature Project (Mae Pan-San Kiang Model) : Research and development of a model community towards a sustainable community for conserving water, forests and occupations that are environmentally friendly.	59,820.22
67	Combined heat generation system from infectious medical waste	29,962.55
68	Research and development of cannabis strains that provide medicinal cannabinoids	633,369.89
	Total sustainable research fund 2021	**3,335,958.71**

No.	Title of research (2022)	Budget (USD)
1	Guidelines for the development of Ban Mae Taman Hot Springs to increase competitiveness and value added of health tourism in Mae Teang District, Chiang Mai Province	750,000.00
2	Prototype of natural astaxanthin production system from Haematococcus alga for using in the food and cosmetics industry	450,000.00
3	Application of biomass residue from Jerusalem artichoke for developing bioherbicide and biosurfactant to promote organic farming	400,000.00
4	Plasma technology in the production of plant essential oils as potential non-chemical control agents against honeybee mites as a substitute for synthetic chemicals	400,000.00
5	Potential Development of Yard Long Bean (Vigna unguiculata spp. sesquipedalis) for Sustainable Organic Agriculture System	1,000,000.00
6	Development of aquaponics in recirculating aquaculture systems (RAS) for system adaptation under climate change small fish farmers in the northern region	2,000,000.00
7	Application of plant probiotics and bio-nanoparticles for disease control in rice	350,000.00
8	Bioplastics films eco-friendly synthesis from crude glycerin by-product form biodiesel production and natural materials	400,000.00
9	Energy Economic and Environmental Analysis of Combined Power Disposal Waste and Heating	200,000.00
10	Development and Upgrading of Product Identity in Phrae Community from Hom Herb Extracts	450,000.00
11	Development of Hot Air Duct Combined with Solar Powered Fan for Agricultural Product Dryer	240,000.00
12	Functional database of microbial communities utilized for sustainable rice production management	350,000.00
13	Well-being Development of the Elderly Base on Lanna Wisdom	450,000.00
14	IOT sensor device for ripeness detecting of durian fruit without damaging the fruit	300,000.00
15	Efficacy of Non-thermal Plasma Technology for Controlling of Dirty Panicle Disease in Rice	300,000.00

No.	Title of research (2022)	Budget (USD)
16	Research for Development of Southern Thai Kluai Hom Thong [Musa (AAA Group) Kluai Hom Thong] Production System by Participatory Method to Reduce the Waste of Produce from a Sustainably Plantation System	250,000.00
17	Systematic biology of off season flowering and zero waste innovative of longan production	1,900,000.00
18	Management and upgrading oil palm biomass as renewable energy for sustainable agricultural and environment	1,250,000.00
19	Application of Compost Synergistic with Microbial Consortium, Water Management and Bio-organic Stimulants for Increasing of 2–Acetyl-1- Pyrroline (2AP) Accumulation and Antioxidant Activity in Aromatic Organic Rice	350,000.00
20	Soil microbial community data for precision agriculture: a case study on longan farm with potassium chlorate-mediated flower induction	450,000.00
21	Synergistic antagonistic activity of surface functionalized nanomaterials via non-thermal atmospheric pressure plasma and Chaetomium for inhibition of Phytophthora from durian root rot	250,000.00
22	Development of meal replacement for malabsorption syndrome using locally-available ingredients	300,000.00
23	Effect of Chaya leaves on health and growth performance in native chicken	120,000.00
24	Isomaltulose Production from Low Grade Longan	375,000.00
25	Utilization of fuelwood guideline for sustainable forest management in The Royal Initiative Project Huai Mae Kieng Highland Agricultural Development Station, Chiang Dao District, Chiang Mai Province	180,000.00
26	Development of functional drink product from Thai herbals to reduce blood sugar levels for Aging age	210,000.00
27	Development of small household compost bin ,Super green, for organic and food waste	180,000.00
28	Potential development of Cordyceps militaris for application in protective and/or therapeutic diseases and as functional foods for non-communicable diseases (NCDs) protection or for elderly health	1,200,000.00
29	Development of processed seafood products to safe food for promote marketing in the development of creative tourism in Chumphon province.	900,000.00
30	การสำรวจและประเมินสุขภาพต้นนางพญาเสือโคร่ง ภูมิทัศน์ลักษณ์เส้นทางท่องเที่ยวอุทยานแห่งชาติดอยฟ้าห่มปก Survey and assessment of the health of Nang Phaya Sua Krong trees; The landscape of tourism routes in Doi Fa Hom Pok National Park	20,000.00
31	การพัฒนาคุณภาพผลผลิตทางการเกษตรด้วยนวัตกรรมการผลิตปุ๋ยชีวภาพเพื่อยกระดับเศรษฐกิจในครัวเรือนอย่างยั่งยืน	685,200.00

No.	Title of research (2022)	Budget (USD)
	Developing the quality of agricultural products through innovative bio-fertilizer production to raise the sustainable economy of the household.	
32	การพัฒนาการผลิตพืชสมุนไพรและพืชเสริมเพื่อยกระดับรายได้ในครัวเรือนอย่างยั่งยืน Developing the production of medicinal and supplementary plants to raise household incomes sustainably	1,000,000.00
33	โครงการการพัฒนาศักยภาพผลิตภัณฑ์เกษตรแปรรูปและการตลาดสินค้าชุมชนเพื่อรองรับการท่องเที่ยววิถีอินทรีย์บนฐานวิถีชีวิตใหม่ Project for developing the potential of processed agricultural products and marketing community products to support organic tourism based on a new normal	1,280,000.00
34	การยกระดับคุณภาพชีวิตเกษตรกรและชุมชนด้วยวิทยาศาสตร์ เทคโนโลยี และนวัตกรรม: บริบทพื้นที่จังหวัดลำพูน Improving the quality of life of farmers and communities through science, technology and innovation: the context of Lamphun Province.	1,240,000.00
35	การสร้างเกษตรนวัตกรและยกระดับมาตรฐานการผลิตพืชในระบบเกษตรปลอดภัยและเกษตรอินทรีย์ Creating innovators and raising the standard of crop production in safe and organic agriculture systems.	690,000.00
36	การพัฒนาตลาดชุมชนและตลาดออนไลน์เพื่อยกระดับคุณค่าและเพิ่มมูลค่าผลิตภัณฑ์อัตลักษณ์เกษตรยั่งยืนลำพูน Developing a community marketplace and online marketplace to enhance value and add value to identity products;. Lamphun Sustainable Agriculture	690,000.00
37	การสร้างนวัตกรรมชุมชนท่องเที่ยวเกษตรอินทรีย์ต้นแบบโดยชุมชนมีส่วนร่วม Creating an innovative model organic tourism community with community participation	690,000.00
38	การสร้างกระบวนการมีส่วนร่วมเพื่อการพัฒนาเชิงพื้นที่ ชุมชนดอยม่อนแจ่ม ตำบลแม่แรม อำเภอแม่ริม จังหวัดเชียงใหม่ Creating a participatory process for spatial development Doi Mon Chaem Community, Mae Raem Subdistrict, Mae Rim District, Chiang Mai Province	500,000.00
39	การพัฒนาขีดความสามารถของกลุ่มเกษตรรุ่นใหม่ (Young Smart Farmers) ในการพัฒนาเศรษฐกิจหมุนเวียนกับการเชื่อมโยงระบบไม้ไผ่ในพื้นที่จังหวัดลำปาง Developing the capacity of young smart farmers in developing a circular economy and linking bamboo systems in Lampang province, creating a participatory process for spatial development Doi Mon Chaem Community, Mae Raem Subdistrict, Mae Rim District, Chiang Mai Province	1,000,000.00
40	แนวทางพัฒนาพื้นที่อย่างยั่งยืนเพื่อการบูรณาการกิจกรรมทางธุรกิจ กรณีศึกษา พื้นที่ร้านสะดวกซื้อ 7-Eleven ตำบลแม่แรม Sustainable and Development design Guidelines for Integrating Business Activities Case Study 7-Eleven Convenience Store Area, Mae Raem Subdistrict	448,000.00
41	การศึกษาสารพันธุกรรม ลักษณะทางกายภาพและสาระสำคัญของกัญชงเพื่อการใช้ประโยชน์ทางอาหารและการแพทย์ Genetic, Physical Characteristics and Materials study of Hemp for Food and Medical Uses	100,000.00
42	ประสิทธิภาพนวัตกรรมผนังสำเร็จรูป (PCC Sandwich Panel) เพื่อการประหยัดพลังงาน Innovative efficiency of prefabricated walls (PCC Sandwich Panel) for energy saving	100,000.00
43	แนวทางการปรับปรุงห้องน้ำสาธารณะ โดยใช้หลักการการออกแบบเพื่อคนทุกคน กรณีศึกษาห้องน้ำสาธารณะวัดพระธาตุช่อแฮ จังหวัดแพร่ Guidelines for improving public restrooms by using design principles for all people: a case study of public toilets at Wat Phra That Cho Hae, Phrae Province	16,000.00

No.	Title of research (2022)	Budget (USD)
44	การพัฒนาธุรกิจชุมชนด้วยการบริหารจัดการโซ่อุปทานกาแฟและโคเนื้อ เพื่อสร้างโอกาสอาชีพที่ยั่งยืนสอดคล้องกับบริบทพื้นที่สูง Community business development through coffee and beef cattle supply chain management To create sustainable career opportunities in accordance with the highland context	3,200,820.00
45	อบรมถ่ายทอดเทคโนโลยีนวัตกรรม การปลูกไม้มีค่าและพืชเศรษฐกิจร่วมกับการเพาะเห็ดไมคอร์ไรซาแบบครบวงจร Innovative technology transfer training Cultivation of precious woods and cash crops together with integrated mycorrhiza cultivation	2,551,500.00
46	การผลิตพลังงานไฟฟ้าร่วมการทำความเย็นและความร้อนจากขยะติดเชื้อทางการแพทย์ Co-generation of electricity, cooling and heating from infectious medical waste.	500,000.00
47	การพัฒนาผู้ประกอบการด้านวัฒนธรรม นวัตกรวัฒนธรรมเพื่อสร้างมูลค่าเพิ่มของผลิตภัณฑ์ทางวัฒนธรรมและกระตุ้นเศรษฐกิจฐานรากในพื้นที่จังหวัดเชียงใหม่ Cultural entrepreneurship development Cultural innovators to create added value of cultural products and stimulate the fundamental economy in Chiang Mai area.	5,700,000.00
48	การพัฒนาระบบรมแก๊สโอโซนเพื่อย่อยซากไวรัส SAR-CoV2 ของทุเรียนสด Development of ozone gas fumigation system for digestion of fresh durian SAR-CoV2 virus	3,258,046.00
49	นวัตกรรมการเพิ่มมูลค่าทะลายปาล์มเพื่อการพัฒนาเศรษฐกิจอย่างยั่งยืน Innovation for adding value of palm bunch for sustainable economic development	3,821,000.00
50	การเพิ่มมูลค่าเศษเหลือการแปรรูปพริกเป็นสารสกัดเชิงหน้าที่และผลิตภัณฑ์อาหารสุขภาพ Value addition of chili waste processing into functional extracts and health food products	2,452,120.00
51	โครงการศึกษาชีพลักษณ์ของพรรณไม้ภายในอุทยานหลวงราชพฤกษ์ จำนวน 22 ชนิด ระยะที่ห้า Project to study the phenotype of 22 species of plants in the Royal Park Rajapruek, Phase 5	200,000.00
52	โครงการบริหารจัดการทรัพยากรธรรมชาติและสิ่งแวดล้อมเพื่อการท่องเที่ยว กิจกรรมศึกษารูปแบบการกระจายรายได้ระหว่างอุตสาหกรรมท่องเที่ยวกับชุมชนท้องถิ่นอย่างเป็นรูปธรรม Natural Resources and Environment Management Project for Tourism Activities to study the pattern of income distribution between the tourism industry and the local community in a concrete way	2,690,515.00
53	การพัฒนานวัตกรเพื่อส่งเสริมการท่องเที่ยวโดยชุมชน สาธารณรัฐประชาธิปไตยประชาชนลาว Developing innovators to promote community-based tourism Lao People's Democratic Republic	600,000.00
54	The study of woodcarving for the conservatin of Local wisdom and the development of designs for digital market: Case study Kiew Lae Noi Village, Chiang Mai Province.	25,000.00
55	Social Capitals and Economic Security Constructing of Karen Farmers at Ban Ka Boe Din, Omkoi District, Chiang Mai Province	40,000.00
56	การออกแบบผลิตภัณฑ์ของที่ระลึกที่มีแนวคิดบูรณาการจากสถาปัตยกรรมไทยพื้นถิ่น Design of souvenir products with an integrated concept of local Thai architecture.	4,000.00
57	การประเมินระดับการให้บริการทางเดินเท้าและความสามารถในการเดินในมหาวิทยาลัยแม่โจ้ Assessment of pedestrian service level and walking ability in Mae Jo University	4,000.00
58	แนวทางการออกแบบปรับปรุงพื้นที่สวนสาธารณะ เพื่อลดการแพร่ระบาดของไวรัสโควิด 19 Design guidelines for improving the park area to reduce the spread of the covid 19 virus	4,000.00
59	การพัฒนาสวนเกษตรชุมชนบนพื้นที่สาธารณะในบริบทไทย The development of community agricultural gardens on public areas in the Thai context.	4,000.00

No.	Title of research (2022)	Budget (USD)
60	ศักยภาพการเข้าถึงพื้นที่ของโครงข่ายการคมนาคมและการขนส่งกับการใช้ประโยชน์ที่ดินของผังเมืองรวมเมืองเชียงใหม่ (ปรับปรุงครั้งที่ 4) พ.ศ. 2565 The potential of access to areas of the transportation and transportation network and land use of the Chiang Mai City Planning (Revised No. 4) B.E. 2022	4,000.00
61	การออกแบบระบบกักเก็บน้ำด้วยพืชพรรณเพื่อประยุกต์ใช้ในการบำบัดน้ำเสียครัวเรือน Designing a water storage system with vegetation for use in treating household wastewater.	4,000.00
62	การสร้างมูลค่าเพิ่มจากมูลม้าอินทรีย์ที่ใช้เพิ่มจุลินทรีย์ในดินแก่พื้นที่เกษตรอินทรีย์เพื่อสร้างรายได้แก่เกษตรกรในชุมชนบ้านห้วยยาบ อำเภอบ้านธิ จังหวัดลำพูน Creating added value from organic horse manure used to increase soil microorganisms to organic farming areas to generate income for farmers in Ban Huai Yab community, Ban Thi district, Lamphun province.	23,000.00
63	การบริหารจัดการชุมชนฐานรากบนฐานการเกษตรอินทรีย์เพื่อยกระดับคุณภาพเศรษฐกิจชุมชนตำบลออนกลาง อำเภอแม่ออน จังหวัดเชียงใหม่ Foundational community management based on organic agriculture for upgrading the economic quality of communities in On Klang Subdistrict, Mae On District, Chiang Mai Province.	23,000.00
64	การพัฒนาเว็บไซต์เพื่อเพิ่มช่องทางการจัดจำหน่ายสินค้าให้วิสาหกิจชุมชนเกษตรอินทรีย์บ้านแม่ตาด ตำบลห้วยทราย อำเภอสันกำแพง จังหวัดเชียงใหม่ Website development to increase distribution channels for organic farming community enterprises at Ban Mae Tad, Huai Sai Sub-district, San Kamphaeng District Chiang Mai Province	23,000.00
65	การเพิ่มมูลค่าน้ำมันพืชจากการสังเคราะห์สบู่หล่อลื่นเพื่อใช้ในอุตสาหกรรม Adding value of vegetable oil from the synthesis of lubricant soap for industrial use	9,000.00
66	การเปรียบเทียบผลกระทบด้านสิ่งแวดล้อมของการจัดการเศษวัสดุเหลือทิ้งจากการผลิตลำไย Comparison of environmental impacts of longan waste management	9,000.00
67	การศึกษาการปนเปื้อนของไมโครพลาสติกในน้ำตะกอนดิน และหอยน้ำจืด บริเวณคลองแม่ข่า จ. เชียงใหม่ A study of microplastic contamination in sediment water and freshwater mollusks at Khlong Mae Kha, Chiang Mai Province.	9,000.00
68	ตัวรับรู้ความชื้นในดินสำหรับฝังตัวภายในกระถางปลูก Soil moisture sensor for embedding inside plant pots	7,500.00
69	การทดสอบฤทธิ์ของใบสาบเสือในการไล่แมลงในห้องพิพิธภัณฑ์ Testing the effect of *Chromolaena odorata* (L.) R.M.King&H.Rob. leaves in repelling insects in a museum room	20,000.00
70	การศึกษาการเจริญเติบโตและลักษณะทางพืชไร่ของคำฝอย ภายใต้การจัดการน้ำและปุ๋ยระบบอินทรีย์ Study on growth and agronomy of safflower under the management of water and organic fertilizers	20,000.00
71	ทัศนคติที่มีต่อการปลูกพืชในระบบเกษตรอินทรีย์ของเกษตรกรตำบลแม่แฝกใหม่ อำเภอสันทราย จังหวัดเชียงใหม่ Attitudes towards planting in organic farming system of farmers in Mae Faek Mai Sub-district, San Sai District, Chiang Mai Province	20,000.00
72	การสำรวจพฤติกรรมตามเกณฑ์สำนักงานสีเขียว ของบุคลากรสำนักงานคณบดี คณะผลิตกรรมการเกษตร Green Office Criteria Behavior Survey of the Dean's Office personnel agricultural production committee	5,000.00
	Total sustainable research fund 2022	**1,297,045.17**

Number of scholarly publications on sustainability

The publication that we selected to the list of sustainability were based on the keywords; green, organic, sustainable, environment, climate, energy and ecology. This year, we used the new method for management in publication database. The number of publication articles comes from three sources as; database of publication on Scopus, Web of Science between January, 1st - August, 31st 2021, and TCI database.

The number of scholarly publications on sustainability (average 3 years) is **147.33**

(83+237+122= **442)**

442/3 = 147.33

Number of scholarly publications on sustainability			
2020	2021	2022	**average**
83	237	122	**147.33**

Sample of publication database of 2022. (All articles are presented on https://green.mju.ac.th/?page_id=246)

Orde		Title	Authors with affiliation:	Year	Source title	Volume	Issue	Page sta	Page e	DOI
1	Green	(Ip1,...,Ipn)-Privacy: privac	Riyana, S., Digital Technolog	2021	Journal of Ambient Intelligence and Humanized C	12	10	9713	9729	10.1007/s12652-
2	Green	6-Benzylaminopurine app	Puangkrit, T., Faculty of Agr	2021	Acta Horticulturae	1312		157	164	10.17660/ActaHo
3	Green	A critical review on differe	Ananthi, V., Department of	2021	Science of the Total Environment	780				10.1016/j.scitoter
4	Green	A critical review on produ	Kartik, A., Department of Ch	2021	Bioresource Technology	329				10.1016/j.biortech
5	Green	A detailed scrutinize on p	Ganesan, R., Department of	2021	Science of the Total Environment	777				10.1016/j.scitoter
7	Green	A multigeneration system	Chaiyat, N., School of Renev	2021	Thermal Science and Engineering Progress	21				10.1016/j.tsep.20
8	Green	A New Approach to Hyers	Govindan, V., Department c	2021	Journal of Function Spaces	2021				10.1155/2021/66
9	Green	A novel investigation of m	Kraisittipanit, R., Program o	2021	International Journal of Agricultural Technology	17	4	1363	1372	
12	Green	A simple Analog to Digital	Kongpark, P., Faculty of Sci	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	124		127		10.1109/ECTIDAM
14	Green	Advancement of fermenta	Trejo, M., School of Renewa	2021	Environment, Development and Sustainability					10.1007/s10668-
16	Green	Alternative-Ingredient Rec	Nadee, W., Information Tecl	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	14		17		10.1109/ECTIDAM
19	Green	An exploratory cross-cult	Yeh, C.J., Department of Hu	2021	Early Child Development and Care	191	3	373	388	10.1080/0300443
20	Green	An Implementation of Prc	Khoenkaw, P., Faculty of Sci	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	31		36		10.1109/ECTIDAM
21	Green	An in vitro investigation o	Narayanan, M., PG and Res	2021	Process Biochemistry	109		178	185	10.1016/j.procbio
22	Green	Analytical approach of Fe	Humphries, U., Department	2021	International Journal of Engineering, Transactions	34	2	517	527	10.5829/IJE.2021.
24	Green	Antibacterial and antioxid	Ramli, A.N.M., Faculty of In	2021	Journal of Food Processing and Preservation	45	1			10.1111/jfpp.149
25	Green	Antidiabetic and renoprot	Boonphang, O., Department	2021	Molecules	26	7			10.3390/molecule
26	Green	Anti-HIV-1 reverse transci	Choengpanya, K., Program i	2021	Saudi Journal of Biological Sciences	28	5	2807	2815	10.1016/j.sjbs.20
27	Green	Antioxidant activities and	Tandee, K., Faculty of Engin	2021	Food Chemistry	348				10.1016/j.foodch
28	Green	Antioxidative study of pol	Bhuyar, P., Algae Biotechno	2021	SN Applied Sciences	3	4			10.1007/s42452-
29	Green	Appropriateness of waste	Khammee, P., School of Ren	2021	3 Biotech	11	5			10.1007/s13205-
30	Green	Asset Management Syste	Wongarsa, D., Faculty of Sci	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	120		123		10.1109/ECTIDAM
31	Green	Automatic Pencil Sketch L	Khayan, A., Faculty of Scien	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	27		30		10.1109/ECTIDAM
32	Green	Automatic Thermal Stress	Kitpitak, N., Faculty of Scien	2021	2021 Joint 6th International Conference on Digital Arts, Media and Technolog	180		184		10.1109/ECTIDAM
33	Green	Bioactive compounds and	Amornlerdpison, D., Center	2021	Applied Sciences (Switzerland)	11	1	1	8	10.3390/app1101
34	Green	Biodegradation competen	Whangchai, K., Center of Ex	2021	Chemosphere	276				10.1016/j.chemos
35	Green	Biodiesel production thro	Davoodbasha, M., School of	2021	Fuel	300				10.1016/j.fuel.20
36	Green	Biodiversity and spatioter	Yotkham, S., Department of	2021	Insects	12	1	1	13	10.3390/insects1
37	Green	Bioethanol production fro	Mariano, A.P.B., School of R	2021	International Journal of Energy Research	45	6	8140	8150	10.1002/er.5544
38	Green	Biogas production from h	Sonwai, A., Department of E	2021	Journal of Environmental Management	299				10.1016/j.jenvma
39	Green	Biogas production from n	Souvannasouk, V., Master P	2021	International Journal of Innovative Research and S	4	3	174	180	10.53894/ijirss.v4
40	Green	Biomacromolecules of chi	Govindan, P., Department c	2021	Environmental Research	202				10.1016/j.envres.
41	Green	Bio-refinery approaches b	Thangam, K.R., Centre for R	2021	Science of the Total Environment	785				10.1016/j.scitoter

Database of publication on Scopus

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		Article Title	Author(s) and Affiliation	Source Title	cument	Publisher	lisher A	ISSN	eISSN	al A
2	Green	A critical review on different harvesting techniques for algal bi	[Ananthi, V] PRIST Univ, Dept Microbiol, Ma	SCIENCE OF THE TOTA	Review	ELSEVIER	RADARWI	0048-969	1879-102	SCI
3	Green	A critical review on production of biopolymers from algae bior	[Kartik, Ashokkumar; Akhil, Dilipkumar; Laks	BIORESOURCE TECHN	Review	ELSEVIER SCI LT	THE BOUI	0960-852	1873-297	BIO
4	Green	A detailed scrutinize on panorama of catalysts in biodiesel synt	[Ganesan, Ramya] St Josephs Inst Technol, O	SCIENCE OF THE TOTA	Review	ELSEVIER	RADARWI	0048-969	1879-102	SCI
5	Green	A multigeneration system of combined cooling, heating, and p	[Chaiyat, Nattaporn] Maejo Univ, Sch Renew	THERMAL SCIENCE AN	Article	ELSEVIER	RADARWI	2451-904		TH
10	Green	An in vitro investigation of the antidermatophytic, antioxidant,	[Narayanan, Mathiyazhagan; Jayashree, Tha	PROCESS BIOCHEMIST	Article	ELSEVIER SCI LT	THE BOUI	1359-511	1873-329	PRO
12	Green	Antibacterial and antioxidative activity of the essential oil and	[Ramli, Aizi Nor Mazila; Badrulzaman, Sharif	JOURNAL OF FOOD PR	Article	WILEY	111 RIVEF	0145-889	1745-454	J FO
13	Green	Antidiabetic and Renoprotective Effects of Coffea arabica Pulp	[Boonphang, Oranit; Phatsara, Manussabhor	MOLECULES	Article	MDPI	ST ALBAN		1420-304	MO
14	Green	Anti-HIV-1 reverse transcriptase property of some edible mush	[Choengpanya, Khuanjarat] Maejo Univ, Pro	SAUDI JOURNAL OF BI	Article	ELSEVIER	RADARWI	1319-562	2213-710	SAU
15	Green	Antioxidant activities and volatile compounds in longan (Dimoc	[Tandee, Kanokwan] Maejo Univ, Fac Engn &	FOOD CHEMISTRY	Article	ELSEVIER SCI LT	THE BOUI	0308-814	1873-707	FO
17	Green	Appropriateness of waste jasmine flower for bioethanol conve	[Khammee, Phitchaphorn; Ramaraj, Ramesh	3 BIOTECH	Article	SPRINGER HEIDI	TIERGART	2190-572	2190-573	3 B
19	Green	Biodegradation competence of Streptomyces toxytricini D2 iso	[Whangchai, Kanda] Chiang Mai Univ, Ctr Ex	CHEMOSPHERE	Article	PERGAMON-ELS	THE BOUI	0045-653	1879-129	CH
20	Green	Biodiesel production through transesterification of Chlorella vu	[Davoodbasha, MubarakAli] BS Abdur Rahm	FUEL	Article	ELSEVIER SCI LT	THE BOUI	0016-236	1873-715	FU
22	Green	Bioethanol production from coconut pulp residue using hydrotl	[Mariano, Alissandra Pauline B.; Ramaraj, R	INTERNATIONAL JOUR	Article	WILEY	111 RIVEF	0363-907	1099-114	INT
23	Green	Bio-refinery approaches based concomitant microalgal biofuel	[Thangam, K. Rohitha; Santhiya, A.; Sri, S. R.	SCIENCE OF THE TOTA	Article	ELSEVIER	RADARWI	0048-969	1879-102	SCI
25	Green	Co-hydrothermal gasification of microbial sludge and algae Ka	[Jayaraman, Ramesh Sai; Gopinath, Kannapa	INTERNATIONAL JOUR	Article	PERGAMON-ELS	THE BOUI	0360-319	1879-348	INT
26	Green	Comparative effect of Volvariella volvacea-treated rice straw a	[Khonkhaeng, Benjamad; Cherdthong, Anusc	LIVESTOCK SCIENCE	Article	ELSEVIER	RADARWI	1871-141	1878-049	LIV
28	Green	Cunninghamella saisamornae (Cunninghamellaceae, Mucorale	[Suwannarach, N. A. K. A. R. I. N.; Kumla, J. A	PHYTOTAXA	Article	MAGNOLIA PRE	PO BOX 4	1179-315	1179-316	PH
29	Green	Current strategies and prospects in algae for remediation and	[Kandasamy, Sabariswaran; He, Zhixia] Jiang	BIOCATALYSIS AND AG	Review	ELSEVIER	RADARWI		1878-818	BIO
30	Green	Customized yeast cell factories for biopharmaceuticals: from c	[Madhavan, Aravind; Arun, K. B.] Rajiv Gand	MICROBIAL CELL FACT	Review	BMC	CAMPUS,		1475-285	MI
32	Green	Development of a closed-loop control system for microwave fr	[Sujinda, Narathip; Varith, Jaturapatr; Jaturo	JOURNAL OF FOOD EN	Article	ELSEVIER SCI LT	THE BOUI	0260-877	1873-577	J FO
36	Green	Effect of algae (Scenedesmus obliquus) biomass pre-treatment	[Mahima, Jain; Sundaresh, Ramesh Kumar; C	SCIENCE OF THE TOTA	Article	ELSEVIER	RADARWI	0048-969	1879-102	SCI
37	Green	Effect of feeding a pellet diet containing high sulphur with fres	[Prachumchai, Rittikeard; Cherdthong, Anusc	JOURNAL OF ANIMAL I	Article	WILEY	111 RIVEF	0931-243	1439-039	J AI
38	Green	Effect of freshwater fish oil feed supplementation on the repro	[Sattang, Supaporn; Amornlerdpison, Doung	AQUACULTURE REPOF	Article	ELSEVIER	RADARWI	2352-513		AQ
39	Green	Effect of partial substitution of wheat flour with resistant starc	[Petchoo, Jaruneth; Jittinandana, Sitima; Tun	INTERNATIONAL JOUR	Article	WILEY	111 RIVEF	0950-542	1365-262	INT
40	Green	Effect of Pretreatment Processes on Biogenic Amines Content i	[Makhamrueang, Netnapa; Chaiyana, Wanti	FOODS	Article	MDPI	ST ALBAN		2304-815	FO
41	Green	Effects of substrate concentration and hydraulic retention time	[Van Giang Tran; Ramaraj, Rameshprabu] M	INTERNATIONAL JOUR	Article	PERGAMON-ELS	THE BOUI	0360-319	1879-348	INT
42	Green	Eggshells biowaste for hydroxyapatite green synthesis using ex	[Umesh, Mridul; Choudhury, Debasree Dutta	ENVIRONMENTAL RES	Article	ACADEMIC PRE	525 B ST,	0013-935	1096-095	EN
43	Green	Energy, exergy, economic, and environmental analysis of an or	[Chaiyat, Nattaporn] Maejo Univ, Sch Renew	THERMAL SCIENCE AN	Article	ELSEVIER	RADARWI	2451-904		TH
44	Green	Enhanced photocatalytic degradation of water pollutants using	[Vasantharaj, Seerangaraj; Senthilkumar, Pa	JOURNAL OF ENVIRON	Article	ELSEVIER SCI LT	THE BOUI		2213-343	J EI
45	Green	Episodically volatile high energy non-cohesive river-floodplain	[Wasson, Robert J.; Lim, Han She] James Coc	GEOMORPHOLOGY	Review	ELSEVIER	RADARWI	0169-555	1872-695	GE
46	Green	Estimating carbon biomass in forests using incomplete data	[Wijedasa, Lahiru Suranga] Natl Univ Singap	BIOTROPICA	Article	WILEY	111 RIVEF	0006-360	1744-742	BIO
47	Green	Evaluation of antibacterial, antioxidant, and nephroprotective	[Narayanan, Mathiyazhagan; Krishnan, Laks	PROCESS BIOCHEMIST	Article	ELSEVIER SCI LT	THE BOUI	1359-511	1873-329	PRO
48	Green	Evaluation of microalgal strains and microalgal consortium for	[Arutselvan, Chithirai; Narchonai, Ganesan; I	BIORESOURCE TECHN	Article	ELSEVIER SCI LT	THE BOUI	0960-852	1873-297	BIO
49	Green	Evaluation of sacha inchi meal as a novel alternative plant pro	[Khieokhajonkhet, Anurak; Aeksiri, Niran] Na	ANIMAL FEED SCIENCE	Article	ELSEVIER	RADARWI	0377-840	1873-221	AN
51	Green	Fabrication and characterization of in vitro 2D skin model-An a	[Pandiyan, Rajesh] Bharath Inst Higher Educ	PROCESS BIOCHEMIST	Article	ELSEVIER SCI LT	THE BOUI	1359-511	1873-329	PRO
52	Green	Filamentous fungi with high paraquat-degrading activity isolat	[Wongputtisin, P.; Supo, C.] Maejo Univ, Fac	LETTERS IN APPLIED M	Article	WILEY	111 RIVEF	0266-825	1472-765	LET

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ฐานข้อมูล TCI ข้อมูลระหว่างวันที่ 1 มกราคม - 31 สิงหาคม 2564

No.	Article name	Author	Affiliation	Journal	Volume
1	คุณภาพผลและปริมาณธาตุอาหารในใบของส้มโอพันธุ์ทองดีและแชนด์เลอร์ที่ผลิตนอกฤดูและในฤดู	สาวิกา กอนแสง	คณะผลิตกรรมการเกษ	วารสารเกษตร	37
2	คุณภาพผลและปริมาณธาตุอาหารในใบของส้มโอพันธุ์ทองดีและแชนด์เลอร์ที่ผลิตนอกฤดูและในฤดู	เพ็ญนภา จักรสมศักดิ์	คณะผลิตกรรมการเกษ	วารสารเกษตร	37
3	Determinants of economic practices among elderly urban migrants in khon kaen, thailand	Saowalak Chaytaweep	คณะศิลปศาสตร์	Kasetsart Journal of	42

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No.	Scholarly publications on sustainability (2022)
1	Air to H2-N2 Pulse Plasma Jet for In-Vitro Plant Tissue Culture Process: Source Characteristics
2	A biorefinery approach for the production of bioethanol from alkaline-pretreated, enzymatically hydrolyzed Nicotiana tabacum stalks as feedstock for the bio-based industry
3	A comprehensive review of thermogravimetric analysis in lignocellulosic and algal biomass gasification
4	A critical review of advanced nanotechnology and hybrid membrane based water recycling, reuse, and wastewater treatment processes
5	A perspective on the interaction between biochar and soil microbes: A way to regain soil eminence
6	A Two-stage strategy for polyhydroxybutyrate (PHB) production by continuous Biohydrogen fermenter and sequencing batch reactor from food industry wastewater
7	A Two-stage strategy for polyhydroxybutyrate (PHB) production by continuous Biohydrogen fermenter and sequencing batch reactor from food industry wastewater

No.	Scholarly publications on sustainability (2022)
8	Advancements of fermentable sugar yield by pretreatment and steam explosion during enzymatic saccharification of Amorphophallus sp. starchy tuber for bioethanol production
9	Alkali pretreatment method of dairy wastewater based grown Arthrospira platensis for enzymatic degradation and bioethanol production
10	An assessment of agricultural waste cellulosic biofuel for improved combustion and emission characteristics
11	Anthocyanin pigment-based dye-sensitized solar cells with improved pH-dependent photovoltaic properties
12	Application of iron-cobalt-copper (Fe-Co–Cu) trimetallic nanoparticles on anaerobic digestion (AD) for biogas production
13	Assessment of the effects of anaerobic co-digestion of water primrose and cow dung with swine manure on biogas yield and biodegradability
14	Bacterial bioactive metabolites as therapeutic agents: From production to action
15	Bio-based algal (Chlorella vulgaris) refinery on de-oiled algae biomass cake: A study on biopolymer and biodiesel production
16	Biochar derived from non-customized matamba fruit shell as an adsorbent for wastewater treatment
17	Biohydrogen production using algae: Potentiality, economics and challenges
18	Bioprophylactic potential of novel human colostrum probiotics via apoptotic induction of colon cancer cells and cell immune activation
19	Catalyst Composites of Palladium and N-Doped Carbon Quantum Dots-Decorated Silica and Reduced Graphene Oxide for Enhancement of Direct Formic Acid Fuel Cells
20	Cellulosic-derived bioethanol from Limnocharis flava utilizing alkaline pretreatment
21	Characteristic and antioxidant activity of Cladophora glomerata ethanolic extract as affected by prior chlorophyll removal and drying methods
22	Combined effect of CO2 concentration and low-cost urea repletion/starvation in Chlorella vulgaris for ameliorating growth metrics, total and non-polar lipid accumulation and fatty acid composition
23	Comparative studies of the longan leaf pigment extraction as a photosensitizer for dye-sensitized solar cells' purpose
24	Comparative study of different catalysts mediated FAME conversion from macroalga Padina tetrastromatica biomass and hydrothermal liquefaction facilitated bio-oil production
25	Comparison Of Growth Of Organic Tilapia From Selective Breeding Program, Fed With Organic Pellet Feed and Duckweed Under The Biofloc Farming System
26	Conflicts in Managing Chiang Mai's Abandoned Monasteries
27	Crocodile Oil Modulates Inflammation and Immune Responses in LPS-stimulated RAW 264.7 Macrophages

No.	Scholarly publications on sustainability (2022)
28	Curcumin nanospheres and nanorods: Synthesis, characterization and anticancer activity
29	Current status of microbes involved in the degradation of pharmaceutical and personal care products (PPCPs) pollutants in the aquatic ecosystem
30	Decontamination of major Salmonella serovars derived from poultry farms on eggs using Salmonella phage cocktail
31	Development of aeration devices and feeding frequencies for oxygen concentration improvement in 60-tones freshwater recirculating aquaculture and biofloc ponds of Asian seabass (Lates calcarifer) rearing
32	Development of sustainable approaches for converting the agro-weeds Ludwigia hyssopifolia to biogas production
33	Doubling of annual forest carbon loss over the tropics during the early twenty-first century
34	Economic and Sensitivity Analyses for an Optimal Hybrid Power Generation for Stand-Alone Power Systems: Case of Klongrua, Phato, Chumphon, Thailand
35	Ecotoxicity testing of paraquat metabolites degraded by filamentous fungi in model organism
36	Effect of biogas sludge meal supplement in feed on growth performance molting period and production cost of giant freshwater prawn culture
37	Effect of hot water extraction process on schizophyllan from split gill mushroom
38	Effect of hydrogen on compression-ignition (CI) engine fueled with vegetable oil/biodiesel from various feedstocks: A review
39	Effectiveness of protected areas in preventing forest loss in a tropical mountain region
40	Effects of Dietary Supplementation with Red Yeast (Sporidiobolus pararoseus) on Productive Performance, Egg Quality, and Duodenal Cell Proliferation of Laying Hens
41	Effects of PM2.5 and Meteorological Parameters on the Incidence Rates of Chronic Obstructive Pulmonary Disease (COPD) in the Upper Northern Region of Thailand
42	Enhancement of biohydrogen production by employing a packed-filter bioreactor (PFBR) utilizing sulfite-rich organic effluent obtained from a washing process of beverage manufactures
43	Enhancement of Fermentable Sugars Obtained from Amorphophallus Spp. Tuber for Bioethanol Production by Optimizing Temperature and Pretreatment Concentration
44	Enhancement of the combustion, performance and emission characteristics of spirulina microalgae biodiesel blends using nanoparticles
45	Enhancing Intrinsic Motivation of Librarian Students using Virtual Reality for Education in the Context of Culture Heritage Museums
46	Enhancing Intrinsic Motivation of Librarian Students using Virtual Reality for Education in the Context of Culture Heritage Museums
47	ENHANCING LEUCAENA LEUCOCEPHALA WOOD PRESERVATION BY STEEPING IT IN BORON COMPOUNDS AND ACETIC ACID TO PROTECT AGAINST TERMITES

No.	Scholarly publications on sustainability (2022)
48	Environmental change since the Last Glacial Maximum: palaeo-evidence from the Nee Soon Freshwater Swamp Forest, Singapore
49	Environmental management and valorization of cultivated tobacco stalks by combined pretreatment for potential bioethanol production
50	Ethanol production from corn stalk juice by Saccharomyces cerevisiae immobilized yeast using a green method
51	Extraction methodology of lignin from biomass waste influences the quality of bio-oil obtained by solvothermal depolymerization process
52	Flowpath influence on stream acid events in tropical urban streams in Singapore
53	Fungi fabrication, characterization, and anticancer activity of silver nanoparticles using metals resistant Aspergillus niger
54	Green route for recycling of low-cost waste resources for the biosynthesis of nanoparticles (NPs) and nanomaterials (NMs)-A review
55	Holistic utilization of Chlorella pyrenoidosa microalgae for extraction of renewable fuels and value-added biochar through in situ transesterification and pyrolysis reaction process
56	Identification of Streptococcus suis carriage in healthy pigs in Chiang Mai, Thailand
57	Impact and significance of pretreatment on the fermentable sugar production from low-grade longan fruit wastes for bioethanol production
58	Impact of nano-ZnO consolidated poly (ether ether sulfone) nano filtration membrane for evacuation of hazardous metal particles
59	Improvement of fermentable sugar for enhanced bioethanol production from Amorphophallus spp. tuber obtained from northern Thailand
60	In vitro and in vivo efficacy of green synthesized AgNPs against Gram negative and Gram positive bacterial pathogens
61	In vitro anticancer activity of silver nanoparticles phyto-fabricated by Hylocereus undatus peel extracts on human liver carcinoma (HepG2) cell lines
62	Influence of urbanization on hourly extreme precipitation over China
63	Innovative biorefinery concept for biogas-based digestate with rice bran protein-rich feed ingredient for tilapia production
64	Innovative biorefinery concept for utilizing uncooked rice berry wastewater on the growth of strawberry
65	Integrating Taguchi method and artificial neural network for predicting and maximizing biofuel production via torrefaction and pyrolysis
66	Intergenerational Transmission of Family Violence and Depressive Symptoms in Urban Thailand
67	Investigating the Predictive Power of Google Trend and Real Price Indexes in Forecasting the Inflation Volatility

No.	Scholarly publications on sustainability (2022)
68	Iodine adsorption isotherms on Matamba fruit shell stemmed biochar for wastewater re-use strategy in rural areas owing to climate change
69	Iodine adsorption isotherms on Matamba fruit shell stemmed biochar for wastewater re-use strategy in rural areas owing to climate change
70	Leucaena–Derived Biochar for Biodiesel Production
71	Lignocellulose in future biorefineries: Strategies for cost-effective production of biomaterials and bioenergy
72	Long-term changes in paddy soil fertility in tropical Asia after 50 years of the Green Revolution
73	Madden–Julian Oscillation-induced extreme rainfalls constrained by global warming mitigation
74	Mathematical modeling on transmission and optimal control strategies of corruption dynamics
75	Microalga Chlorella sp. in the cultivation with chicken farm biogas fermenter effluent and simultaneously nutrient removal
76	Microbial valorization of lignin: Prospects and challenges
77	Microwave assisted biodiesel production from chicken feather meal oil using Bio-Nano Calcium oxide derived from chicken egg shell
78	Microwave-Assisted Extraction of Anticancer Flavonoid, 2’,4’-Dihydroxy-6’-methoxy-3’,5’-dimethyl Chalcone (DMC), Rich Extract from Syzygium nervosum Fruits
79	Modulatory effects of longan seed powder on growth performance, immune response, and immune-antioxidant related gene expression in Nile tilapia (Oreochromis niloticus) raised under biofloc system
80	Multifunctionalities of mycosynthesized zinc oxide nanoparticles (ZnONPs) from Cladosporium tenuissimum FCBGr: Antimicrobial additives for paints coating, functionalized fabrics and biomedical properties
81	Muntingia calabura fruits as sources of bioactive compounds and fermentative ethanol production
82	Nanocellulose as green material for remediation of hazardous heavy metal contaminants
83	Nanomaterials as adsorbents for As(III) and As(V) removal from water: A review
84	Natural resource conflict management in local communities of forested watershed areas of Northern Thailand
85	Natural resource conflict management in local communities of forested watershed areas of Northern Thailand
86	Non-thermal plasma removal of naphthalene as tar model compound from biomass gasification
87	Occurrence and characteristics of Salmonella isolated from various vegetable sources: Potential for the human-food interface in salmonellosis in Vientiane, the capital of Laos PDR
88	Optimal parameter estimation of proton exchange membrane fuel cell using improved red fox optimizer for sustainable energy management

No.	Scholarly publications on sustainability (2022)
89	Optimization of ethanol precipitation of schizophyllan from Schizophyllum commune by applied statistical modelling
90	Passive cooling strategies for cattle housing on small farms: A case study
91	Performance of simple green synthesized Ag incorporated TiO2 nanoparticles based photoanodes by doctor-blade coating as working electrodes for dye sensitized solar cells
92	Performance, combustion and emission characteristics of the CI engine fueled with Botryococcus braunii microalgae with addition of TiO2 nanoparticle
93	Perovskite-based solar cells fabricated from TiO2 nanoparticles hybridized with biomaterials from mollusc and diatoms
94	Photocatalytic activity of calcined chicken eggshells for Safranin and Reactive Red 180 decolorization
95	Physical pretreatment and algal enzyme hydrolysis of dried low-grade and waste longan fruits to enhance its fermentable sugar production
96	Physiological response of Simocephalus vetulus to five antibiotics and their mixture under 48-h acute exposure
97	PM emissions - assessment of combustion energy transfer with Schizochytrium sp. algal biodiesel and blends in IC engine
98	Polyester-releasing sesamin by electrospinning technique for the application of bone tissue engineering
99	Potential evaluation of biogas production through the exploitation of naturally growing freshwater macroalgae Spirogyra varians
100	Production and utilization of pyrolysis oil from solidplastic wastes: A review on pyrolysis process and influence of reactors design
101	Production of Producer Gas from Densified Agricultural Biomass in Downdraft Gasifier and Its Application to Small Diesel Engines
102	Production of single-chain fragment variable (scFv) antibodies specific to plasma membrane epitopes on bull Y-bearing sperm
103	Production, downstream processing, and characterization of polyhydroxyalkanoates (PHAs) boosted by pyruvate supplement using mixed microbial culture (MMC) and organic wastewater
104	Progress in microalgal mediated bioremediation systems for the removal of antibiotics and pharmaceuticals from wastewater
105	PTAD: A web-based climate service for building design adaptation
106	Sacha inchi meal as a fish-meal replacer in red hybrid tilapia (Oreochromis niloticus × O. mossambicus) feeds: effects on dietary digestibility, growth metrics, hematology, and liver and intestinal histology
107	Simultaneous carbon dioxide reduction and methane generation in biogas for rural household use via anaerobic digestion of wetland grass with cow dung

No.	Scholarly publications on sustainability (2022)
108	Spectral and structure characterization of Ferula assafoetida fabricated silver nanoparticles and evaluation of its cytotoxic, and photocatalytic competence
109	Stabilization of Fuzzy Hydraulic Turbine Governing System With Parametric Uncertainty and Membership Function DependentH∞ Performance
110	Sustainability and application of corncob-derived biochar for removal of fluoroquinolones
111	Sustainable valorization of water primrose with cow dung for enhanced biogas production
112	SYNTHESIS AND CHARACTERIZATION OF LITHIUM SILICATE AND POTASSIUM SILICATE FROM RICE HUSK ASH BY HYDROTHERMAL-MICROWAVE METHOD AND APPLICATION FOR BIODIESEL CATALYST
113	Synthesis of mesoporous SiO2 nanoparticles and toxicity assessment in early life stages of zebrafish
114	Synthesis of two different zinc oxide nanoflowers and comparison of antioxidant and photocatalytic activity
115	The effect of sustainability report on value relevance of accounting information: Case study of Thai listed firms
116	The effect of various pretreatments conditions on the distribution of fermentable sugar from dried elephant ear plant
117	The potential risks of climate change and weather index insurance scheme for Thailand's economic crop production
118	Thermal imaging for assessment of maize water stress and yield prediction under drought conditions
119	Thermal performance of a combined cooling, heating, and power (CCHP) generation system from infectious medical waste
120	They like to move it (move it): walking kinematics of balitorid loaches of Thailand
121	Upgrading of Bio-oil from Energy Crops via Fast Pyrolysis using Nanocatalyst in a Bubbling Fluidized Bed Reactor
122	Valorization of agriculture waste biomass as biochar: As first-rate biosorbent for remediation of contaminated soil

No.	Scholarly publications on sustainability (2020)
1	Self-management process of Ban Mankong Community, Wat Chiang Yuen, Nakornping, Muang Chiang Mai
2	The process of physical transition from community to university city Maejo University Case Study, Chiang Mai
3	A learning process that promotes the design of spatial planning together through real experience.

No.	Scholarly publications on sustainability (2020)
4	A group of microorganisms featured in the system produces biogas from salads, ponds, and longan shells.
5	Access to organic rice production certified by farmers in Chiang Mai
6	The elimination of bacteria that produce corn cob enzymes to produce as feed raw materials, the sorting of bacteria that produce corn cob digestive enzymes to produce as feed raw materials.
7	Selection of species for the restoration of deciduous forests in the upstream area of Ban Boon Chaem. Rong Kwang District, Phrae Province
8	Energy management of refrigeration systems in the frozen food industry
9	Energy management of refrigeration systems in the frozen food industry
10	Testing for fuel-based vehicles from transverse biomass gas furnaces
11	Consumption of organic products and food of the people in San Sai District, Chiang Mai Province.
12	Engaged water management of Mae Jai River User Group Network Fang District, Chiang Mai Province
13	Evaluation of the life cycle of the organic rankin cycle in conjunction with the centralized drying chamber from geothermal energy.
14	Application of clean technology to reduce loss in the lettuce wrap sorting process.
15	Application of geographic information system to study changes in land utilization in Mae Tom Basin Muang Koi, Chiang Mai
16	Changes in the amorphous structure of the city from the new city bypass road. Case Study of San Phe Saur Municipality and Muang Kaeo Sub-district Municipality, Chiang Mai Province
17	Processing of baking cups from brown rice germination, organic red jasmine.
18	Biodiesel production from used vegetable oils using longan ash as a catalyst
19	Electricity generation combined with cooling and heating from San Kamphaeng's stepped geothermal energy technology
20	Development of concrete blocks from aromatic zucchini
21	Development of energy-saving noodle drying machine
22	Developing public policy with clear practices to green localities

No.	Scholarly publications on sustainability (2020)
23	Web application development for the performance monitoring system of solar power generation system
24	Community-level biogas improvement equipment development
25	Relying on non-wood forest products in ban O community forests Tumbol Bansantakaew, Amphoe Mae Tha, Lampang
26	Community involvement in water management of Klong Rua village Tumbol Paksong, Amphoe Pha to, Chumphon
27	Acceptance of methods of planting under good and appropriate agricultural practices (GAP) of farmers, Luang Mon Wana Project Development Center, Mae Taeng District, Chiang Mai Province.
28	Learning by student discovery, case study subjects, geo-architectural design practices.
29	Analysis of the properties of bio charcoal from husks and corn cob to improve the soil.
30	Analysis of Sustainable Community Development Indicators: Mae Faek Sub-district Municipality Case, San Sai District, Chiang Mai Province
31	Economic analysis of 8 MW solar power plant between fixed installation and solar tracking system in Thailand.
32	Analysis of 8 MW solar power plant economics Between fixed and sun tracking installation in Thailand.
33	Studies of increasing the oil content of tea seeds oil (*Camellia oleifera* Abel.) after harvesting.
34	Study of the strength of the roof frame of the factory building, where solar panels are installed, different distance levels to reduce the temperature under the panels.
35	A feasibility study of Venjury in carbon dioxide filling systems For closed-loop algae culture
36	Feasibility study of electricity generation by wind power in the pan basin area Chiang Mai Lamphun
37	Study the physical and chemical characteristics of tea seeds oil (Camellia oleifera Abel.) after harvesting.
38	Study of tourism potential in Chiang Mai Old Town
39	A study of the performance of the solar power generation system and the basic electricity system for a fish pond inflators.
40	Communication for the development of the Chiang Mai environment in a way: Spark U Chiang Mai project implements change

No.	Scholarly publications on sustainability (2020)
41	The supplementation of the pellet edible Rain tree leaf formula improves the kinetics of gas production, digestion and fermentation processes in vitro.
42	Reinforcing the mass transfer rate of carbon dioxide in the carbonator series for spirulina culture
43	Power sharing system design with time-division multiplexer technique for agricultural water pumps
44	Agricultural Sustainability of Sugarcane Farmers in Udon Thani
45	The relationship of organic carbon by the Permanganate Ossidice Sable and Organic products is an index of the quality of the soil growing laiya and rice-growing soil.
46	Diversity and plant utilization in the conservation forest area of the forest garden. Forest Industry Organization
47	The diversity of species and ecology of wild mushrooms can be eaten in the forest area of Ban Bun Chaem Community, Phrae Province.
48	The quality of arabica coffee beans grown under different forest conditions in the royal project area in Ban Khun Tap area. Tumbol Doi Kaeo, Amphoe Chom Thong, Chiang Mai
49	Energy index of fish pond aeration systems powered by photovoltaic systems combined with basic electrical systems
50	Textbooks, treatments and waste utilization
51	Take off the flood lessons in the sustainable upstream forest conservation process: a case study of Ban Boon Chaem Community Forest
52	Oil extraction techniques and biodiesel production from seed oil
53	Fuel furnace design technology for steaming mushroom cubes Case Study: Ban Luang Farmer, Mae Ai District, Chiang Mai
54	Landscape architecture concept to alleviate flooding in sub-municipality Nong Jom, Sansai, Chiang Mai
55	Financial management guidelines using the information system of the organic soy bean producers
56	Guidelines for youth tourism development for sustainable community tourism management Tumbol Kod Chang, Amphoe Mae Taeng, Chiang Mai
57	Modeling the structural equations influencing the decision to produce organic rice in Chiang Mai

No.	Scholarly publications on sustainability (2020)
58	Biodiesel from Coconut Processing Industry Waste
59	The effectiveness of certain essential oils on the control of *Tropilaelaps mercedesae* mites in bee species (*Apis mellifera* L.)
60	The volume of wood chips after the total cutting of teak wood, aged 37, in Suan Pa Thong Pha Phum, Kanchanaburi Province.
61	Factors affecting the acceptance of organic rice production of farmers in Chiang Mai
62	Solar impact and labor force on the financial value of solar rice mills
63	The effect of moringa leaves on the substitute of soybean meal on gas production kinetics, digestion capacity, and in vitro fermentation processes.
64	The effect of replacing soybean meal with crushed leaves on gas production kinetics In vitro gas production techniques are used to process gas production in vitro.
65	The effect of organic fertilizer on the yield and chemical composition of Napier Pak Chong 1
66	The effect of coffee bean shells and coffee grounds on the properties of fuel. Biomass Pellets
67	The effect of the cassava leaf formula includes the pellets. Gas production kinetics, sub-capacity and fermentation processes using in vitro gas production techniques.
68	Drought and flood risk areas, Mae Tha Basin, Lamphun Province
69	The control system and microcontroller from the PLC main control via the Internet of power generation system with the organic rangkin of San Kamphaeng Hot Springs Business, Mae On District, according to the Royal Initiative.
70	A form of conservation and restoration of folk sailing for ecotourism. Lamae District, Chumphon
71	Analyze the differences in decisions to buy organic products between urban and out-of-town consumers in Chiang Mai.
72	Learn the influence of turbine cover on the features of the Savonias wind turbine.
73	Maintaining status and approach to maintaining suburban agricultural land by promoting the role of cultural ecosystem service : San Kamphaeng District Case Study
74	Performance of rice drying system using integrated thermal energy sources
75	Influence of disclosure of sustainability report on business value

No.	Scholarly publications on sustainability (2020)
76	The influence of the corn cob on the properties of rubber flooring sheets from rubber.
77	Application of Compost Produced from the Wastewater of Mulberry Pulp and Paper Handicrafts on Soil Bioremediation
78	Impact of Climate Change on Oil Palm Production in Southern Thailand
79	Impacts of Climate Change and Adaptation Simulation for Risk Reduction of Rain-fed Rice Production in Central Region
80	Impacts of Migrant Labors on the Economics, Social and Environment on Chiang Mai District, Chiang Mai Province
81	The Impact Assessment of Climate Changes toward People's Healthy in Bangkok Metropolis
82	The Study of Temperature from Heat Transfer through Building Envelopes to Design Guidelines and Renovation High-performance Wall for Thai Lanna Vernacular Houses in Hot-humid Climate
83	Tobacco waste residue as the N-source for composting

No.	Scholarly publications on sustainability (2019)
1	Antibacterial, Antioxidant Properties and Bioactive Compounds of Thai Cultivated Mushroom Extracts against Food-borne Bacterial Strains
2	Dry Anaerobic Digestion of Sweet Corn Waste: Pilot Scale Study
3	Effect of gaseous ozone fumigation on organophosphate pesticide degradation of dried chilies
4	Effect of Plant Shading and Water Consumption on Heat Reduction of Ambient
5	Enhanced gas sensing performance of Ru-loaded p-type Co_3O_4 nanoparticles
6	Glucose Biosensors based on Nickel Ferrite Composite materials modified Glassy Carbon Electrode
7	Influence of Longan Biochar on Soil Temperature, Chemical Properties and Plant Growth in Loamy Sand
8	Influence of organic fertilizers on Growth and Yield of Piper sarmoentosum Roxb.
9	Microbial Production of Syrup from Broken Organic Jasmine Rice Grain

No.	Scholarly publications on sustainability (2019)
10	Microfluidic paper-based devices for arsenic (V) detection in contaminated environmental samples
11	Production of Briquette from agricultural residue
12	Synthesis of Molybdenum Trioxide: Structure Properties and Sensing Film Preparation
13	The Use of Bioreactor System and Aquatic Plants (Water Hyacinth) for Aquaculture Wastewater Treatment
14	The selection and classification of bacteria produces aminocyclopropane-1-carboxylate (acc) deaminase enzymes to help reduce stress conditions in organic plants.
15	The growth and yield of rice under different phosphorus fertilizer levels.
16	Energy consumption for organic riceberry production
17	Heat transfer test of the material sheet made of agricultural waste material with cement as a solder.
18	Vehicle performance testing using fuel from a transverse biomass gas burner
19	High efficiency biomass furnace performance assessment when entering corn cob pellets continuously
20	The application of geopolymer/zirconium oxide mixtures for application in green building structures.
21	Comparison of biomass and nutritional value of algae in the culture of environmentally friendly closed systems.
22	Comparing the equation, the relationship between tree height and trunk diameter and estimating the amount of carbon in the biomass of two areas of Dipterocarp’s forest in northern Thailand.
23	Electricity generation combined with cooling and heating from San Kamphaeng's stepped geothermal energy technology.
24	Development of biomass fuel from peanut shell fragments
25	Development of web applications for solar power performance monitoring systems
26	Acceptance of the farming system of maize farming by means of not burning debris and overlapping with the legumes of farmers in the area of the Royal Mae Salong High Area Development Project. Mae Fah Luang District, Chiang Rai Province
27	Thermal Analysis of Biochar Products

No.	Scholarly publications on sustainability (2019)
28	Strengthening the Organic Rice Planting Group of Nong Slap Organic Community Enterprises, Omkoi District, Chiang Mai Province
29	Bio charcoal furnace design
30	Chiang Mai Municipal Park Spatial Development Guidelines for Sustainable Urban Vision
31	Guideline for development and network management of The Organic Vegetable Community Enterprise Group, Chiang Mai
32	Residential and environmental design guidelines using an engaging design approach Ban Phen Den Case Study
33	Guidelines for designing and improving the green pavement system, Maejo University Chiang Mai
34	Guidelines for designing prototype buildings for energy conservation in accordance with green university policy
35	Factors affecting organic rice production, Hat Kruat Sub-district, Uttaradit Province
36	The effects of the use of bio-charcoal in combination with the management of wet, dry water in the soil, planting rice. greenhouse gas emissions and certain properties of the soil. Compared to water management in the water.
37	The impact of temperature and torry factors on agricultural waste properties
38	The effect of triple super phosphate and organic fertilizer management on the change in the chemical properties of the soil in the production of green beans in Kamphaeng Saen varieties. 2
39	The effect of organic fertilizer on the growth and total content of the phenolic compounds of the jingu shia.
40	The control system and microcontroller from the PLC main control via the Internet of power generation system with the organic rangkin of San Kamphaeng Hot Springs Business, Mae On District, according to the Royal Initiative.
41	Structural characteristics of the society of wild plants Dipterocarp with wild sweet vegetables. Ban Pong Development Project due to The Royal Initiative Maejo University, Chiang Mai
42	A web application for real-time energy monitoring systems based on NodeJs and AngularJs.
43	Study the release of nitrogen beneficial to soil plants where various types of organic fertilizers are used.

No.	Scholarly publications on sustainability (2019)
44	Some soil properties and entry into the roots of the fungus *Arbuscura mycorisa* in the aroma coffee plot under different planting patterns.

Number of events related to sustainability

Number of event and projects related to sustainability is **82 projects** event from the government budget and others.

Project Summary for The Operation of Green University Year 2022

	Project Name
1	โครงการสร้างความรู้ความเข้าใจเกี่ยวกับสำนักงานสีเขียว (Green Office) (Project to build knowledge and understanding about the green office)
2	การขับเคลื่อนการดำเนินงานเพื่อมุ่งเป็นสำนักงานสีเขียวของคณะบริหารธุรกิจ (Green Office BAMJU) (Driving operations to be a green office of the Faculty of Business Administration)
3	โครงการต่ออายุใบรับรองมาตรฐานปัจจัยการผลิตอินทรีย์ ACT-IFOAM ของผลิตภัณฑ์จุลินทรีย์ชีวภาพ MMO ตราแม่โจ้ กรีน ประจำปี 2564 (Project to renew the certificate of organic production inputs ACT-IFOAM for biological microbial products MMO brand Maejo Green Year 2021)
4	โครงการต่ออายุใบรับรองมาตรฐานปัจจัยการผลิตอินทรีย์ ACT-IFOAM ของผลิตภัณฑ์จุลินทรีย์ชีวภาพ MMO ตราแม่โจ้ กรีน ประจำปี 2565 (Project to renew the certificate of organic production inputs ACT-IFOAM for biological microbial products MMO brand Maejo Green Year 2022)
5	โครงการ "สำนักงานสีเขียว Green office มุ่งสู่ Well being มหาวิทยาลัยแม่โจ้-ชุมพร ประจำปีงบประมาณ พ.ศ. 2565" (Project "Green office Green office towards Well being Maejo University - Chumphon Fiscal Year 2022)
6	โครงการ “Green & Sustainability Design of Universal” การออกแบบสภาพแวดล้อมสีเขียว เพื่อความยั่งยืนสำหรับคนทุกคน (“Green & Sustainability Design of Universal” project, green environment design for sustainability for all)
7	โครงการ Green economics for all students 2021 (Green economics for all students 2021 project)
8	โครงการ Green Economy for all ประจำปี 2565 (Green Economy for all project of the year 2022)
9	โครงการ Green Office: กิจกรรมอบรมการป้องกันและระงับอัคคีภัยและฝึกซ้อมดับเพลิงและหนีไฟ ประจำปี 2565 (Green Office Project: Fire prevention and suppression training activities and fire and fire escape drills for the year 2022)
10	โครงการการดำเนินกิจกรรมด้านสิ่งแวดล้อมของเยาวชนภายในมหาวิทยาลัย (Green Youth) ปี 2565 (Biochar/เชื้อเพลิงแข็ง รักษ์ดิน รักษ์โลก) (Environmental Activities for Youth within the University Project (Green Youth) Year 2022 (Biochar/Solid Fuels, Save the Earth, Save the Planet))

11	โครงการขับเคลื่อนการดำเนินงานมหาวิทยาลัยสีเขียว MJU Green University (Project to drive green university operations MJU Green University)
12	โครงการคณะสีเขียว (Green office) (Faculty of Green Project (Green office))
13	โครงการบริหารจัดการห้องสมุดสีเขียวและสำนักงานสีเขียวอย่างยั่งยืน (Green Library and Green Office Sustainable Management Project)
14	โครงการพัฒนาอาคารอำนวย ยศสุข สู่สำนักงานสีเขียว (Green Office) (Amnuay Yossuk Building Development Project to Green Office)
15	โครงการเพิ่มระดับ Ranking ในระดับนานาชาติและ Green University (International Ranking Program and Green University)
16	โครงการยกระดับการเป็นองค์กรสีเขียว Green Office (Project to upgrade to be a green organization Green Office)
17	โครงการส่งเสริมและพัฒนาเทคโนโลยีเกษตรอัจฉริยะและดิจิทัล และ Green University Ranking (Project for the promotion and development of smart and digital agricultural technology and Green University Ranking)
18	โครงการสนับสนุนยุทธศาสตร์ GO Eco U มหาวิทยาลัยแม่โจ้ : กิจกรรมการสร้างความรู้ความเข้าใจความสำคัญของสำนักงานสีเขียว (Green Office) และการลดขยะเป็นศูนย์ (Zero Waste)ในงานสำนักงาน (Maejo University GO Eco U Strategic Support Project: Green Office (green) Office) and reduce zero waste in office work)
19	โครงการสร้างภาพลักษณ์ศูนย์เกษตรอินทรีย์ต้นแบบเพื่อขับเคลื่อนยุทธศาสตร์ Green Organic Eco University (Project to create an image of a prototype organic agriculture center to drive the strategy of Green Organic Eco University)
20	โครงการสำนักงานสีเขียว (Green office) (Green office project)
21	โครงการสำนักงานสีเขียว (Green Office) คณะสารสนเทศและการสื่อสาร (Green Office Project, Faculty of Information and Communication)
22	โครงการสำนักงานสีเขียว (Green Office) คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม (Green Office Project, Faculty of Architecture and Environmental Design)
23	โครงการสำนักงานสีเขียว (Green Office) สำนักงานมหาวิทยาลัย (Green Office Project, University Office)
24	โครงการสำนักวิจัยฯ สีเขียว และสำนักงานสีเขียว (Green Research Office Project and Green Office Project)
25	โครงการศึกษาดูงานด้านรัฐศาสตร์และรัฐประศาสนศาสตร์ในมิติการบริหารองค์การชุมชนและสิ่งแวดล้อม ประจำปีการศึกษา 2564 (A study visit project on political science and public administration in the dimension of community organization management and environment Academic year 2021)

26	โครงการ "การบริหารการพัฒนาศูนย์กลิกรรมไร้สารพิษเกษตรสุขภาพ รักษ์สิ่งแวดล้อม สู่ความยั่งยืน" (Project "Development Management of Non-Toxic Agriculture Center for Health Agriculture environmental protection towards sustainability)
27	กิจกรรมการเพิ่มช่องทางการเข้าถึงบทความในฐานข้อมูลออนไลน์ ด้านอนุรักษ์พลังงานและสิ่งแวดล้อม ด้านการเกษตร (Activities to increase access to articles in online databases Energy and Environment Conservation Agriculture)
28	โครงการ "การบริโภคนิยมใหม่ใส่ใจสิ่งแวดล้อมและสุขภาวะ" (Project "New consumerism cares about the environment and health)
29	โครงการ “ธรรมชาติปลอดภัยแม่แจ่ม ; สร้างฝายมีชีวิตเพื่ออนุรักษ์คน น้ำ ป่า และอาชีพที่เป็นมิตรกับสิ่งแวดล้อม ประจำปี 2565” (Project “Nature is safe, Mae Chaem ; Build a living weir to conserve people, water, forests, and environmentally-friendly occupations for the year 2022.”)
30	โครงการการดำเนินกิจกรรมด้านสิ่งแวดล้อมของเยาวชนภายในมหาวิทยาลัย (Green Youth) ปี 2565 (Biochar/เชื้อเพลิงแข็ง รักษ์ดิน รักษ์โลก) (Environmental Activities for Youth within the University Project (Green Youth) Year 2022 (Biochar/Solid Fuels, Save the Earth, Save the Planet))
31	โครงการค่ายอนุรักษ์และพัฒนาสิ่งแวดล้อม ประจำปีการศึกษา 2564 (Environmental Conservation and Development Camp Project Academic year 2021)
32	โครงการเตรียมความพร้อมสหกิจศึกษา สาขาวิชาเศรษฐศาสตร์เกษตรและสิ่งแวดล้อม ประจำปีการศึกษา 2565 (Cooperative Education Preparation Project Department of Agricultural and Environmental Economics Academic year 2022)
33	โครงการนำนักศึกษาสาขาวิชาเศรษฐศาสตร์เกษตรและสิ่งแวดล้อม ศึกษาดูงานนอกสถานที่ ประจำปีการศึกษา 2565 (Field Study Plan for Students of Agricultural and Environmental Economics, 2022 Academic Year)
34	โครงการประชาสัมพันธ์คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม (Public Relations Project of the Faculty of Architecture and Environmental Design)
35	โครงการปรับปรุงและพัฒนาสิ่งแวดล้อม (Environmental improvement and development project)
36	โครงการฝึกอบรมเชิงปฏิบัติการพัฒนาทักษะความเป็นผู้นำและจิตอาสาพัฒนาสิ่งแวดล้อม (Leadership skills development workshops and environmental development volunteers)
37	โครงการเพิ่มศักยภาพการเรียนรู้ และส่งเสริมการจัดกิจกรรมของนักศึกษาหลักสูตรการออกแบบและวางแผนสิ่งแวดล้อม (Project to increase learning potential and promote the organization of student activities in the Environmental Design and Planning Program)
38	โครงการเลี้ยงปลาเชิงซ้อนร่วมกับการปลูกพืชอควาโปนิกส์ในระบบที่เป็นมิตรกับสิ่งแวดล้อม เพื่อเข้าสู่เกษตรอินทรีย์ (Complex Fish Farming Project with Aquaponics Planting in an Environmentally Friendly System to enter organic agriculture)
39	โครงการวาระครบรอบ 15 ปี วันสถาปนาคณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม มหาวิทยาลัยแม่โจ้ (15th Anniversary Project, Founding Day of the Faculty of Architecture and Environmental Design Maejo University)

40	โครงการศึกษาดูงานนอกสถานที่ ทำความดีเพื่อชุมชน รณรงค์รักษ์สิ่งแวดล้อม (Field investigation: do well for the community and carry out environmental protection campaigns)
41	โครงการส่งเสริมการขับเคลื่อนยุทธศาสตร์เกษตรพลังงานทดแทนและพัฒนาสิ่งแวดล้อมมหาวิทยาลัยแม่โจ้ (Project to promote the strategy of agriculture, renewable energy and environmental development, Maejo University)
42	โครงการสหกิจศึกษา ศศ 497 สาขาวิชาเศรษฐศาสตร์เกษตรและสิ่งแวดล้อม ประจำปีการศึกษา 2/2564 (Cooperative Education Project ศศ 497 in Agricultural and Environmental Economics Academic year 2/2564)
43	โครงการสัมมนาสโมสรนักศึกษาคณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม ประจำปี 2565 (Student Club Seminar Project of Faculty of Architecture and Environmental Design Year 2022)
44	โครงการสานสัมพันธ์น้องพี่สาขาวิชาเศรษฐศาสตร์เกษตรและสิ่งแวดล้อม ประจำปี 2565 (Sister Relations Project in the field of Agricultural Economics and Environment Year 2022)
45	โครงการสำนักงานสีเขียว (Green Office) คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม (Green Office Project, Faculty of Architecture and Environmental Design)
46	โครงการอนุรักษ์สิ่งแวดล้อม (environmental conservation project)
47	โครงการอบรมเชิงปฏิบัติการตามแผนแม่บทโครงการอนุรักษ์พันธุกรรมพืชอันเนื่องมาจากพระราชดำริ สมเด็จพระกนิษฐาธิราชเจ้า กรมสมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี เรื่อง“หมอต้นไม้ในงานภูมิทัศน์” โดยเทศบาลตำบลแม่สาย จังหวัดเชียงราย ร่วมกับ หลักสูตรเทคโนโลยีภูมิทัศน์ คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม มหาวิทยาลัยแม่โจ้ จังหวัดเชียงใหม่ มหาวิทยาลัยราชภัฏเชียงราย สมาคมยางนา-ชี้เหล็กสยาม (Workshop project according to the Master Plan of Plant Genetic Conservation Project under the Royal Initiative Somdej Phra Kanitthathirat Department of Her Royal Highness Princess Maha Chakri Sirindhorn Her Royal Highness Princess Maha Chakri Sirindhorn “Tree Doctor in Landscape Work” by Mae Sai Subdistrict Municipality Chiang Rai Province together with the Landscape Technology Course Faculty of Architecture and Environmental Design Maejo University Chiang Mai Province Chiang Rai Rajabhat University Rubber Association - Cassia Siam)
48	โครงการอบรมเพื่อพัฒนาทักษะเกษตรด้านการผลิตพืชผักอินทรีย์และพัฒนาสิ่งแวดล้อมอย่างยั่งยืน ภายใต้แหล่งเรียนรู้ระบบเกษตรธรรมชาติ คณะเศรษฐศาสตร์ (Training project to develop agricultural skills in organic vegetable production and sustainable environmental development Under the learning source of natural agriculture system Faculty of Economics)
49	แลกเปลี่ยนเรียนรู้วิถีชีวิตล้านนาและสิ่งแวดล้อมบูรณาการเรียนการสอน (Exchanging knowledge of the Lanna way of life and the integrated teaching and learning environment)
50	โครงการการบริหารจัดการและพัฒนาชุมชนโดยใช้ทุนทางสังคมเป็นฐานเพื่อการพัฒนาอย่างยั่งยืน (Social Capital-Based Community Management and Development Projects for Sustainable Development)

51	โครงการการบริหารจัดการศูนย์เรียนรู้ลานบุญชุมชนแพะป่าห้าให้เกิดความเข้มแข็งและยั่งยืน (Project for the management of the Ban Phae Pa Ha Community Merit Learning Center for strength and sustainability)
52	โครงการ "การบริหารการพัฒนาศูนย์กสิกรรมไร้สารพิษเกษตรสุขภาพ รักษ์สิ่งแวดล้อม สู่ความยั่งยืน" (The project of "Sustainable Development Management of the Center for Non toxic Health and Environment in Agriculture")
53	การผลิต “ถ่านใบไม้ไร้ควัน” เพื่อการพัฒนาที่ยั่งยืนของเครือข่ายวิสาหกิจชุมชน ในตำบลป่าไผ่ อำเภอสันทราย จังหวัดเชียงใหม่ (Production of “smokeless leaf charcoal” for sustainable development of community enterprise networks in Tambon Pa Phai, San Sai District, Chiang Mai Province)
54	การฝึกอบรมให้ความรู้ด้านปรัชญาเศรษฐกิจพอเพียงแก่ชาวต่างชาติเพื่อความยั่งยืน (Training to educate foreigners on Sufficiency Economy Philosophy for Sustainability)
55	การยกระดับบุคลากรทางการศึกษาภาคเหนือให้มีทักษะการผลิตสื่อ Digital หรือ Animation เพื่อถ่ายทอดโครงการพัฒนาอย่างยั่งยืน (SDGs) และนวัตกรรมแก่คนรุ่นใหม่และชาวต่างประเทศ (สื่อ digital ภาษาไทยและภาษาอังกฤษ) (Upgrading education personnel in the North to have the skills to produce Digital or Animation media in order to transfer Sustainable Development Projects (SDGs) and innovations to the new generation and foreigners (digital media in Thai and English))
56	การอบรมการประยุกต์ใช้โมเดลเศรษฐกิจหมุนเวียนสีเขียวและการพัฒนาที่ยั่งยืนของเกษตรที่สูง (Training on the application of the Green Circular Economy Model and the Sustainable Development of High Agriculture)
57	โครงการ "จัดทำระบบสื่อความหมายเพื่อเชื่อมโยงเส้นทางการอนุรักษ์พันธุกรรมพืช ของมหาวิทยาลัยแม่โจ้-ชุมพรเพื่อการท่องเที่ยวอย่างยั่งยืน" (Project "Building a interpretive system to link the path of conservation of plant genetics of Maejo University - Chumphon for sustainable tourism)
58	โครงการ “Green & Sustainability Design of Universal” การออกแบบสภาพแวดล้อมสีเขียว เพื่อความยั่งยืนสำหรับคนทุกคน (“Green & Sustainability Design of Universal” project, green environment design for sustainability for all)
59	โครงการการจัดการเส้นทางท่องเที่ยวอย่างยั่งยืน ประจำ ปีงบประมาณ 2565 (Sustainable Tourism Route Management Project for fiscal year 2022)
60	โครงการขับเคลื่อนและหนุนเสริมองค์ความรู้ของในหลวงรัชกาลที่ 9 สู่ชุมชนและสังคมอย่างยั่งยืน (Project to drive and support the knowledge of King Rama IX towards sustainable communities and society)
61	โครงการจัดการพลังงานทางเลือกของชุมชนอย่างยั่งยืน (Sustainable Community Alternative Energy Management Project)
62	โครงการบริหารจัดการทรัพยากรด้านพลังงานทดแทน เพื่อการหารายได้และใช้ประโยชน์อย่างยั่งยืน (Renewable Energy Resource Management Project for income and sustainable use)
63	โครงการบริหารจัดการห้องสมุดสีเขียวและสำนักงานสีเขียวอย่างยั่งยืน (Sustainable Green Library and Green Office Management Project)

64	โครงการบัณฑิตนักพัฒนา มุ่งสร้างคุณค่าแหล่งท่องเที่ยวสู่ความยั่งยืน (Developer Graduate Program Aiming to create tourism value for sustainability)
65	โครงการบูรณาการวิชาการแก่ชุมชน "ชุมชนยั่งยืน" (Community Academic Integration Project "Sustainable Community)
66	โครงการประชุมวิชาการระดับชาติศิลปศาสตร์วิชาการ ครั้งที่ 2 :ภาษา วัฒนธรรม การสื่อสารและสุขภาวะกับนวัตกรรมการพัฒนาสังคมอย่างยั่งยืน (The Second National Academic Conference on Liberal Arts: Language, Culture, Communication and Health and Innovation for Sustainable Social Development)
67	โครงการพระราชดำริที่ยั่งยืนด้วยวัตกรรมเกษตร อาหาร และสุขภาพ (Sustainable Royal Initiative Project with Agriculture, Food and Health Innovations)
68	โครงการพัฒนาศูนย์ต้นแบบเศรษฐกิจพอเพียง (SE) ตามแนวทางพระราชดำริ ฯ สู่การพัฒนาที่ยั่งยืน (SDGs) มหาวิทยาลัยแม่โจ้-แพร่ เฉลิมพระเกียรติ (According to the project of the Demonstration Center (SE) for the Development of Self sufficiency Economy under the Royal Sustainable Development Initiative (SDG), Maejo University - Phrae, ChaloemPhrakiat)
69	โครงการส่งเสริมความเข้มแข็งและยั่งยืนของชุมชน (Community Strengthening and Sustainability Project)
70	โครงการเสริมสร้างความเข้มแข็งการพึ่งพาตนเองในการทำการเกษตรแบบปลอดภัยเพื่อการพัฒนาที่ยั่งยืน (Strengthening sustainable development, safe agriculture and self-reliance Project)
71	โครงการอบรมเพื่อพัฒนาทักษะเกษตรด้านการผลิตพืชผักอินทรีย์และพัฒนาสิ่งแวดล้อมอย่างยั่งยืน ภายใต้แหล่งเรียนรู้ระบบเกษตรธรรมชาติ คณะเศรษฐศาสตร์ (Training project to develop agricultural skills in organic vegetable production and sustainable environmental development Under the learning source of natural agriculture system Faculty of Economics)
72	งานเกษตรแม่โจ้ตามศาสตร์พระราชาเพื่อการพัฒนาอย่างยั่งยืน (Maejo Agriculture Fair according to the King's Science for Sustainable Development)
73	กิจกรรมการเพิ่มช่องทางการเข้าถึงบทความในฐานข้อมูลออนไลน์ ด้านอนุรักษ์พลังงานและสิ่งแวดล้อมด้านการเกษตร (Activities to increase access to articles in online databases Energy and Environment Conservation Agriculture)
74	โครงการ 1 คณะ 1 ผลิตภัณฑ์ (ต้นแบบ ตู้อบแห้งพลังงานพลังงานแสงอาทิตย์ร่วมกับไฟฟ้าแบบแยกส่วน) (Project 1 Board 1 Product (Prototype Drying Cabinet Solar Energy Combined with Split Electricity))
75	โครงการ การแปรรูปและเพิ่มมูลค่าผลผลิตทางการเกษตรโดยใช้ห้องอบแห้งพลังงานแสงอาทิตย์ (Processing and Value Adding of Agricultural Products by Using Solar Drying Room Project)
76	โครงการ การพัฒนาศักยภาพผู้ประกอบการรุ่นใหม่ วิทยาลัยพลังงานทดแทน (Project to develop the potential of new entrepreneurs Renewable Energy College)

77	โครงการ พัฒนาพลังงานทดแทนอย่างมีส่วนร่วมเพื่อเพิ่มศักยภาพศูนย์การเรียนชาวไทยภูเขาและคุณภาพชีวิตที่ดีกว่าของชุมชนบนพื้นที่สูงบ้านจอลือเหนือจังหวัดแม่ฮ่องสอน (Participatory renewable energy development project to increase the potential of the hill tribe learning center and the better quality of life of the community in Ban Jorlue Nuea, Mae Hong Son Province)
78	โครงการ อบรมเผยแพร่องค์ความรู้เทคโนโลยีพลังงานทดแทนและระบบสมาร์ทฟาร์มแก่เกษตรกรเพื่อพัฒนาสู่เกษตรดิจิตอล 4.0 (Training project to disseminate knowledge of renewable energy technology and smart farm systems for farmers to develop into digital agriculture 4.0)
79	โครงการจัดการพลังงานทางเลือกของชุมชนอย่างยั่งยืน (Sustainable Community Alternative Energy Management Project)
80	โครงการบูรณาการพลังงานทดแทนกับการทำนุบำรุงศาสนาและวัฒนธรรม (Renewable Energy Integration Project with Religious and Cultural Preservation)
81	โครงการผลิตบัณฑิตและพัฒนาศักยภาพบัณฑิตทางด้านพลังงานทดแทนในกลุ่มประเทศอาเซียนสำหรับนักศึกษาปริญญาตรี (โครงาน ทุนยากจน) (Graduate Production and Graduate Potential Development Program in Renewable Energy in ASEAN Countries for Undergraduate Students (Poverty Scholarship Program))
82	โครงการส่งเสริมการขับเคลื่อนยุทธศาสตร์เกษตรพลังงานทดแทนและพัฒนาสิ่งแวดล้อมมหาวิทยาลัยแม่โจ้ (Project to promote the strategy of agriculture, renewable energy and environmental development, Maejo University)

Number of student organizations related to sustainability

There are many student organizations which create activities about green and environment conservation. During normal situation they can do many things to promote except in the period of Covid-19.

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There are 18 student organizations related to sustainability.

No.	Logo	Name of organization	Objectives of organization	Activities
1		องค์การนักศึกษา มหาวิทยาลัยแม่โจ้ Student Union of Maejo University	It is the main organization of students in organizing activities to develop students within the university in accordance with the identity of the university.	MJU learning & sharing together 2022 activities

No.	Logo	Name of organization	Objectives of organization	Activities

No.	Logo	Name of organization	Objectives of organization	Activities
2		สภานักศึกษา มหาวิทยาลัยแม่โจ้ Student Council of Maejo University	It is a student organization to monitor, defend the rights, and present the material necessary for the life of students on campus.	Intinil project, a new bold council in 2022
3		สโมสรนักศึกษาคณะเศรษฐศาสตร์ Student Union of Faculty of Economics	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's	Training courses "Organic vegetable production and simple straw mushro

			graduate qualities.	om cultivation
4		สโมสรนักศึกษาคณะวิทยาศาสตร์ Student Union of Faculty of Science	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's graduate qualities.	Project Activities "Garbage Exchange"

No.	Logo	Name of organization	Object of organiz
5		สโมสรคณะเทคโนโลยีการประมงและทรัพยากรทางน้ำ Student Union of Faculty of Fisheries Technology and Aquatic Resources	Faculty-level organization organizes act for students the Faculty to become stud according to Faculty's grad qualities.

6		สโมสรวิทยาลัยบริหารศาสตร์ Student Union of School of Administrative Studies	Faculty-level organization organizes act for students the Faculty to become stud according to Faculty's grad qualities.
7		สโมสรนักศึกษาคณะผลิตกรรมการเกษตร Student Union of Faculty of Agricultural Production	Faculty-level organization organizes act for students the Faculty to become stud according to Faculty's grad qualities.

No.	Logo	Name of organization	Objectives of organization	Activities
8		สโมสรนักศึกษาคณะศิลปศาสตร์ Student Union of Faculty of Liberal Arts	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's graduate qualities.	Classify the garbage before disposal.
9		สโมสรนักศึกษาคณะวิศวกรรมและอุสาหกรรมเกษตร Student Union of Faculty of Engineering and Agro-industry	Faculty-level student organization that organizes activities for students within the Faculty to become students	MJU Green & Clean Food Festival

			according to the Faculty's graduate qualities.	
10		สโมสรนักศึกษา คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม Student Union of Faculty of Architecture and Environmental Design	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's graduate qualities.	Environmental protection camp

No.	Logo	Name of organization	Objectives of organization	Activities
11		สโมสรนักศึกษาคณะสัตวศาสตร์และเทคโนโลยี Student Union of Faculty of Animal science and Technology	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's graduate qualities.	Green Heart Smart Student Animal Science Volunteer University Development Activities
12		สโมสรนักศึกษาคณะสารสนเทศและการสื่อสาร Student Union of Faculty of Information and Communication	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's	Faculty Development Volunteer Activities

			graduate qualities.	
13		สโมสรนักศึกษาคณะพัฒนาการท่องเที่ยว Student Union of School of Tourism Development	Faculty-level student organization that organizes activities for students within the Faculty to become students according to the Faculty's graduate qualities.	Provide drinking water for forest fire fighting tasks to the forest fire fighting volunteer team, and establish forest fire lines in the area.
14		สโมสรนักศึกษาวิทยาลัยพลังงานทดแทน Student Union of School of Renewable Energy	Faculty-level student organization that organizes activities for students	volunteer activities

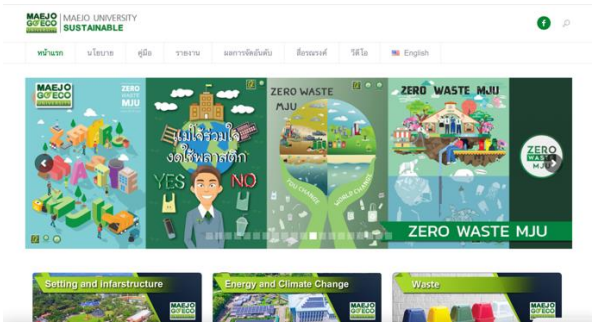
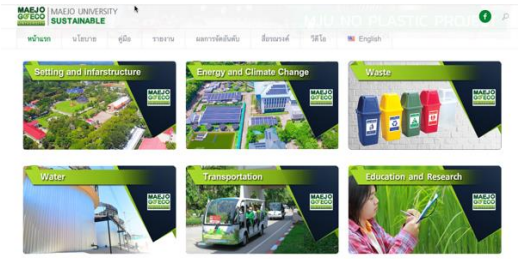
			within the Faculty to become students according to the Faculty's graduate qualities.	
15		ชมรมนกเสรี Freedom Bird Club	To develop creative competence and problem solving in the public mind towards helping the community and society.	lack rice planting camp and learn life skills
16		ชมรมรากดินแม่โจ้ Maejo's Rakdin Club (RMC)	To encourage students to have a public mind to help the community and society.	Invite the new generation to try, learn and understand the community,

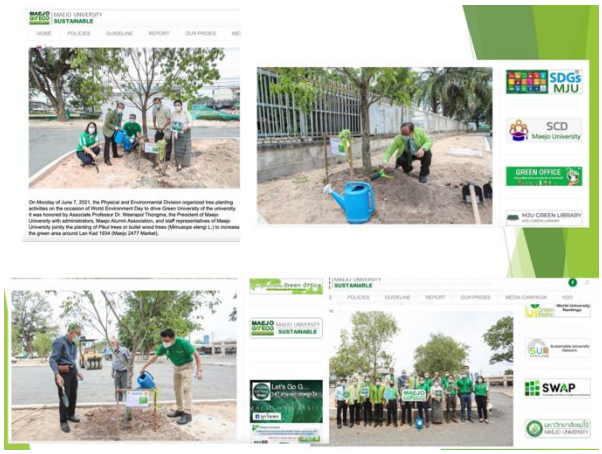
				and enjoy the happiest meal in the Huay Hin Lad community.

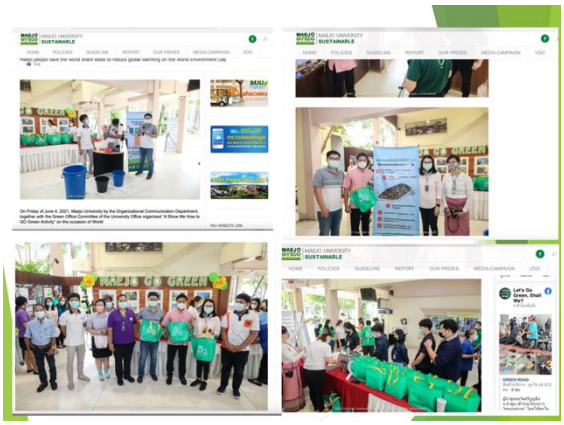
No.	Logo	Name of organization	Objectives of organization	Activities
17		ชมรมอนุรักษณ์ธรรมชาติและสิ่งแวดล้อม Nature and Environmental Conservation Club	To enable students who are interested in environmental conservation to participate in activities and benefits.	Biochar making activity
18		ชมรมยุวเกษตรกร Young Farmers Club	To foster the attitude of young agricultural group members to be proud of	Project to Strengthen Agricultural

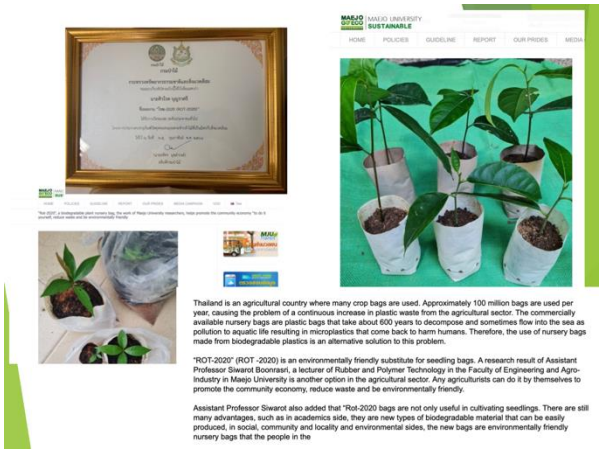
			the value of agriculture and to accept agriculture as a profession	Production Group

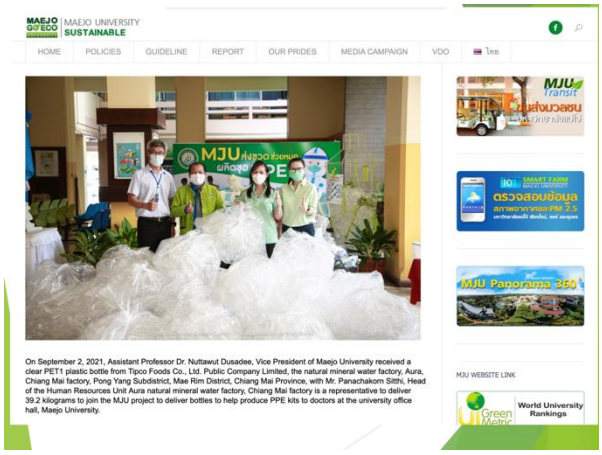
University-run sustainability website

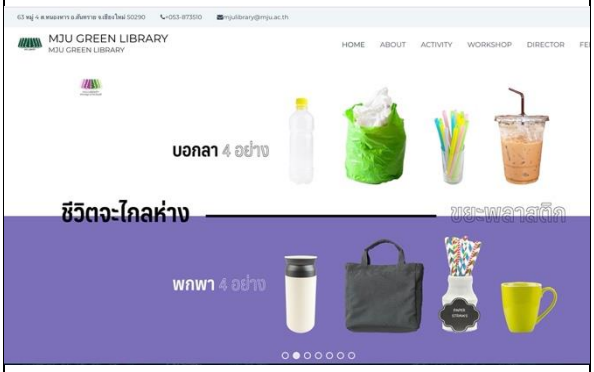
	











University sustainability website is available at http://www.green.mju.ac.th as bilingual description which consist of university's policy and strategies in green and sustainability. The information of green university issue, news and activities in both our staff and students were published on website. In addition, we also operate activities of SDGs (https://sdg.mju.ac.th) and green office that linked on university's website. Our website is available, accessible and updated regularly.

Sustainability report

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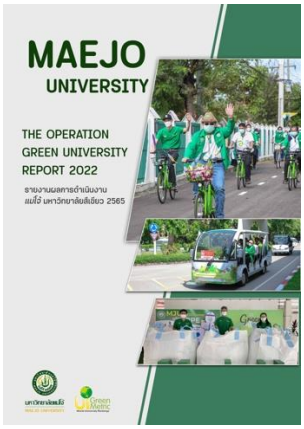
<td> 
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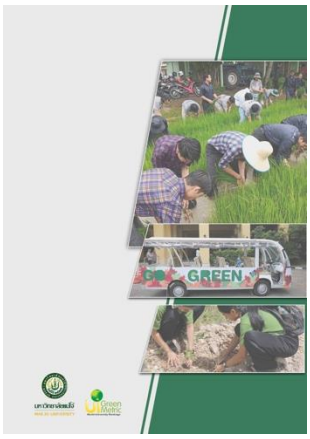
<td> 
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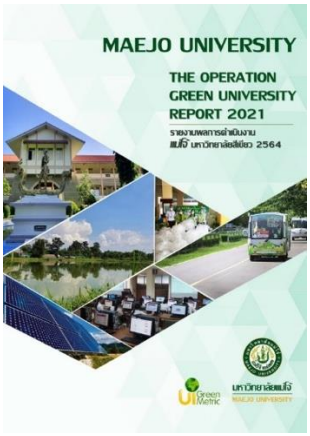
<td> 
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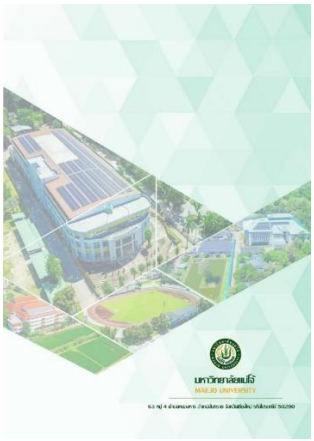
<td>  </td>
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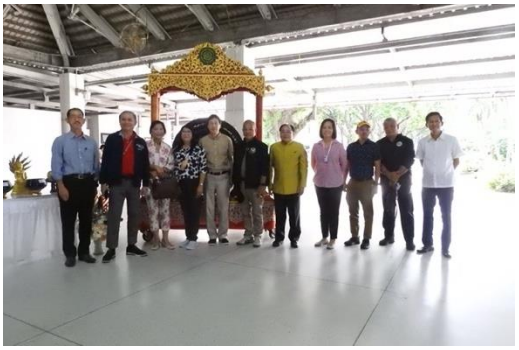
The sustainability report of Maejo university is available and updated annually. We operate both in UI Green metric and SDGs report that available on website https://green.mju.ac.th/?page_id=3289&lang=en and https://sdg.mju.ac.th

Number of cultural activities on campus (e.g.Cultural Festival) including virtual activities (if any)

Worship ceremony of Maejo Shrine

Restoration of Mae Jo Ruam Jai Memorial Bridge 70th Anniversary

Ceremony to offer Buddhist candle 2022



Candle casting ceremony for the year 2022

Sacred ceremony to indoctrinate the students

Pouring water on the hands of revered elders and ask for blessing, Songkran Festival

The **cultural activities on campus** organized by the University: more than 3 **events**

- On October 28, 2021, the Rector of Maejo University presided over the worshiping ceremony of Maejo Shrine for auspiciousness before starting the landscape improvement project "Jad Chaeng decorates the Hue Mae garden" in the area of Chao Mae Jo Shrine which is a project that Maejo University together with Maejo Alumni Association and Maejo alumni networks across the country held "Maejo Shrine", an important sacred object that holds the hearts of the people of Maejo have been built since the times Khun Phra Chuang Kaset Silpakorn be the headmaster. It has been renovated and relocated several times. Until November 2008, there was construction and improvement of the landscape of Chao Maejo Shrine (present) at the Thai Orchid Garden in honor of Her Royal Highness Princess Maha Chakri Sirindhorn Her Royal Highness Princess Maha Chakri Sirindhorn. The landscape improvement project “Jad Chang decorates Suan Hue Mae” was born from the intention of Maejo alumni who wanted to improve the landscape. The area of Chao Maejo Shrine continues to be beautiful, and is a learning center for landscape management as well as a collection of various plant species according to an environmentally friendly landscaping system. There will be improvements in the planning, leveling, pool work, courtyard work, main entrance floor, misting water system work, electrical system work, waterfall, stream work, and additional tree planting work. This represents the unity of the children of Maejo who have joined together to nourish the place that is the center of the mind of all Maejo students.

- On October 30, 2021, the Chairman of Maejo University Council presided over the ceremony of robe offerings to repair the bridge, Maejo Ruam Jai, a 70-year memorial that the Maejo Alumni Association has held. Maejo Senior Alumni Representatives of Maejo alumni of each generation attended the ceremony at the Maejo Alumni Association, Chiang Mai Province, “Maejo Ruamjai Bridge, a 70th Anniversary Memorial, built in the year 2004 by the bridge structure. It is a solid wood assembled in the form of a two-sided truss structure. The objective is to build a bridge across the Huai Jo River to be a link between the Alumni Association with Maejo University. This will facilitate and use as a travel route for students and staff of Maejo University including creating intimacy between students personnel and alumni of Maejo as well. Later, a large tree fell on the bridge causing damage. At present, the bridge has been damaged due to the decay of the wooden structure over time. As a result, the bridge collapsed until it became unusable. Organizing the robe of the association for fundraising from Maejo alumni across the country to improve the repair of the aforementioned bridge It is truly a joint effort of Maejo's students.

- On July 11, 2022, Vice President of Maejo University Presiding over the candle offering ceremony for the year 2022, leading the management team, faculty members, personnel, deans from the department of the bureau to attend the candle offering ceremony Rain cloth and Thai dharma utensils by offering to Mae Jo Temple, Wivewanaram Temple Wat Thung Pa Mueng Wat Thung Muen Noi and Wat Huai Kiang in order to preserve Buddhism and carry on the tradition of the Buddhist Lent to continue at the Phutthaming Mongkhon Building Maejo University
- On July 4, 2022, Arts and Culture Promotion Division Maejo University organized candle casting ceremony for the year 2022 with the Rector of Maejo University presided over lighting

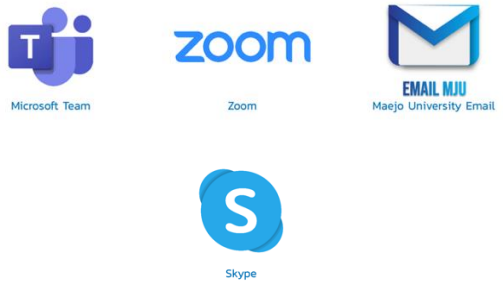
incense and candles to worship the Three Jewels along with the management team. It was also honored to attend international seminars of the Association of Asian Agricultural Colleges and Universities and Maejo University. Between 4-8 July 2022 at the Furama Hotel conference room from the Philippines, Taiwan, Indonesia, the United States, South Korea, Japan, India, Nigeria, Germany, Pakistan, Malaysia and Thailand, before joining with faculty, staff, students, cast 1 candle at the plantation building to offer candles to the Buddhist Lent.

- On August 18, 2022, Faculty of Architecture and Environmental Design held a ceremony "Kru Kin Aor's family pays respect to the integrated art teacher of the year 2022" in order to cultivate professional ethics. Build morale in education as well as to create unity among the group and show gratitude to the faculty. In this regard, the Bai Sri Su Kwan ceremony was performed. Lanna style art teachers also known as "Khru Chang's family ceremony", which is organized this time. Emphasis on staging style in "less but more" Lanna art style, using the background of the ceremony as a digital file format. which is integrated with teaching by organizing a design contest for students in related subjects jointly create works and select the best works by the faculty members In order to save resources and time to create a backdrop for the ceremony. by modifying from creating a real scene simulation come as a digital file

- Black Ceremony for the President and Seniors of Maejo University has been held annually By assigning the Arts and Cultural Promotion Division to be the main unit in carrying out the activities. to join in asking for forgiveness salute the elders and is a continuation of the Lanna New Year tradition or Thai New Year traditions during Songkran Festival

References: https://erp.mju.ac.th/informationIndex.aspx?tid=7

Number of university program(s) to improve teaching and learning

	
Helpdesk for E-Learning	Programs for online teaching and learning

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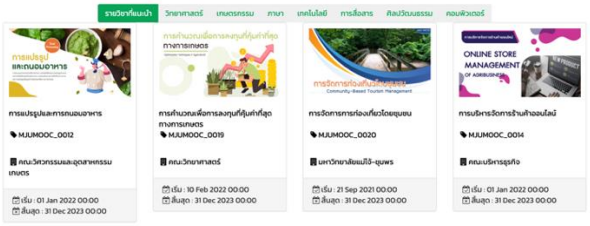
<tr><td>  </td><td>  </td></tr>
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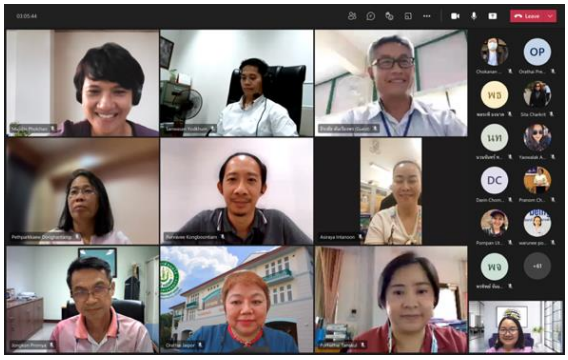
<tr><td>  </td><td>  </td></tr>
<tr><td>Online learning</td><td></td></tr>
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<tr><td colspan="2">Online meeting</td></tr>
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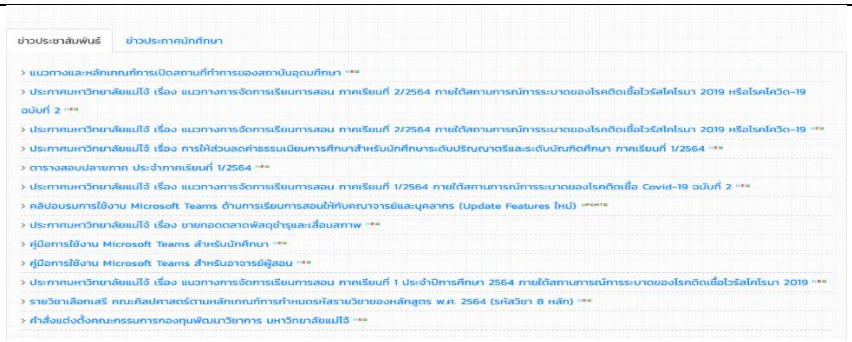

Online Teaching Methods

For student;
http://www.education.mju.ac.th/1stYearStudent/regManual/MS%20Teams%20for%20Student%20V1.0.pdf

For teacher;
http://www.education.mju.ac.th/1stYearStudent/regManual/MS%20Teams%20for%20Teacher%20V1.0.pdf

Helpdesk group for E-Learning

Switching to E-Learning. This mission has as objective to maintain the relationship with the students locked down home and reassure them as well as their families about the fate of the courses and the diplomas. Nevertheless, professors were not ready to switch to total distance learning and some were completely not familiar with eLearning platforms and or software.

For this, the Pedagogic Innovation Cell of the university of Sousse worked very hard to identify the needs very quickly and to organise distance lectures to professors for eLearning discovering and mastering. A Facebook group (Helpdesk for E-Learning) has been created, see Fig. 2, to ensure un quick interaction with professors. Also, no software was imposed to professors (Moodle, Microsoft Team, social media, etc) to reduce technological constraints or teachers/ students apprehension.

Programs for online teaching and learning

Bringing Microsoft Team, Zoom, Skype programs to help with online learning and teaching. To make communication between teachers and students more convenient and faste

MJU Mooc

Maejo University online course Learn anywhere, anytime with a wide variety of subjects. for students students and interested It offers a wide range of courses including science, agriculture, language, technology, communication, art and culture, and computers.

Online meeting

Thursday, May 5, 2022 Faculty of Liberal Arts Maejo University Meeting with the National Academic Conference Network "Academic Arts No. 2", a total of 9 institutions, 14 agencies, online through the Zoom program to discuss to organize a national academic conference. 2nd Academic Arts : Language, Culture, Communication and Health and Sustainable Social Development Innovation on August 26, 2022 at Wintree City Resort, Chiang Mai.

Digital Technology Division Maejo University : https://it.mju.ac.th/wtms_index.aspx?&lang=th-TH

Number of sustainablity community services project organised and/or involving students

There are 26 **sustainablity community services** projects.

No.	Project name	Project duration	Project area
1	โครงการ Green economics for all students 2021 (Green economics for all students 2021 project)	1 year	ED
2	โครงการการดำเนินกิจกรรมด้านสิ่งแวดล้อมของเยาวชนภายในมหาวิทยาลัย (Green Youth) ปี 2565 (Biochar/เชื้อเพลิงแข็ง รักษ์ดิน รักษ์โลก) (Environmental Activities for Youth within the University Project (Green Youth) Year 2022 (Biochar/Solid Fuels, Save the Earth, Save the Planet))	1 year	EC, ED
3	โครงการศึกษาดูงานด้านรัฐศาสตร์และรัฐประศาสนศาสตร์ในมิติการบริหารองค์การชุมชนและสิ่งแวดล้อม ประจำปีการศึกษา 2564 (A study visit project on political science and public administration in the dimension of community organization management and environment Academic year 2021)	1 year	ED
4	กิจกรรมการเพิ่มช่องทางการเข้าถึงบทความในฐานข้อมูลออนไลน์ ด้านอนุรักษ์พลังงานและสิ่งแวดล้อม ด้านการเกษตร (Activities to increase access to articles in online databases Energy and Environment Conservation Agriculture)	1 year	EC
5	โครงการ “ธรรมชาติปลอดภัยแม่แจ่ม ; สร้างฝายมีชีวิตเพื่ออนุรักษ์คน น้ำ ป่า และอาชีพที่เป็นมิตรกับสิ่งแวดล้อม ประจำปี 2565” (Project “Nature is safe, Mae Chaem ; Build a living weir to conserve people, water, forests, and environmentally-friendly occupations for the year 2022.”)	1 year	SI
6	โครงการค่ายอนุรักษ์และพัฒนาสิ่งแวดล้อม ประจำปีการศึกษา 2564 (Environmental Conservation and Development Camp Project Academic year 2021)	1 year	EC

No.	Project name	Project duration	Project area
7	โครงการปรับปรุงและพัฒนาสิ่งแวดล้อม (Environmental improvement and development project)	1 year	SI
8	โครงการเพิ่มศักยภาพการเรียนรู้ และส่งเสริมการจัดกิจกรรมของนักศึกษาหลักสูตรการออกแบบและวางแผนสิ่งแวดล้อม (Project to increase learning potential and promote the organization of student activities in the Environmental Design and Planning Program)	1 year	ED
9	โครงการศึกษาดูงานนอกสถานที่ ทำความดีเพื่อชุมชน รณรงค์รักษ์สิ่งแวดล้อม (Field investigation: do well for the community and carry out environmental protection campaigns)	1 year	WS
10	โครงการส่งเสริมการขับเคลื่อนยุทธศาสตร์เกษตรพลังงานทดแทนและพัฒนาสิ่งแวดล้อม มหาวิทยาลัยแม่โจ้ (Project to promote the strategy of agriculture, renewable energy and environmental development, Maejo University)	1 year	EC
11	โครงการสัมมนาสโมสรนักศึกษาคณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม ประจำปี 2565 (Student Club Seminar Project of Faculty of Architecture and Environmental Design Year 2022)	1 year	ED
12	โครงการสานสัมพันธ์น้องพี่สาขาวิชาเศรษฐศาสตร์เกษตรและสิ่งแวดล้อม ประจำปี 2565 (Sister Relations Project in the field of Agricultural Economics and Environment Year 2022)	1 year	ED
13	โครงการอนุรักษ์สิ่งแวดล้อม (environmental conservation project)	1 year	EC
14	โครงการอบรมเชิงปฏิบัติการตามแผนแม่บทโครงการอนุรักษ์พันธุกรรมพืชอันเนื่องมาจากพระราชดำริ สมเด็จพระกนิษฐาธิราชเจ้า กรมสมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี เรื่อง“หมอต้นไม้ในงานภูมิทัศน์” โดยเทศบาลตำบลแม่สาย จังหวัดเชียงราย ร่วมกับ หลักสูตรเทคโนโลยีภูมิทัศน์ คณะสถาปัตยกรรมศาสตร์และการออกแบบสิ่งแวดล้อม มหาวิทยาลัยแม่โจ้ จังหวัดเชียงใหม่ มหาวิทยาลัยราชภัฏเชียงราย สมาคมยางนา-ซี้เหล็กสยาม (Workshop project according to the Master Plan of Plant Genetic Conservation Project under the Royal Initiative Somdej Phra Kanitthathirat Department of Her Royal Highness Princess Maha Chakri Sirindhorn Her Royal Highness Princess Maha Chakri Sirindhorn “Tree Doctor in Landscape Work” by Mae Sai Subdistrict Municipality Chiang Rai Province together with the Landscape Technology Course Faculty of Architecture and Environmental	1 year	ED

No.	Project name	Project duration	Project area
	Design Maejo University Chiang Mai Province Chiang Rai Rajabhat University Rubber Association - Cassia Siam)		
15	โครงการการบริหารจัดการและพัฒนาชุมชนโดยใช้ทุนทางสังคมเป็นฐานเพื่อการพัฒนาอย่างยั่งยืน (Social Capital-Based Community Management and Development Projects for Sustainable Development)	1 year	ED
16	การผลิต “ถ่านใบไม้ไร้ควัน” เพื่อการพัฒนาที่ยั่งยืนของเครือข่ายวิสาหกิจชุมชนในตำบลป่าไผ่ อำเภอสันทราย จังหวัดเชียงใหม่ (Production of “smokeless leaf charcoal” for sustainable development of community enterprise networks in Tambon Pa Phai, San Sai District, Chiang Mai Province)	1 year	EC
17	โครงการบัณฑิตนักพัฒนา มุ่งสร้างคุณค่าแหล่งท่องเที่ยวสู่ความยั่งยืน (Developer Graduate Program Aiming to create tourism value for sustainability)	1 year	ED
18	โครงการพัฒนาศูนย์ต้นแบบเศรษฐกิจพอเพียง (SE) ตามแนวทางพระราชดำริ ฯ สู่การพัฒนาที่ยั่งยืน (SDGs) มหาวิทยาลัยแม่โจ้-แพร่ เฉลิมพระเกียรติ (According to the project of the Demonstration Center (SE) for the Development of Self sufficiency Economy under the Royal Sustainable Development Initiative (SDG), Maejo University - Phrae, ChaloemPhrakiat)	1 year	ED
19	โครงการส่งเสริมความเข้มแข็งและยั่งยืนของชุมชน (Community Strengthening and Sustainability Project)	1 year	ED
20	โครงการเสริมสร้างความเข้มแข็งการพึ่งพาตนเองในการทำการเกษตรแบบปลอดภัยเพื่อการพัฒนาที่ยั่งยืน (Strengthening sustainable development, safe agriculture and self-reliance Project)	1 year	ED
21	งานเกษตรแม่โจ้ตามศาสตร์พระราชาเพื่อการพัฒนาอย่างยั่งยืน (Maejo Agriculture Fair according to the King's Science for Sustainable Development)	1 year	ED
22	โครงการ 1 คณะ 1 ผลิตภัณฑ์ (ต้นแบบ ตู้อบแห้งพลังงานพลังงานแสงอาทิตย์ร่วมกับไฟฟ้าแบบแยกส่วน) (Project 1 Board 1 Product (Prototype Drying Cabinet Solar Energy Combined with Split Electricity))	1 year	EC

No.	Project name	Project duration	Project area
23	โครงการ พัฒนาพลังงานทดแทนอย่างมีส่วนร่วมเพื่อเพิ่มศักยภาพศูนย์การเรียนชาวไทยภูเขาและคุณภาพชีวิตที่ดีกว่าของชุมชนบนพื้นที่สูงบ้านจอลือเหนือจังหวัดแม่ฮ่องสอน (Participatory renewable energy development project to increase the potential of the hill tribe learning center and the better quality of life of the community in Ban Jorlue Nuea, Mae Hong Son Province)	1 year	EC
24	โครงการ อบรมเผยแพร่องค์ความรู้เทคโนโลยีพลังงานทดแทนและระบบสมาร์ทฟาร์มแก่เกษตรกรเพื่อพัฒนาสู่เกษตรดิจิตอล 4.0 (Training project to disseminate knowledge of renewable energy technology and smart farm systems for farmers to develop into digital agriculture 4.0)	1 year	EC
25	โครงการจัดการพลังงานทางเลือกของชุมชนอย่างยั่งยืน (Sustainable Community Alternative Energy Management Project)	1 year	EC
26	โครงการผลิตบัณฑิตและพัฒนาศักยภาพบัณฑิตทางด้านพลังงานทดแทนในกลุ่มประเทศอาเซียนสำหรับนักศึกษาปริญญาตรี (โครงาน ทุนยากจน) (Graduate Production and Graduate Potential Development Program in Renewable Energy in ASEAN Countries for Undergraduate Students (Poverty Scholarship Program))	1 year	EC

The knowledge base of our campus was operated both onsite visiting and in the media that participants can access via online. Such as

Centrifugal and circulating hydraulic pumps	https://kb.mju.ac.th/article.aspx?id=3596
Academic services project of Maejo university;	https://erp.mju.ac.th/projectPlanLst.aspx?pid=2
The Office of Agricultural Research and Extension Maejo University	https://rae.mju.ac.th/wtms_index.aspx?&lang=th-TH
MJU U2T	https://researchex.mju.ac.th/otou/index.php
Ministry of Higher Education, Science, Research and Innovation	https://researchex.mju.ac.th/youth/
Smart mush	https://www.youtube.com/watch?v=QrrdXB_fU9w
The more you know, the more you love Maejo Chumphon.	https://www.youtube.com/watch?v=NBG3F27qB9Y


ฐานข้อมูลองค์ความรู้มหาวิทยาลัยแม่โจ้
Knowledeg Base Maejo University
ฐานเรียนรู้ มหาวิทยาลัยแม่โจ้
ฐานเรียนรู้
สื่อวีดีโอ
ปฏิทินอบรม /สัมมนา


ฐานเรียนรู้
ผลงานวิจัย
วารสารวิจัย
แม่โจ้ปริทัศน์
ศึกษาดูงาน
สื่อวีดีโอ
ปฏิทินอบรม /สัมมนา
ไม่มีข้อมูล


มหาวิทยาลัยแม่โจ้
RANKING WEB OF UNIVERSITIES
มหาวิทยาลัย
ได้รับการจัดอันดับที่สูงขึ้นจาก Webometrics
อันดับ 2586 ของโล
อันดับ 91 ของ Sout
รอบที่ 2 เดือนกรกฎาคม
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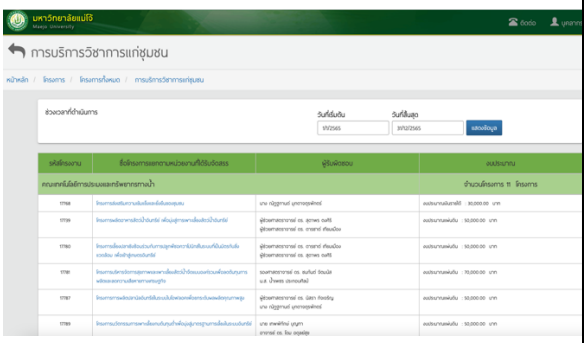
312,461 บ.
2,906 บ.


มหาวิทยาลัยแม่โจ้
การบริการวิชาการแก่ชุมชน


เครื่องสูบน้ำ
พลังน้ำไหลแบบวงกตและแบบสูบ


ระบบโรงเรือนเห็ดอัจฉริยะ (Smart mush)


KINEMAST
ยิ่งรู้จัก ยิ่งหลงรักแม่โจ้-ชุมพร ภายใต้แนวคิด

Number of sustainability-related startups

There are two cases of BCG/SDG Green Business Entrepreneur supported by Technology Business Incubator and Innovation Ecosystem Development Department Agriculture and Food Science Technology Park Maejo University (MAP) as follows;

No.	Information
1	**Startup name:** BSF embryo and BSF embryo protein powder **Name of operator:** Mr. Chanchai Jaitieng Status (Student/Alumni) Students of the Bachelor's Scholarship Program for New Generation Farmers (Smart Farmer) of the Agricultural Research Development Agency (Public Organization) Faculty of Fisheries Technology, Fisheries, and Aquatic Resources **Startup area in UI Greenmetric questionnaire (SI, EC, WS, WR, TR, ED):** ED **URL:** 1) https://www.facebook.com/siambioinsect 2) https://shorturl.asia/xWGjF

Description: Innovative animal feed products for sustainability Dried *Hermetia illucens* (Black Solider Fly Larvae) larvae can be cultured and produced for use as quality proteins. For the animal feed industry, including aquaculture, livestock, and pets that can control management of both the matter of transportation and sustainability in the future and lead to problems and solutions to survive in the era current economic crisis.

The use of Dried *Hermetia illucens* (Black Solider Fly Larvae) larvae for animal husbandry has been studied and tested by experts from both domestic and foreign universities. Especially in foreign countries has been certified to agree to use it as it provides much better long-term benefits. The operator's products include BSF embryo, BSF embryo protein powder.

Photos:

2	**Startup name:** KEAH Spa Gel **Name of operator**: Mr. Methus Ngernchan Status (Student/Alumni) PhD student Faculty of Fisheries Technology and Aquatic Resources **Startup area in UI Greenmetric questionnaire (SI, EC, WS, WR, TR, ED):** ED **URL:** 1) https://www.facebook.com/keahCrocodileoil/ 2)https://mthai.com/tell/283179.html?fbclid=IwAR3IyJv4L1j-AQolju9rxdlR-bSQSzN-WuOOEARFNYxuWD5OjJ8pyaVSqfE 3)https://www.tedfundmarket.com/innovation/view/368?fbclid=IwAR1NzSK_JQKydsSo5mdvZzR-WqSHNOgAY7RxJjlUNuFeNaHWWhSFqfzIjvI **Description:** From leftovers Entering the concept of Circular Economy, KEAH brand was born from the determination of Methus Ngernchan, Founder and Managing Director of B.S.N. Life Co., Ltd., beginning when he was a doctoral student. Faculty of Fisheries Technology and Aquatic Resources, Maejo University has researched the properties of crocodile fat which has outstanding properties, high omega 9, and has the effect of reducing blood glucose levels and can inhibit inflammation. KEAH SPA GEL TRAIL RUNNING has anti-inflammatory properties and good inhibition of bacteria. It has also been tested to be non-toxic to cells and also protects against UVB rays, thus making the product stand out, anti-inflammatory, and contains important ingredients of crocodile oil with the extraction process under the petty patent filing. KEAH SPA GEL relieves aches and pains and restores the muscle groups of athletes -Bronze Award from the National Research Council of Thailand (NRCT) -2ND RUNNER UP BIO PITCH & PARTNER 2021 by Thailand Center of Excellence for Life Sciences (TCELS) Overall, our business is part of the Zero waste mechanism, which is a Circular Economy, where the source of the fat mass affects the cost and environmental problems of the crocodile community agricultural farm, therefore, it is used to develop and add value to KEAH SPA GEL. **Photos:**
	 


Crocodile Oils
ฟื้นฟูกล้ามเนื้อที่อ่อนล้า
Menthol
หอมเย็นสดชื่น สบายผิว
Vitamin E
บำรุงผิวนุ่ม ชุ่มชื้น
KEAH
SPA GEL
new
product
KEAH MINI SPA GEL 25ML
บรรเทาอาการปวดเมื่อยของกล้ามเนื้อ
ลดอาการแสบร้อนจากแสงแดด เย็นสบายผิว


BIO
ASIA PACIFIC
2ND RUNNER UP
BIO PITCH & PARTNER 2021
KEAH