

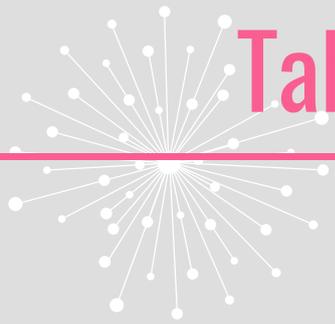


Chulalongkorn University  
**Sustainability  
Report**  
2020-2021

INNOVATIONS FOR A SUSTAINABLE SOCIETY

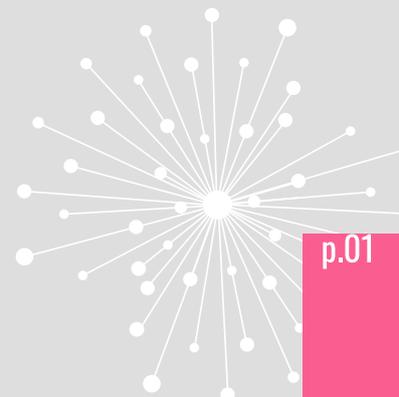






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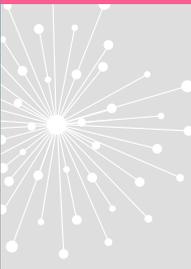
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# Message from the President



During 2020-2021, Chulalongkorn University has faced many challenges which have also provided us with various opportunities to grow and take on a greater role in helping advance Thai society and solve problems confronting it. These efforts include the prevention of the spread of the COVID-19 virus, support for innovation and innovators, as well as development of teaching and learning for the future society.

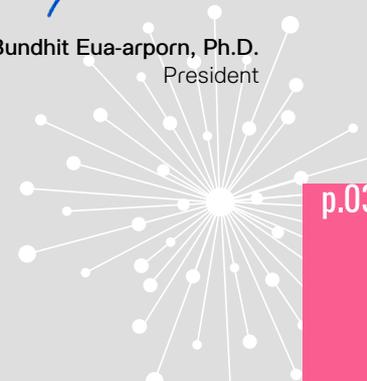
The year 2021 has been another golden year for Chulalongkorn University. We are proud that our innovative contributions to society have led us to be ranked number 1 in Asia and 23rd in the world for Global Impact in the Times Higher Education's Global Impact Ranking 2021—the highest ranking ever to be achieved by a Thai university. Our projects regarding various Sustainable Development Goals was also ranked 1st in Asia and 1st in ASEAN.

The University recognizes the rapid global changes that greatly affect the learning process and educational institutions, and thus its vision for 2020-2021 is “To take the lead in creating knowledge and innovations that will build and support a sustainable society.”

The administration of Chulalongkorn University under the ‘new normal’ of the global pandemic continues to adhere to its three key strategic plans to upgrade its quality standards, comprising Future Leaders, Impactful Research & Innovation, and Sustainability. In other words, Chulalongkorn University strives to be Thailand's world-class university, focusing on creating knowledge and innovations to improve the quality of life for the Thai people as well as global communities through sustainable development. This will enable Chulalongkorn University to be a leading university both in Thailand and internationally.

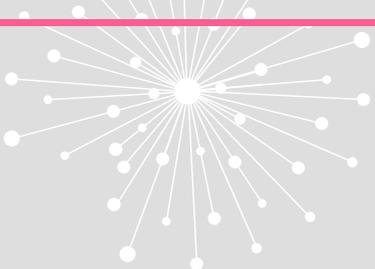
This volume of the Sustainability Report highlights the various projects related to the United Nations Sustainable Development Goals that Chulalongkorn University has played a key role in advancing during 2020-2021.

**Professor Bundhit Eua-arporn, Ph.D.**  
President





# About Chulalongkorn University



Chulalongkorn University was the first institution for higher learning established in Thailand. Founded by King Vajiravudh (King Rama VI) in March 1917, the university was named after his father, King Chulalongkorn (King Rama V). Chulalongkorn University has played a leading role in national and international development throughout the past 104 years. Our graduates have served the people by applying their knowledge and expertise for the advancement and prosperity of society and contributing to the development of the nation in all areas.

Located in the central district of Bangkok, the capital of Thailand, the Chulalongkorn University campus covers a tract of land covering approximately two million square meters (494 acres), of which about 50% is dedicated solely to academic activities. In the 2019 academic year, Chulalongkorn University offered 441 academic programs, of which approximately 24% were international or English-language programs. In that same year, there were 37,364 regular students enrolled, and the university employed 8,138 academic members and administrative staff.

In the fiscal year 2020, from the total university budget of 28.12 billion Thai Baht (883.47 million US Dollars), the university allocated approximately 1.75 billion baht (55.27 million US Dollars) to research, of which approximately 50% was allocated to support sustainability-related research projects.

Chulalongkorn University has secured the highest position among Thai universities on the QS (Quacquarelli Symonds) Rankings for the 8th consecutive year (2012-2021). In 2021, the QS World University Ranking rated Chulalongkorn University at 96th for academic reputation and 208th in the world for overall performance, moving up 39 positions from the previous year. According to the Times Higher Education University Impact Rankings 2021, of 1,115 participating universities worldwide, Chulalongkorn University placed first in Asia and 23rd in the world (the highest-ranking that any Thai university has ever received).

A clear strategic master plan has been put in place for the period from 2021-2024 to drive Chulalongkorn University toward excellence; this strategic master plan focuses on positioning the university as a leader in creating knowledge and innovations from cutting-edge research. Equally important is the aim to produce graduates who are future innovators able to transform Thai society into one that can add value to existing resources and build meaningful ties in the global community. Under the current strategic master plan, Chulalongkorn University is progressively implementing three main strategies to fulfill its vision.

## Vision

To take the lead in creating knowledge and innovations that will build and support a sustainable society.

## Strategic Plan 2021-2024

### 1. Future Leaders

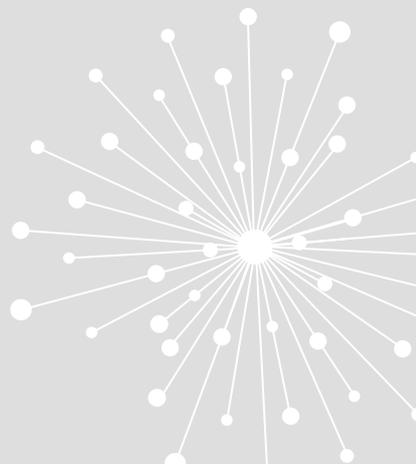
Chulalongkorn University students, faculty, staff, and external units all cooperate to use the university space to build success internationally and take the lead in peacefully and clearly developing a future society rich with wisdom.

### 2. Impactful research and innovations

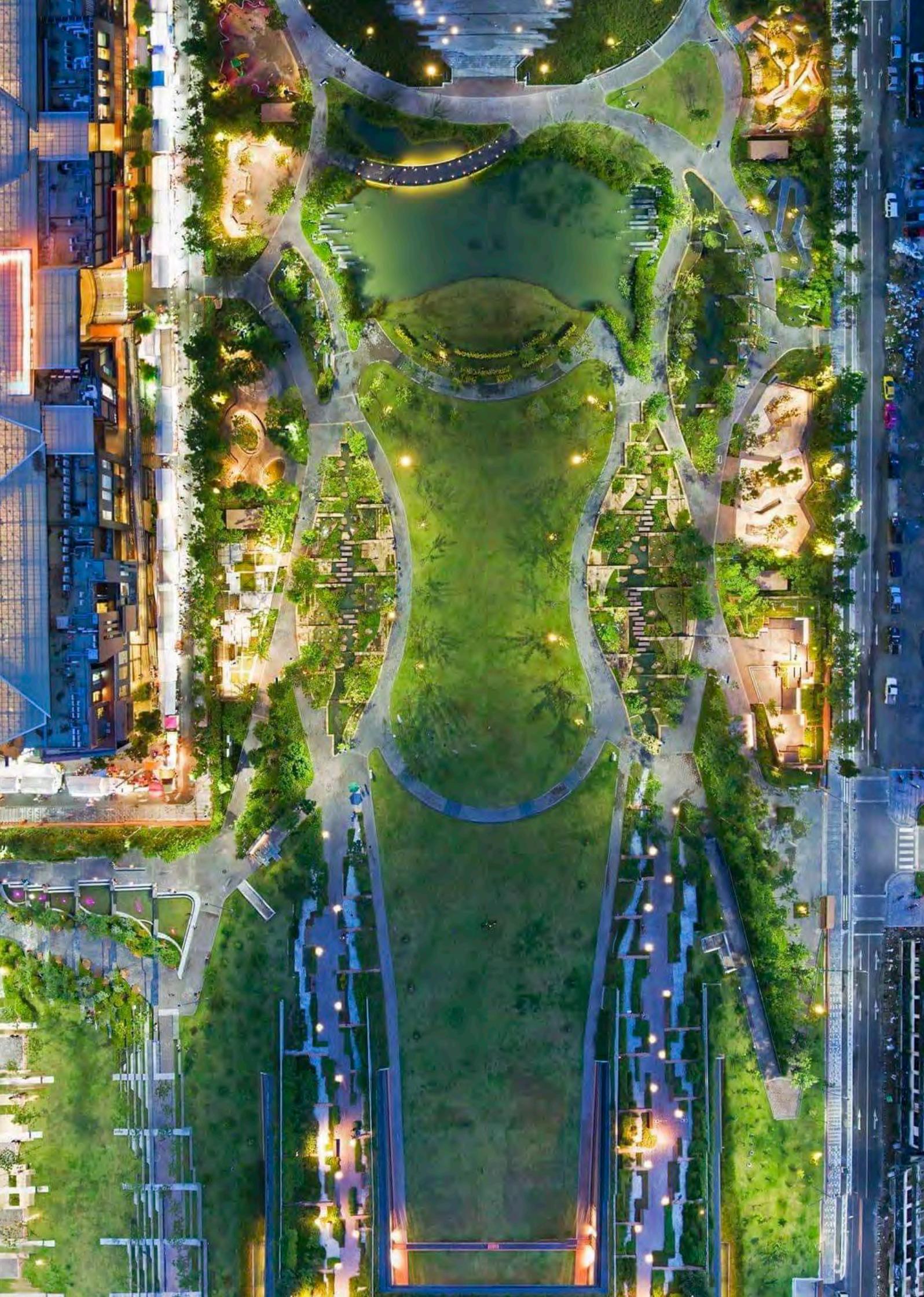
The university's objective is to increase the ratio and number of publications in academic journals to reach the top 10% and 25%, respectively. Also, the university aims to operate innovation businesses using the university's research and technology to generate revenue, raising funds of at least 1 billion Baht or reaching an accumulated market value of a similar amount, while gaining acceptance from academia and society as a leading research institution in particular fields.

### 3. Sustainability

The university aims to create impactful projects that develop society sustainably. Chulalongkorn University further aims to obtain or develop systems that allow the university to efficiently create and manage projects, and to be able to predict possible impacts on social development in the future.







# Sustainability at Chulalongkorn University

Thailand has faced great challenges since early 2020 due to the COVID-19 outbreak. This global pandemic has not only become the biggest public health crisis of the past century, but has also affected the global economy and society at all levels. Responding to this public health crisis, Chulalongkorn University has rethought the way our members live and learn. Many health crisis response programs implemented in immediate response to the COVID-19 threat early last year. Although the rate of on-campus COVID-19 infection was controlled, the decision to lock-down the university and institute a work/study from home campaign greatly impacted the university's operations. Nevertheless, sustainability remains one of the most critical issues of this generation and the next, and the university's decisions and responses to this public health crisis have been consistent and effective.

Chulalongkorn University is fully committed to sustainability and environmental stewardship, which is reflected in the university's vision "to take the lead in creating knowledge and innovations that will build and support a sustainable society." In 2017, Professor Dr. Bundhit Eua-arporn, the president of the university, announced its first Sustainable University Policy, based on the Sufficiency Economy Philosophy developed by the late King Bhumibol Adulyadej and the United Nations Sustainable Development Goals (SDGs).

In 2021, one of the main events that helped raise awareness of the university's sustainability profile was the Times Higher Impact Ranking 2021, which ranked Chulalongkorn University at 23rd place in the World and 1st place in Asia for body of work on SDGs; this is the highest-ranking that any Thai university has ever received. After careful consideration of the rapidly changing social, environment and academic situations, the university revised the University Sustainability Committee and set up the Chulalongkorn University Sustainability Taskforce (CUSTF) for planning, directing, and overseeing all campus activities and operations related to sustainability issues. The vice president, Professor Dr. Narin Hirunsuthikul, M.D. was appointed as the CUSTF chairman. In January 2021, CUSTF developed a new Sustainable Policy Framework in harmony with internal and external dimensions. The framework aims to provide focus for all of the university's efforts and activities on issues related to campus sustainability. Included in the new policy are sustainability issues categorized into five areas: 1) Infrastructure and physical features, 2) Development for staff living, 3) Resource and environmental management, 4) Teaching and research, and 5) Administration and social engagement.

In addition, the CUSTF proposed four flagship initiatives as accelerators of change for development of a more sustainable university for FY2021-2022 including: CUVFit (promoting good health and well-being), CU SDG Academy (fostering life-long learning and sustainability literacy), CU Smart and Inclusive Community (creating a sustainable living environment), and CU Sustainability Global Challenge (developing future leaders).

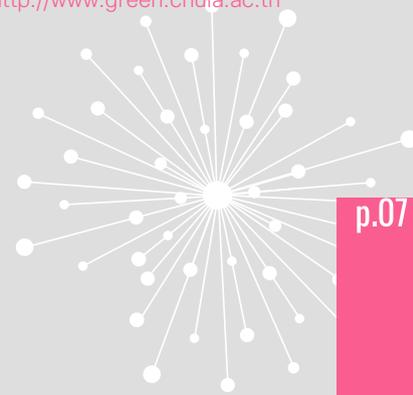
Unfortunately, most, if not all activities, have had to be put on hold due to the current COVID-19 outbreak in Thailand. All projects, however, are expected to resume as soon as the COVID-19 situation improves.

Chulalongkorn University continued its efforts to maintain and enhance its role as a leading international university. We aspire to be a university of academic excellence and recognize our responsibility to nurture social, economic, and environmental sustainability. As a comprehensive university, a diverse range of academic and non-academic activities have been developed and executed by various units across campus. To showcase our sustainability achievements, we are proud to present our fifth sustainability report. The boundaries of this report encompasses all units of Chulalongkorn University except the King Chulalongkorn Memorial Hospital, Chulalongkorn University Demonstration Primary School, and Chulalongkorn University Demonstration Secondary School.

The university has fully applied the United Nations Sustainable Development Goals to drive the sustainable practice; therefore, the main contents of this report are organized under the headings of the 17 SDGs, which is different from our prior reports (which were based on the ISCN-GULF). The case studies (qualitative information) listed in each SDG were conducted during the period of October 2019 – September 2021. Summaries of initiatives and activities that contribute to the achievement of the goals are provided to increase the readers' awareness of the different ways Chulalongkorn University supports and contributes to the SDGs. Additional quantitative data provided in this report were collected from the reporting period of the 2020 fiscal year (October 2019 – September 2020) or the 2019 academic year (August 2019 – July 2020).

In total, we have collected almost 200 case studies from all units of Chulalongkorn University. Case studies were gathered from descriptions provided by operating units and a review of university websites and reports. While the full list of initiatives and activities from all campus units cannot be described, we have tried our best to highlight case studies through consultation with related academics and professional staffs. Additional case studies can be found at our sustainability website at <http://www.sustainability.chula.ac.th>

For more information on the physical and environmental sustainability of the campus, please visit our Green Chula website at <http://www.green.chula.ac.th>





# CU At a Glance



Total campus area  
(m<sup>2</sup>)

**983,441**



Total campus ground floor  
area of buildings (m<sup>2</sup>)

**227,332**



Total campus buildings area  
(m<sup>2</sup>)

**1,339,409**



The ratio of open space area  
to total area

**71.80**



Total area on campus  
covered in vegetation and  
water absorption (%)

**52.50**



University budget for  
sustainability effort (\$)

**36,095,341**



Total number of academic  
and administrative staff

**8,138**



Total number of  
regular students

**36,018**



Electricity usage  
per year (kWH)

**79,551,969**



Recycling program for  
university waste

**>75%**



Consumption of  
treated water (m<sup>3</sup>)

**1,357,501**



Number of courses/subjects  
related to sustainability  
offered

**1,557**



Total research funds  
dedicated to sustainability  
research (\$)

**29,381,943**

# Integrating Sustainability in General Education

Education allows teaching and learning to shape a sustainable future. It requires a participatory environment that motivates and empowers learners to change their behaviors and take action for sustainable development. It also promotes competencies like critical thinking, imagining future scenarios, and collaborative decision-making.

The General Education Center (GenEd) of Chulalongkorn University aims to pave the way for the development of a culture of sustainability and improved quality of life. Thus far, there are 124 general education courses that directly address sustainable development goals. These courses are designed to help develop students into well rounded individuals with the ability to tackle real-world problems in order to shape a better future.

The GenEd Center also support extracurricular activities to support the courses that are related to SDGs. For example, in the 2020 academic year, during the spread of COVID-19, the center provided financial support for 11 courses, with 1,149 participants, such as the Social Innovation for Sustainable Development in Bophankhan, the Watershed Forest Restoration and Reforestation Program, and the Pawsible website to find new homes for stray dogs.

Most recently, the GenEd Center launched the CU Neuron, a life-long learning platform offering courses for students and the Thai public from a wide range of education levels that allows them to take online courses offered by Chulalongkorn professors. The courses are arranged using a credit bank approach. As part of the innovative learning concept, a certificate will be issued upon completion of the course. The credits earned are stored in the credit bank and can be utilized as actual GenEd course credits if the person later decides to enroll in a degree program at Chula (according to the course and curriculum requirements).

For more information, please visit <http://www.gened.chula.ac.th>



# CU Volunteers to Fight COVID-19

With the COVID-19 pandemic still raging and with little indication of it going away soon, countries all over the world are striving to put in place policies and measures to ensure people's safety from the COVID-19 virus. Many countries are working hard to develop and produce the vaccines for their people so that they can develop immunity to the virus and thus lessen the severity of the situation. Chulalongkorn University is among the organizations that have been allocated vaccines from the government to urgently vaccinate its personnel and those of organizations and agencies in Patumwan, Sathorn and other nearby districts.

Chulalongkorn University has set up two vaccination centers—at Chamchuri Square and the Chamchuri 9 Building. With little time to get ready, the management of the centers fell under the responsibility of the Core Team comprising the Vaccine Center Management Committee, medical staff and volunteers who did their best to prepare the venues and equipment. Smaller teams comprising both frontliners and various support teams took responsibility for their respective areas.

Apart from the aforementioned preparation, another important mechanism that has made it possible for the centers to run has been the staff manning the centers, who have facilitated and provided assistance and advice to those who visit each day. The number of people receiving vaccines at Chamchuri Square was expected to exceed 1,500 per day, so a program to invite Chula staff to volunteer was created. Public relations media and an application link for volunteers were developed, as well as a volunteer Line group to be used as online community and communication channel for volunteers. The number of Chula staff volunteering was overwhelming; some volunteered as individuals, others as groups, and still others as representatives of various organizations. Indeed, the Chula community came out in full force in a volunteering effort to help local residents and society.

While on duty, the volunteers have had to observe strict safety measures to protect themselves as well as provide advice to service receivers regarding safety measures. The University provided equipment such as masks, face shields, alcohol sanitizer and thermometers to support the work of the volunteers. Moreover, medical staff volunteers also provided safety protocols such as the proper way to wear a mask while taking care not to touch the outside part of the mask, social distancing, and frequent hand washing.

Despite daily exhaustion, the volunteers did not give up and many signed up to help long-term, happy and proud to be a part of a crucial effort to help Thai society and the nation in a time of crisis.

For a period of over 30 days during May-June 2021, more than 1,500 Chulalongkorn University staff, including medical staff, non-medical staff volunteers such as faculty members, support staff, management, researchers, students at all levels, and employees of outside organizations, participated as volunteers at the vaccination centers. June 30, 2021, marked the date Chulalongkorn University provided 100,000 vaccine doses to those seeking them. This was a joint effort to help society in a time of need, ensuring that people had access to the vaccine. It also serves the "Good health and well-being" goal which is one of the 17 Sustainable Development Goals (SDGs) of Chulalongkorn University.





# No Poverty

## ขจัดความยากจน

### End poverty in all its forms everywhere

#### ขจัดความยากจนทุกรูปแบบ ทุกสถานที่

#### A Model for Sustainable Community Development

Deforestation and land-clearing are taking a toll on farmers in the Wanaprai and Nam Pii villages of Nan province. The destruction of areas of forest cover has resulted in a degraded environment, reduced biodiversity, and increased poverty.

The Faculty of Economics tried to help these local farmers and villagers by suggesting alternative ways of generating income and transforming current farming practices to more sustainable ones. Therefore, a community-based project was launched to help solve societal problems and improve the local quality of life. The project brought together academics to work with the local farmers, local government, and non-profit organizations. Through various facilitation techniques and many trial-and-error attempts, the project proposed innovative methods for mountain water resource management and rice cultivation

Income diversification was also introduced through local agricultural product innovations such as the production of biodegradable plates from leaves and bamboo bark, the production of skin lotion from local herbs, and the promotion of hand-made basketry.

Instead of waiting for aid from a governmental organization, this Faculty of Economics project has helped strengthen community dynamics with shared goals and a shared vision. Approximately half of the farmers have reduced the scope of their land-clearing for corn farming. Most importantly, the net income of farmers and villagers was found to be increasing while their level of debt has slowly decreased.

#### Income Diversification for Small-Scale Farmers

Inclusive agriculture, food production, and off-farm economies can create jobs that lead to a decent life and end poverty in all its forms for the extreme poor who depend on agriculture for their livelihoods in rural areas.

Chulalongkorn University's Center of Learning Network for the Region (CLNR) aims to strengthen rural institutions and improve access to social protection for the rural poor in Nan Province. Income diversification has been promoted as an alternative to those who rely on farming for rural household income. Low-income households have been able to increase their income from local farming activities through knowledge sharing. The university's experts have introduced opportunities for diversified, related income-producing activities, such as raising earthworms, that create new income streams while maintaining each family's core activity of farming. The center has also promoted sustainable agricultural production and non-toxic farming through collaboration with the community enterprise group of Ban Pai Ngam, leading to development of local farming operation, standardized products, and expansion of market segments.

These strategies help expand several sources of income, and improve income stability by varying the mix of income-producing activities and assets. It is also possible to resolve social-ecological traps for small-scale farmers and help them improve agricultural productivity, which is a key element in successfully transforming agricultural practices and enabling rural communities to strive for sustainable development.



### CU-Crab Bank

The Blue Swimmer Crab is a popular delicacy that is in high demand, especially in tourist destinations such as Si Chang Island. It is also an important economic aquatic animal, generating income for coastal communities and the processed food export industry.

To keep up with market demand, the Aquatic Resources Research Institute stepped in and laid out a coastal ecosystem restoration plan to manage the environmental impact on the blue swimming crab fishery. The Crab Bank Learning Center was then established with funding support from the National Research Council of Thailand. A total of twenty-two crab banks have been established to collect and culture gravid crabs for spawning before releasing them into the sea in Si Chang district. The learning center has become a model of community-based sustainable coastal ecosystem management, and has scaled up the crab bank initiative to include four other coastal communities: one in Bang Saray, Chon Buri; two in Ko Muk in Trang; and one in Pak Khlong Tha Thong in Surat Thani.

Working in partnership with local communities, these sustainable practices ensure healthy marine crab stocks, as along with ensuring the livelihood of local fishermen into the future. Moreover, this partnership is helping to enhance the resilience of those in vulnerable situations and supporting accelerated investment in poverty eradication actions.

### CU Wealth Plus: Personal Finance for all Aged People

The lack of financial literacy can cause not only poor financial status, but also fewer job opportunities and reduced productivity. A project spearheaded by Associate Professor Dr. Pornanong Budsaratagoon of Chulalongkorn Business School aims to improve the financial literacy and solve the problem of high levels of debt and insufficient savings among vulnerable Thai citizens who may be just starting a career, or working for the government or in the private sector. The project has created various channels to promote financial literacy, including production of educational videos highlighting how to create an effective retirement plan, as well as development of "CU Wealth Plus", a mobile application for individuals that can help them to project their retirement funds. As a result, individuals participating in the project have shown a significant increase in awareness, through the use of simulation models, of their financial situations and the urgency needed in preparing for future retirement. Another of the project's key successes has come through collaboration with the government pension fund. Projection results from the simulation program developed by the study are now included in the yearly report to their members, highlighting issues related to low savings levels and passive investment. Through this collaboration, a significant number of the people involved reported that they would like to increase their saving or choose a more effective investment plan.

To obtain an aggregate assessment for the nation as a whole and to measure the retirement readiness of Thai citizens, the project scope has been extended to include the construction of a "National Retirement Readiness Index" which can be used as a benchmarking and monitoring tool for policy makers to help understand and enhance the financial readiness of Thais.

### Health Promotion for the Homeless

The phenomenon of homelessness and its relationship to physical and mental illness is a cause for increasing concern in Thailand. Initiated by the Social Research Institute with funding from Thai Health Promotion Foundation, the Knowledge Development and Network Coordination for the Health Promotion of the Homeless Program works with the homeless and other vulnerable groups facing the potential risk of homelessness. The program aims to develop a body of knowledge to support policy formulation and implementation, to develop a network to drive health promotion for the homeless, and to develop mechanisms for accessing health insurance and registration status. The program also supports the work of civil society and network partners that work with target groups such as the Housing Development Foundation, and Four Regions Slum Network to design and develop self-management mechanisms for homeless people and those at risk of homelessness.

The activities consist of

- (1) Vocational training to enhance occupational competence and to enable homeless people to earn a steadier income
- (2) Promoting food security through actions such as vegetable cultivation, livestock development, and food preservation.
- (3) Improving both physical and mental health by encouraging the homeless to obtain registration status or by gaining access to health insurance. Rehabilitation and mental development programs have also been introduced.
- (4) Providing suitable housing for the homeless in Bangkok, Pathum Thani, Chiang Mai, and Khon Kaen.
- (5) Organizing activities to support and assist homeless people and those at risk of homelessness due to the epidemic situation of COVID-19.

The results of the program include enhanced quality of life for the homeless, reduction of risk from living in public spaces, developing the potential of homeless people for self-reliance and return to society, alleviating poverty, and preventing vulnerable populations from becoming homeless.





# Zero Hunger

## ขจัดความหิวโหย

End hunger, achieve food security and improved nutrition and promote sustainable agriculture

ขจัดความหิวโหย บรรลุความมั่นคงทางอาหาร ส่งเสริมเกษตรกรรมอย่างยั่งยืน

### “Kaow Saen Klong-Zero Hunger”

With the ongoing global pandemic, COVID-19 has caused a critical life crisis to vulnerable people across Thailand. The problem of people facing severe financial difficulties and poor food security could exacerbated by the responses to the health crisis as they may experience negative effects from staying home and social isolation. Many people have lost their jobs because of the lockdown measures, which has had a direct and deleterious effect on their quality of life. Some have been quarantined upon being infected or being exposed to infected people, causing them to be isolated for a minimum of 14 days after exposure.

Owing to this crisis, the Faculty of Law, Chulalongkorn University and Chulalongkorn University Alumni Association under the King's Patronage, with collaboration from public and private sector organizations such as the Electricity Generating Authority of Thailand (EGAT), Thailand Post, and SEA (Thailand), with the co-creation network entitled “Food For Fighters”, hopes to achieve Sustainability Development Goal 2 (SDG 2): Zero Hunger, which aims to end hunger and all forms of malnutrition by establishing a project named “Kaow Saen Klong-Zero Hunger” (which means '100,000 meal boxes' in Thai). This project was designed to be a crowd-funded free meal box project to alleviate the difficulties victims face arising from the pandemic.

Donors are able to contribute about 10,000 meal boxes per day to the recipients. Due to the overwhelming demand for food created by the COVID-19 crisis, the program covers approximately 25 of Bangkok's 50 districts, and 7 districts in suburban areas in 7 surrounding provinces, and even includes food supplied to some field hospitals and hospitals such as Thammasat Field Hospital and Field hospitals at the Bang Kwang Central Prison.

The project operates entirely on a volunteer basis, aiming to provide support to COVID-19 affected people across communities in and around Bangkok. In September 2021, the project donated almost 500,000 meal boxes to those in need.

### Alternative Protein from Coconut

Nowadays, there is a global need to improve both the quantity and quality of food in the fight against hunger. However, the goals of food production cannot be on mere availability of foodstuffs, but must also include a focus on providing nutritious foods that will enhance the health of those who are currently malnourished. Alternative protein from plants can be an option for people who need additional protein in their diets. As a food technologist and a researcher, Assistant Professor Dr. Inthawoot Suppavorasatit, from the Department of Food Technology, Faculty of Science, Chulalongkorn University has extracted coconut protein from coconut skim milk, which is a waste product from the production of virgin coconut oil. The main purpose of the research involved in this achievement was to find a source of plant protein utilized from industrial waste that can be used in the production of many types of high-protein food products. Using his expertise, he modified extracted coconut protein using an enzyme called protein-glutaminase to improve the solubility, emulsification, and foaming properties of the protein. The study demonstrated that the modified protein can potentially be used in many emulsified food products, such as high-protein beverages. In addition, a study of flavor-protein interaction was also performed since high-protein food products usually face problems with flavor fade. Vanillin, potent compound that provides the primary aroma and taste of vanilla, was used as a flavor model in the study. The modified coconut protein exhibited lower binding potential to vanillin than the non-modified one, confirming that the modified coconut protein can be used to produce high-protein beverages with less vanillin required. This can lead to the production of alternative high protein foods at lower cost compared with production that is dependent on proteins from dairy and animals.



### CU-GOAT MILK Profitable Shift to Goat Milk

Goat's milk is known as a 'superfood' since it has important minerals and helps nourish the beneficial bacteria living in the human digestive system. Also, people with mild lactose intolerance may find goat's milk less disruptive to digest than cow's milk.

As there aren't many goat milk farmers, and selling prices are relatively high, it also offers an attractive investment opportunity. Many farmers in Muak Lek district in Saraburi province have started to change from dairy cow farming to rearing goats for milk. This industry is gaining ground thanks to interdisciplinary collaboration between the Faculty of Veterinary Science and the Faculty of Science, which are sharing knowledge about such things as farm management, animal health, and milk production across the value chain.

At a later stage, the project will expand to include the processing of cheese and milk tablets, as well as producing skin-care products such as bar soap, liquid soap, and body lotion. The added opportunities will help create greater agricultural productivity among small-scale food producers and will provide a more standardized and higher-quality goat-rearing model for greater food security.

### Smart Farming at the Tropical Dairy Research Center

The Tropical Dairy Research Center (TDRC) is a teaching, academic services and research facility located within the Center of Learning Network for Region. TDRC functions through a partnership between Faculty of Veterinary Science, Agritech and Innovation Center (AIC) of the Ministry of Agriculture and Cooperatives, Thailand, and other dairy cooperatives and private companies. This center operates the Milk and Feed Quality Monitoring Laboratories and Chula Dairy Research Farm, a smart farm that is equipped with modern instruments capable of animal behavior monitoring and real time milk testing. It is also capable of delivering quick results through the use of modern technologies such as sensors, animal tracking systems, and farm management software. This provides opportunities for teaching, training and transfer of knowledge based on research.

Research at the center focuses on tropical dairy management, innovation development, mastitis & milk quality management, reproduction, and nutrition as well as dairy manufacturing through collaboration with the Chulalongkorn University Center of Excellence in Food Processing Pilot Plant. This center has also been designated as a Center of Excellence for Dairy Cattle and Dairy Products Innovation by the Ministry of Agriculture and Cooperatives for the work it does to provide social services to dairy farmers and related sectors by building a network of farmers, government agencies and private organizations in Saraburi and adjacent areas. The center's mission is to create sustainability in the occupation of dairy cattle farming and related industries by focusing on creating value-added products such as premium milk and dairy products, and an intelligent market. This center will also act as an incubator for start-up in agribusiness and processing for farmers and SMEs hoping to develop concrete professions.

### CU-Organic Circle

Sustainable food production helps maintain ecosystems and strengthen capacity for adaptation to climate change. In the past decade, organic farming has grown dramatically in an effort to achieve food security.

With an academic team led by the School of Agricultural Resources, the Faculty of Science, the Faculty of Veterinary Science, and the Faculty of Engineering, under the program "Organic Circle: Technologies for Full-cycle Organic Farming", 25 participants from Nan province, with support from veterinary students, discovered that they could earn an income not only by growing organic crops and vegetables, but also from raising sheep, with the latter being in demand and selling at high prices in the lamb and mutton market. The Organic Circle Program provides alternative paths for farmers to supplant the usual maize plantations on local mountain slopes, which enhances forest restoration efforts and provides a better income for farmers.

The program has created a network of people from faculties within the university, as well as among the local community and others, aiming to solve real world problems and hoping to develop full-cycle organic farming to promote sustainable agriculture.

### Tann:D - Egg White Noodle Innovation

In the ongoing fight to end all forms of hunger and malnutrition, it is always a challenge to provide sufficient and nutritious food for all since food allergy or digestive problems create obstacles to meeting nutritional needs.

Dr. Sathaporn Ngamukote and Dr. Tanyawan Suantawee from the Faculty of Allied Health Sciences, under a CU innovation hub start-up project, have developed Tann:D - an innovative healthy noodle and rice substitute made from protein alternatives, including egg white and plant-based protein (soy, pea, and algae). Since the noodles contain no carbohydrates or gluten, they are suitable for those who have trouble digesting a particular protein such as red meat, and provide a functional food for those with eating disorders such as diabetes, people who are health conscious, the ketogenic elderly, hemodialysis patients, or individuals trying to control their weight.

After years spent developing the product through collaborative research, the product was introduced to the market in 2020, and was recognized as the first global ready-to-eat brand of no carbohydrate-added noodles and rice, which is a sustainable future food that strengthens food security through innovation.



### Ensure healthy lives and promote well-being for all at all ages

รับรองการมีสุขภาพและความเป็นอยู่ที่ดีของทุกคนในทุกช่วงอายุ

#### Mobile Dental Unit for Health Promotion

Access to oral health care is essential to promoting and maintaining the overall health and well-being of communities. However, people in rural areas of Thailand are burdened excessively by oral diseases, and access to oral health services is limited due to socioeconomic inequalities.

The Faculty of Dentistry has always been committed to community engagement. As part of the university's mission of social responsibility, the school has initiated various projects and activities aimed at promoting health and improving the quality of life for all communities in Thailand. Volunteer dentists from Chulalongkorn University take turns every week to provide dental services to people. In fact, for over 40 years, the mobile dental unit has been dispatched to remote areas of the country to offer dental services to residents free of charge. Dental care services provided include tooth extraction, routine cleaning, cavity filling, and root canal therapy.

Apart from providing dental care, students are given the opportunity to work with local administrative organizations to develop health policies and improve rules in an effort to create an environment conducive to good health. With knowledge that has been accumulated from more than 200 field sites, the mobile dental unit project's success has been acknowledged by many public dental health personnel around the country.

#### A Campaign to Sustain Well-being for Law Enforcement Officers

The risk of police officer health morbidities is harmful to the individual and affects the profession and public safety. Since police officers are involved in many traumatic and life-threatening situations, support of their mental and physical health is critical; ensuring healthy lives and promoting well-being is essential to sustainable living.

The Faculty of Nursing in collaboration with Pathumwan Metro Police Station has launched a campaign to improve the health and well-being of law enforcement officers. A total of 117 officers enrolled in a health screening program that helped them receive medical care for individual needs. Their health records were digitally documented and used for individual health diagnosis, and health advice was given on an individual basis. This health screening program allows for early detection of symptoms and advice for lifestyle changes designed to prevent illness, combined with treatment that improves the health and well-being of our law enforcement officers.

#### Stronger Mental Health for Students

The extended period of COVID-19 outbreaks and the Work-From-Home policy has increased the level of anxiety leading to a mental health crisis countrywide. People can mitigate stress and anxiety by connecting with friends, families, or mental health professionals. Various units of Chulalongkorn University have initiated many projects related to improving the mental health of students and communities.

For example, the Faculty of Nursing in collaboration with the Faculty of Engineering has launched a project "Strong Health for Students, CU" to raise awareness of student's mental health since they are considered to be a group at risk. As part of the project, a mental health workshop was set up to discuss appropriate counselling techniques. In addition, professors and alumni from the Master of Nursing Science Program in Psychiatric and Mental Health are working together to provide counseling services for students struggling with mental health issues related to their campus and personal lives.

"Hear to Heal" is another counseling service offered by the Faculty of Psychology, with the support from Thai Health Promotion Foundation, to help console people who have been emotionally affected during the pandemic. The online therapy is delivered via the faculty's platform free of charge, with the goal of providing university academic services from the professionals to the society. Almost 50 people per day are able to get access to the session, lessening the leading causes of emotional distress such as depressive or anxiety disorders, and helping to treat other conditions or sources of distress.



### Fitness Session with Online Personal Trainer

The Non-Communicable Diseases (NCDs) problem has gained increased recognition in response to the growing economic, social, and health problems. A report from the Department of Disease Control highlighted that being overweight or obese, smoking, and drinking alcohol caused the most common health issues for middle-aged and elderly adults.

To promote healthy aging and avoid premature deaths, regular exercise helps prevent or manage many health concerns. Thus, the Faculty of Sports Science has launched a public campaign for university staff and communities known as “working out with an online personal trainer” to boost exercise motivation, help kickstart an exercise routine, and improve nutritional knowledge for individuals. The online training is broadcast via online platforms with professional sessions from the faculty members. The participants are easily able to join in at home during the pandemic, while people in the Pathumwan district and nearby communities can take part in this community engagement between the university and the public.

The campaign not only promotes well-being for communities, but the also offers special educational opportunities for students to experience real-world situations that allow them to practice the skills they learn about in their courses, which encourages them to think outside of the proverbial box by striving for learning dimensions of sustainable development.

### Care in Aging Society

Our rapidly ageing society has made it necessary to prepare and plan to avoid social problems affecting our work and way of life. Chulalongkorn University has brought together faculty members and researchers from related disciplines to undertake cross-disciplinary research on social, economic and technological innovations that promote the potential and capacity of the elderly and ensure their health and self-reliance.

The Chulalongkorn University Universal Design Center (UDC) was established for the purpose of preparing infrastructural design accessible to everyone. As the idea of universal design was slowly gaining acceptance in society, the center opened a call center to provide essential basic design information about appropriate modifications to houses and living spaces where older people are at risk of falling or being injured. Furthermore, together with Thai Health Promotion Foundation and the Center of Excellence in Universal Design, the Universal Design Academy was launched a short-term program for professionals from various fields that focuses on how to prepare buildings and facilities with universal design principles.

An integrated research team spearheaded by the center with the Faculty of Science, the Faculty of Engineering, and support from the National Research Council of Thailand, has led to new preventive innovations for age-related eye problems. The team developed a new kind of LED lamp that can help keep elderly eyes healthy and maintain clear vision. The lamp, when it is ready to be publicly launched, will be another sustainable innovation that will enhance health care in today's aging society.

### Chula HealthStreet

Education leads to improved health and well-being of communities through research-based understanding of community resources. As the university aims to provide innovations for a sustainable society, Chulalongkorn University continuously engages with communities in health promotion. The College of Public Health Sciences has launched an innovative platform known as the “CU HealthStreet” to connect with community members in order to assess their needs and concerns on health issues.

With multi-stakeholder partnerships, CU HealthStreet provides an open platform to help tackle the root causes of urban health challenges. People can participate in research and access medical and social services such as health checkups, healthy exercise programs, food and nutrition security, or maximizing individual health and well-being aspirations, while the university's staff and students have opportunities to develop a more adaptable skill set by experiential and community-based learning as they seek to better engage the community and achieve long-term sustainable outcomes.

Community engagement efforts have the potential to advance health equity, and they offer potential solutions that address health care disparities. This intervention is more likely to be effective when a diverse representation of communities is engaged in planning and implementation for sustainable development.

### Smoking Cessation Treatments

Smoking causes cancer of the lung, emphysema, tuberculosis and triggers allergies, and it kills about 8 million people each year. For nonsmokers, breathing secondhand smoke has immediate harmful effects on the cardiovascular system that can increase the risk of heart attack.

Aimed at the prevention of respiratory diseases, Osotsala, a community pharmacy and laboratory operated by the Faculty of Pharmaceutical Sciences, developed a project that aims to encourage smokers to quit smoking. The founders of the project realized that behavioral intervention can effectively support more people in their efforts to stop smoking. The smokers are encouraged to find out what behaviors or actions in their lives have been associated with smoking in the past, and identify effective strategies to break those connections. Prescription medicines and pharmacological interventions are also provided to those requiring treatment for addiction.

In addition, the Faculty of Nursing, in collaboration with professional health call services such as Quitline 1600, has developed a social-innovative solution known as “SMS 2 Quit” to turn smoking urges into benign thoughts that won't impede the commitment to quit smoking. The short messages from mobile interactive systems are sent to participating smokers as part of a process of self-efficacy. Researchers have reported that 58.74 per cent have been able to realize the negative impact of smoking and maintain the motivation to quit smoking.

### Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

รับรองการศึกษาที่เท่าเทียมและทั่วถึง ส่งเสริมการเรียนรู้ตลอดชีวิตแก่ทุกคน

#### Chulalongkorn University Values Integration Program (CUVIP)

Achieving inclusive and quality education for all regardless of gender, age, or educational or occupational backgrounds is one of the most powerful and proven vehicles for sustainable development.

The General Education Center of Chulalongkorn University aims to foster personal development by organizing short-term activities under the Chulalongkorn University Values Integration Program (CUVIP). This co-creation platform allows students, alumni, staff, and the general public to play a leading role in creating a holistic learning network and developing themselves into well-rounded individuals through selected courses. As a form of personalized learning, the CUVIP program is designed to prepare students for success in social, professional, and academic settings based on each student's individual goals. Thus far, over 4,000 people have participated in more than 100 activities and events. During the COVID-19 crisis, classes have been moved to an online platform, offering a convenient and accessible way for all participants to continue to learn at a distance, with the aim of creating transformative learning experiences and promoting global citizenship as part of the mission of higher-education institutions. For more information, please visit <http://www.cuvip.gened.chula.ac.th/>

#### Outreach for Learning outside of School

Education is a fundamental human right and is indispensable to the achievement of sustainable development. Further, striving to improve social and educational outreach is prioritized with students of Chulalongkorn University. Throughout the year, student clubs create many outreach programs that provide inclusive and equitable quality learning opportunities for organizations and schools in rural areas. Example of projects that occurred in 2020-2021 are:

- Voluntary Engineering Student Camp (VESC) from the Faculty of Engineering built the water tower infrastructure in Srinarong District, Surin province.
- Law Chula Camp from the Faculty of Law donated studying materials to Huaylagpuen School, Denchai District, Phrae province.
- The Environment Volunteer Project from the Faculty of Education provided learning media and teaching resources for Ban Chom Bueng Literary Botanical Garden and Khao Prathap Chang Wildlife Sanctuary.
- A voluntary project from the Faculty of Architecture helped a local community through the design and construction of a multipurpose pavilion in Nan province.

#### Education for the Learning Disabled

Education for all is a global movement that has gained commitment from nations to provide quality education for all, including individuals with disabilities. In Thailand, after the early ratification of The United Nations Convention on the Rights of Persons with Disabilities (CRPD) in 2008, the country's commitment to the rights-based disability policy led to the enforcement of legislation and policies for the promotion of inclusive education and life quality enhancement for individuals with disabilities. A project entitled "Vocational Innovation Scholarships for Students with Special Needs" was launched in early 2020 with the goal of granting scholarships to students with disabilities and strengthening student support systems in participating vocational schools.

The Faculty of Education, Chulalongkorn University, in collaboration with Thailand Equitable Education Fund (EEF) and governments and private sector partnerships, developed a guideline prototype of an enhancement program embedded into a school personnel training program to ensure effective inclusive education aimed at preparing students with disabilities for transition to work. An intriguing finding that emerged from this study is that career readiness enhancement can be enhanced through teacher capacity building. Teachers would need to have knowledge, skills, and positive attitude to support the students in 3 main fields: support of wellbeing, support of curriculum and instruction, and support of work and career opportunity. The enhancement process could be achieved by using an innovative set of activities based on Design Thinking, including 4 main components: basic training for teachers, advanced training for teachers, career readiness intervention, and close supervision by outside experts.



### CU-Smart Lens for Marginalized Schools

To eradicate disruption of learning and upending lives for marginalized schools, the Sensor Research Unit at the Department of Chemistry in the Faculty of Science in partnership with the Ministry of Digital Economy and Society has developed CU Smart Lens - a portable optical microscope lens for small objects to be used in scientific studies. With its ease of use, it can be clipped on any smartphone camera to produce enlarged images. Thai Samsung Electronics Co., Ltd. also supports the use of smartphones to deploy innovative solutions for schools across Thailand. Together they are helping to tackle connectivity gaps in schools and facilitate inclusive learning opportunities not only for higher education, but for vulnerable groups of children and youth to access quality education.

### 50++ Policy to Combat Education Disruption

The COVID-19 pandemic has severely impacted the education sector across Thailand. To provide financial support for students, in 2020, Chulalongkorn University launched the "10+" and the "10++" policies to reduce tuition fees by 10 percent, as well as introducing over 5000 bursaries covering all categories. This year, 2021, during the ongoing global pandemic, the university is continuing to provide financial aid to students through the "50++" campaign. To help relieve students' financial pressure, with a total budget of 500 million THB, various programs have been launched, such as the reduction of tuition fees by 50 percent and the initiation of scholarships for undergraduate and graduate students.

Health and well-being are managed during the pandemic through innovative solutions aimed at caring for students and reducing the panic and risk of infection. Examples of such solutions include free COVID-19 test services, the CU shelter-in-place program, vaccination programs, and health insurance for all 37,000 students.

### Smartphone Donation for Students' Online Schooling

As the COVID-19 pandemic has spread across the country, temporary closures of schools have impacted many children since the learning mode has shifted to online platforms. One of the many challenges that has arisen in this situation is a lack of supporting tools and required infrastructure, especially for those living without any mobile devices.

The Student Government of Chulalongkorn University (SGCU), therefore, launched a public campaign of cellphone donation to help underprivileged children from schools in Pathumwan and Bang Rak district. Providing free refurbished phones is part of the student-run projects designed to ensure quality in primary and secondary education leading to effective learning outcomes for all.

### Lessons from Drama

Lessons from Drama is a transdisciplinary project between scholars in the Department of Dramatic Arts, the Faculty of Arts and the Faculty of Fine and Applied Arts at Khon Kaen University, the regional partner. The main purpose of the project is to apply dramatic arts to curriculum design, learning processes, and everyday lives to develop 21st century skills. The project involves organizing training for teachers and students who will, in turn, transfer their skills to schools and communities in the network of Khon Kaen University. The participants are expected to be able to apply the knowledge from the training to their curriculum designs, which will later be shared among their network partners. In addition to spreading 21st century skills to regional communities, the participants are also trained to engage in respectful dialogue in argument with respect for different opinions. This training helps participants improve overall communication skills and develop critical thinking.



**Chula**  
Chulalongkorn University

**จุฬาร่วม อว. ออกนโยบาย 50++**  
บรรเทาความเดือดร้อนภาคอื่น 2564

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ติดต่อเพิ่มเติม: CUNEX หรือ www.sc.chula.ac.th #จุฬาร่วมอว. #กิจการนิสิต

**คุณสนับสนุนค่าใช้จ่ายต่างๆ**

- คุณสงเคราะห์สวัสดิภาพนิสิต
- ทำประกัน Covid-19 (เบี้ย 37,000 บาท)
- คุณช่วยเหลือนิสิตพลศึกษา (ทำคุณประโยชน์/ลดหย่อนค่าธรรมเนียมตามความเดือดร้อน)
- ยื่นเงินเทรนต์เน็ตเวิร์ค (3,000 บาท)
- มาตรการดูแลด้านสุขภาพ++ (เงินช่วยเหลือเงินสงเคราะห์นิสิตนิสิต)
  - เงินช่วยเหลือฉุกเฉิน
  - เงินช่วยเหลือฉุกเฉิน

**คุณสนับสนุนการศึกษา**

- คุณนิสิตช่วยงาน (100-500 บาท/ชม)
- คุณค่าเล่าเรียนระดับป.โท/เอก (+150 บาท)
- คุณลดหย่อนการศึกษา ระดับป.ตรี
- คุณรับ Laptop และ Tablet ให้ยืมเรียน

Chula Communication Center (CCC) Chulalongkorn University

### Achieve gender equality and empower all women and girls

บรรลุความเท่าเทียมทางเพศ พัฒนาบทบาทสตรีและเด็กผู้หญิง

#### Gender Health Clinic to Serve the Transgender Community

Currently, the Thai transgender community members face health-related issues that affect their bodies and minds, including issues as an innate gender identity inconsistent with the current gender. Due to discrimination, many transgender individuals are denied access to fundamental health care.

King Chulalongkorn Memorial Hospital, in collaboration with faculty members from the Gender, Sexual and climacteric medicine, Department of Obstetrics and Gynecology, Faculty of Medicine, has established the "Gender Health Clinic" to provide a comprehensive medical service specifically for transgender people. The clinic provides reliable and standardized healthcare under experienced staff who specialize in various fields (e.g., cross-sex hormone therapy, gender reassignment surgery, adam's apple sharpening, integrative adolescent health, psychological healthcare). They can advise the safest and most appropriate ways to meet the patient's preference.

A popular method used by transgender people to transform their physique into their desired gender is hormone therapy. Many people use it without consulting a physician because they are unaware of the threat. The abuse of hormone therapy can be life-threatening. Gender health clinic adjusts the types of cross-sex hormones to suit all patient's need based on health safety.

In addition, the clinic is an international research center on transgender health in conjunction with the Center of Excellence in Transgender Health (CETH), Chulalongkorn university. Our staff published various types of research that promote taking care of patients and improve the standard of transgender healthcare.

#### Service Dealing with Sexual Health Issues of "Teenage Moms"

A primary goal is to achieve gender equality and empower all women and girls through non-discrimination policies that can lead to the opportunities they deserve as basic human rights. However, adolescent girls face some disproportionate burdens like the risk of early pregnancy. Because unwanted pregnancy affects the physical and mental health of many adolescents and women who may face challenges in caring for a newborn child, Chulalongkorn University via Chula Student Wellness, and under the supervision of the Office of Student Affairs, in partnership with Chulalongkorn University Health Service Center and Center for Psychological Wellness of the Faculty of Psychology Chulalongkorn University, has designed a new service promoting well-being and dealing with the sexual health issues of "Teenage Moms", while also offering individual help via counseling services provided by psychiatrists and counseling psychologists. Moreover, through cooperation with agencies outside of the university, including organizing workshops on sexual well-being, together with the United Nations, the university is able to assist students facing sexual well-being issues to effectively adapt to society and finish their studies as planned, with the hope of decreasing the global surge in inequalities faced by women and girls.



**An Application to End Domestic Violence**

Domestic violence remains a pressing issue, especially for women and girls. According to the Safe Cities for Women Thailand Organization and the ActionAid Thailand, nearly 15 percent of Thai women have experienced physical and/or sexual violence, and 78 percent of those women have never received help or support, which puts them at greater risk. Domestic violence is a behavioral pattern that should not be tolerated. The College of Public Health Sciences, therefore, developed the iCanPlan mobile application to assess domestic violence and family abuse, whether physical or emotional, and provide access to help. The application administers a series of questionnaires asking about family matters and intimate partner actions in order to rate the probable levels of violence, and it can help identify behavioral red flags and offer a list of support sources nearby.

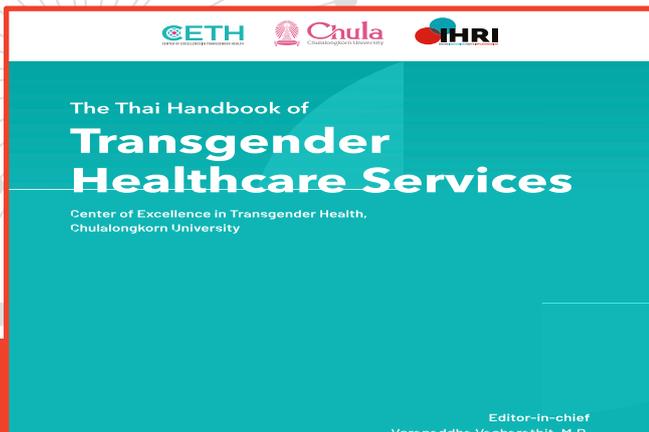
**COVID-19**

A child’s health is always a concern for parents. Unfortunately, in the modern work environment, parents may have limited access to child health specialists. To strengthen and improve the quality of childcare, the Faculty of Nursing offers a free healthcare consultant service via online platform. The services provided include a care plan for children with conditions, health and safety practices in child care, and consultation for developmental issues. Since 2019, the Facebook page has resulted in more than 1,500 contacts. Questions regarding aggressive behavior, attention deficit/hyperactivity disorder, and COVID-19 care have been among the most common inquiries.

**Book Donation Sought for Incarcerated Pregnant Women**

Pregnancy and childcare in prison poses a particular challenge due to poor mental and physical health conditions, since the incarcerated individuals have unique care needs, including gynecological and obstetric services, and most of the mothers had primary custody of their children before going to prison.

Chulalongkorn University Book Center, in collaboration with Plan for Kids Company, gives precedence to these women in order to create opportunities to live and learn behind the walls, and to help educate them about child development, parenting, health, and provide them with material on families. The center launched a children’s book donation project to collect donated books and deliver them to the women’s division of the prison; the men’s division for those with their children was also included in an effort to further promote the transfer of knowledge from parent to child. Furthermore, the donor is able to write a personal note on a card that is attached to the books in a further effort to empower positive changes in the prison community. With the book donation, the university believes that opportunities to learn are not limited, and everyone will have improved access to educational experiences with fewer inequities.



### Ensure availability and sustainable management of water and sanitation for all

รับรองการมีน้ำใช้ การจัดการน้ำและสุขาภิบาลที่ยั่งยืน

#### CU-WATER Healthier Water Sources: Improving Water Quality in Nan Province

In remote and valley areas of Nan province, ground and surface water sources are likely to be contaminated by agricultural chemicals. Research by Chulalongkorn University has found that most of the groundwater in the Chiang Mai-Lamphun Basin has a higher level of fluorides than the standard recommended for consumption. Excessive levels of fluoride can affect the health of those consuming groundwater over a long period.

Water quality improvement through pre-consumption treatment is vital so that residents can safely drink from natural sources and thus improve the quality of their lives. The Faculty of Engineering and the Center of Excellence on Hazardous Substance Management, therefore, set up a project to develop a prototype for treating ground and surface water for consumption. A treatment system to remove fluorides and other contaminants was designed and built at the point of use. Studies and experiments were carried out on bone charcoal production via a carbonization process to remove fluorides. The efficacy of the process was evaluated through data collected on site, and improvements were applied for use over a wider area.

So far, the project has benefited 394 people from 106 households in Ban Mai Nai Fun in Sanian sub-district of Nan province, and the system has now spread beyond Nan province to Lamphun and Chiang Mai.

#### Effectiveness of Disinfection with Chlorine Dosage on Corona Virus

In June 2021, home isolation was suggested by the Thai Minister of Public Health as the best approach in the fight against the COVID-19 severe outbreak, which had resulted in 250,000 cases as of late June. COVID-19 patients suffering only mild symptoms are expected to undertake self-care at home under a close monitoring system setup by medical staff. The patients must isolate themselves for at least 14 days following exposure, or until their test results are negative. Unfortunately, results from research suggest that the SARS-CoV2 can be detected in sewage, feces, and urine for about 2 weeks. Thus, there is a substantial risk that both person-to-person transmission and the environment-based spread of COVID-19 will occur in home care settings where secondary handling of people and urine/fecal matter may occur.

The Professor Aroon Sorathesn Center of Excellence in Environmental Engineering, Chulalongkorn University, therefore, conducted a study on chlorination of sewage from households where COVID-19 patients were quarantined. The results show that chlorination in the sewage treatment process can kill the original coronavirus strain. The efficiency of chlorine disinfection depends on the concentration of chlorine used and chlorine contact time. To treat wastewater during the COVID-19 pandemic, it was found that 6,700 milligrams per liter of chlorine and a 10-minute contact time is sufficient for disinfection. While there is need for additional research on coronaviruses disinfection data, chlorinated water treatment is perhaps the easiest method to implement and most necessary for minimizing any potential risk of wastewater disease transmission.



### Desalinization of Bangkok Tap Water

River salinization is a growing risk faced by many coastal cities. During every dry season in Thailand, the drought conditions and resulting surge in sea levels cause Bangkok's tap water to taste saltier than usual. Salinization of the Chaopraya River is not only a threat to biodiversity, but also a potential cause of severe health problems. The high concentration of sodium in the water is harmful to children and people with heart diseases, diabetes, and high blood pressure.

To help solve the problem, the Professor Aroon Sorathes Center of Excellence in Environmental Engineering offered salinity testing of water service and gave advice for appropriate water treatment methods to the public. Together with the National Nanotechnology Center (NANOTEC), the center also conducted research on using an electro dialysis method to separate salt from water.

### Sustainable Water Resources Management for Agriculture areas in Nan Province

Natural water is important for the agricultural industry in rural areas of Thailand. The Sustainable Water Resources Management for Agriculture project organized by the rural development student volunteer group, the Office of Student Affairs, Chulalongkorn University, and Rakkaew Foundation aims to investigate local knowledge and improve water resources management for agriculture by using piping irrigation systems in the Sanian sub-district of Nan province. In this project, the pipe water irrigation was upgraded, resulting in better use of land for agriculture. The project has raised awareness of villagers and governmental agencies about the need to further develop programs for collaboration, operation, and maintenance of water resource management systems. This project has built a foundation for sustainable agriculture and create greater awareness of environmental stewardship in the community.

### The Wastewater Treatment and Recycling System at Chulalongkorn Centenary Park

Efficient water use can have major environmental, social, and economic benefits. By recycling and reusing water, the effects of drought can be mitigated. To encourage efficient water use, the Property Management of Chulalongkorn University (PMCU) promotes a water-efficient policy and program at Chulalongkorn Centenary Park.

The objective of this program is to collect and manage wastewater from the CU Terrace and CU I-House buildings, which are located adjacent to the park. The wastewater treatment system demonstrates how a centralized water treatment facility can be designed and used in which wastewater is collected, treated, and released as graywater for irrigating plants in the park.

The treated water is automatically monitored at the end of the pipe for water quality parameters such as pH, turbidity, and residual chlorine before the water is released into the public pond. At the same time a water meter is installed that collects data and calculates the wastewater treatment index every day. The system has a production capacity of more than 200 m<sup>3</sup> per day. In addition, the Internet of Things (IoT) system was connected to enable the transfer of water quality data to the cloud system in real-time. The cloud platform then links to the treatment database for water quality assurance.





# Affordable and Clean Energy

## พลังงานสะอาดที่ทุกคนเข้าถึงได้

Ensure access to affordable, reliable, sustainable and modern energy for all

รับรองการมีพลังงานที่ทุกคนเข้าถึงได้ เชื้อถือได้ ยั่งยืนทันสมัย

### CU Smart Energy

The Peer-to-Peer (P2P) electricity trading model was developed as a consequence of the increasing deployment of Distributed Energy Resources (DERs), privately owned by the end consumers. The Peer-to-Peer (P2P) trading system does not only allow buyers and sellers to directly interact without the need for intermediaries, but it also enables consumers to trade their excess energy and become a prosumer (consumer that produce electricity) at the same time.

Chulalongkorn University has a vision that includes the development of Chula Smart Campus, a prototype for an intelligent and innovative city, under the concept of SMART 5, including Smart Energy, Smart Environment, Smart Mobility, Smart Security and Smart Community. The Energy Research Institute was appointed to conduct a study on Smart Energy with the goal of testing the online operation of the peer-to-peer energy trading platform between buildings in Chula campus, to develop smart contracts and test new market mechanisms, and to provide guidelines for designing wheeling charges and understanding their impact to P2P energy trading.

Thus far, the research team has installed monitoring sensors and IoT equipment for an intelligent energy management system that supports the production and utilization of energy produced from rooftop solar collection panels.

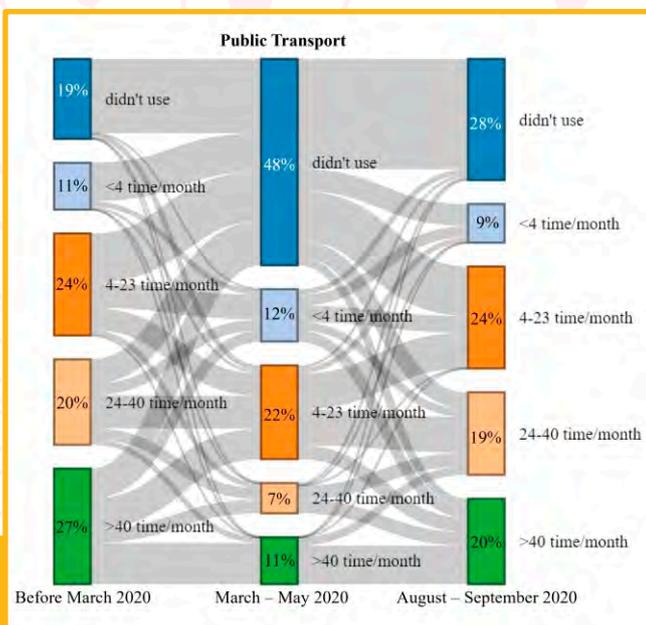
In this project, it is anticipated that the trading platform technology powered by reinforcement learning will act on the behalf of building owners to place bid/offer prices through the platform, and that Smart Contracts will find the optimal price where the buyers and sellers meet. Ultimately, the algorithms for CU trading will enhance the effectiveness of energy sustainability development in the future.

### Changes in Urban Travel Behaviors and Attitudes after the Start of the COVID-19 Pandemic

Transportation has traditionally been the second-highest energy consuming sector in Thailand. Road transport, while it plays an important role in economic development, also accounts for approximately 80% of the energy consumption in the transport sector. The use of public transit systems can enhance energy conservation and emission reduction efforts.

In response to the COVID-19 pandemic, the Thai government implemented prevention and control measures to limit economic activities, e.g., working from home, online learning, and partial lockdowns to reduce the risk of COVID-19 infection. These restrictive measures combined with personal concerns over health and safety in the face of the contagious disease caused people to change their travel behaviors. In order to understand the “new normal” travel behavior, the Transportation Research Institute conducted a study analyzing how COVID-19 affects the use of public transportation, which could impact the public transport system’s efficiency and service quality. Specifically, if demand for public transport decreases, public transport operators may have to decrease their frequency of service in order to maintain profitable operation. This could further lead to increasing generalized cost for travelers. Moreover, people may shift from using public transport to private vehicles, worsening traffic congestion. In considering these issues, it is essential to understand both the changes in people’s travel behaviors and their determinants.

Transportation Institute conducted this research in order to propose appropriate measures to mitigate the impacts on traffic, public transport systems, and public transport users. The research collected panel data from 157 public transport users. The findings showed that during the first wave of the COVID-19 outbreak in Thailand, demand for public transport substantially decreased, and did not return to normal levels after the first wave. This reflected decreased trust in public transport services in terms of prevention measures related to COVID-19. The results highlighted the need to establish appropriate measures to restore the trust of public transport users.



### Waste-to-Energy Incineration

With more than 45,000 students and staff, Chulalongkorn University produces a large quantity of waste daily. Therefore, the university has made continuous efforts to implement sustainable waste management practices on campus by segregating the waste at source. General waste is sent out to municipal landfill sites and recyclable waste is treated appropriately. Nevertheless, a few types of waste commonly found on campus such as plastic straws, wax paper cups, and plastic cup covers, cannot be recycled or sold. Therefore, the Office of Physical Resources Management's CU Zerowaste program, together with the INSEE Eco-cycle Company Limited, initiated a program for waste-to-energy incineration

The incineration of solid waste is one of the best waste treatment methods. The general concept is to minimize the amount of waste as much as possible. Incineration in a cement kiln can eliminate most, if not all, solid waste at extremely high temperatures. For the project, Chulalongkorn University aims to send a minimum of 10 tons of leftover waste to the Saraburi incineration site annually. This method of waste treatment does not only supplement the energy usage in the production of cement, but also reduces the amount of greenhouse gas emitted to the environment.

### EV Campus Fleet

The urgent need to reduce air pollution in combination with technological advancement in electrical power storage has resulted in the increasing popularity of electric vehicles (Evs). According to the International Energy Agency, the number of EVs is forecast to increase to 35% of all vehicles by 2040.

In the past few years, the Property Management of Chulalongkorn University (PMCU) and the Office of Physical Resources Management (PRM) have promoted the use of EVs on campus in various forms, including the CUPopbus, the Muvmi: electric TukTuk and Leaf: e-scooter sharing service. In 2020, PRM decided to replace their seven 1600cc combustion-engine fleet vehicles with electric ones. To facilitate the use of electric vehicles, EV charging stations were installed at both on- and off-campus locations. EV is an innovation that helps lessen global warming by reducing the amount of fossil fuels consumed to power automotive vehicles. Although, the results are promising, challenges remain for the promotion of on-campus carbon-neutral mobility.

### Clean Affordable and Secure Energy for Southeast Asia (CASE)

Recently, the electricity market has been altered by technological advancements and a societal push toward sustainability. To realize potential benefits, the energy sector must adapt to these new technologies such as Distributed Energy Resources (DERs), Demand Response (DR), Electrical Energy Storage (EES), and Electric Vehicle (EV). To support the energy transition from fossil-based to zero-carbon, the Energy Research Institute initiated the Clean, Affordable and Secure Energy for Southeast Asia (CASE) project with supporting funds from the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH: GIZ.

This program aims to provide empirical evidence of the benefits of the current energy transition in the Southeast Asia region, and to build the capacity of stakeholders in the energy sector related to the energy transition process. Most importantly, the program emphasizes a pathway toward transformation of the Thai energy sector to renewable energy sources like wind, solar, and biogas, as well as the promotion of efficient electricity use. Thus far, many regional organizations have joined the CASE program, and it is anticipated that results from the program will assist in the reduction of energy-related greenhouse gas emissions in Thailand.

### Electrical Engineering, Community Development Volunteer Camp

Electricity is essential for basic human needs. The availability and affordability of electricity is fundamental to sustainable economic and community development. Unfortunately, many rural areas of Thailand still lack effective electrification.

The Electrical Engineer Club of Chulalongkorn University realized the problem, and, therefore, set up a community development volunteer camp. The volunteer camp allows students, staff and alumni of the Electrical Engineering Department to contribute their expertise and help the community in the upkeep and preservation of equipment and systems that supply electricity. In 2020 the volunteer camp was established at Kaeng Khoi district in Saraburi province.

Engaging in community service projects provides real-world experience, refines problem-solving skills, and helps develop higher level social skills such as cooperation, while strengthening relationships with other students and local residents. The activities will continue every year, providing ongoing opportunities for students to serve rural sustainable development.



# Decent Work and Economic Growth

## งานที่มีคุณค่าและการเติบโตทางเศรษฐกิจ

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

ส่งเสริมการเติบโตทางเศรษฐกิจที่ต่อเนื่องครอบคลุมและยั่งยืน การจ้างงานที่มีคุณค่า

### The Distribution of Resources Adopted Sharing Economy Model in Sustainable Development

Over the past few years, the term “sharing economy” has become a buzzword. Not only has it become a business strategy that bears fruit, but this peer-to-peer-based sharing system has also opened up potential opportunities for communities of people. “Sustainability” is one of the primary keys to making the idea of a sharing economy gain momentum. This socio-economic system allows assets and services to be shared between private individuals by using online platforms, and monetizing some underutilized assets.

The Faculty of Architecture, Chulalongkorn University conducted a study of the socio-economic phenomenon of the sharing economy in the world’s major cities, e.g., Bangkok, Berlin, and Chicago, and collaborated with other leading universities such as Illinois Institute of Technology, USA, the University of North Carolina at Charlotte, USA, Technical University of Berlin, Germany and the University of Tsukuba, Japan to better understand the observable facts occurring in various influential cities globally. The study was divided into four topics: food delivery services and restaurants, the accommodation and short-term rentals industry, city transport, and accessibility to public spaces.

The results were published to beneficially develop the efficiency of the sharing economy. While strategic planning and urban development may not be straightforward tasks, applying the results to such areas can help achieve sustainability.

### Career Seminar on Campus

Employee development is recognized as a strategic tool for an organization’s continuing growth, and it also helps eligible individuals to pursue employment goals. The Career Seminar is an event that provides an opportunity for participants to meet and discuss developments in learning and teaching for their career paths. Furthermore, information shared in the open multi-stakeholder partnerships session can lead to actions and implementations in communities.

Chulalongkorn University facilitates platforms for multi-stakeholder dialogues seminars with different types of jobs under 3 concepts - inclusiveness, empowerment and development - to lead the university to success in academic and career opportunities.

By way of example, the Human Security and Equity Research Unit (HuSE) held an online seminar entitled “Migrant worker development” where differences in labor outcomes and discrimination policy against migrant workers were discussed. These have always been issues that involve not only cultural or economic factors, but also entitlement or inequality, even though there have been shifts in demographics and a changing economic pattern among all stakeholders. Both employers and migrant workers should be framed without binary perspectives, and non-discrimination policies can be examined through the lens of equality in international law.

Chulalongkorn University in collaboration with Ministry of Social Development and Human Security also held an academic seminar and discussion forum entitled “Promoting Decent Work for Older Persons for an Inclusive Society in ASEAN+3: Strengthening a More Resilient and Inclusive Society During and After the COVID-19 Pandemic”, with the aim of encouraging elderly-friendly employment practices, and creating a job portal for seniors to help them explore work opportunities in various sectors as part of a meaningful retirement.



### Job Opportunities in Aging Societies

The Association of Southeast Asian Nations (ASEAN) Plus Three (APT) was founded to strengthen East Asian cooperation in various areas, but particularly in social fields. Elderly demographic groups are expected to be the fastest growing in the region, where the percentage of population is expected to almost double from 16.6% in 2020 to 36.4% in 2100. The world has already begun the challenging process of meeting the needs of an ageing society and supporting the quality of life of older persons.

The COVID-19 pandemic has raised unemployment, which had already been on the rise in response to the aging population. Older persons are valuable resources who should pass on wisdom and experience to younger generations; thus, Chulalongkorn University Social Research Institute (CUSRI) has established a research project to create new job opportunities in today's aging society with the aims of promoting quality of life, a positive attitude, and social protection for the elderly. Furthermore, the university has set up a strategic plan following a quick win action plan from Ministry of Higher Education, Science, Research and Innovation, in response to the National Strategy, to help the elderly to cope better with the vicissitudes of aging while preparing people for the challenges of an aging population, focusing on human resources and social equality development.

### Grab Jobs to Achieve Career Choice

In today's globalized labor market, the pandemic has impacted employment and changed the nature of work in a multitude of ways. By staying in touch with potential employers, universities are able to better prepare students for future employment by understanding what employers expect a graduate to be able to do in today's market.

The Student Government of Chulalongkorn University has launched a "Grab Jobs" program to guide students in their efforts to get a job and understand how to succeed once they have joined an organization. Virtual job fairs and online hiring events have been organized to introduce students to alternative career paths. Lists of companies were classified based on a degree programs and majors such as engineering, business, and social sciences, allowing job candidates to explore individual company profiles, job requirements and application processes in order to match up with their goals.

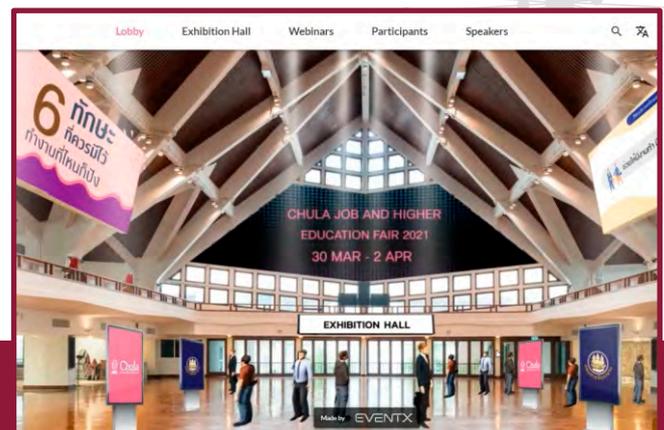
A developmental training program was provided via an online learning platform to build skills and career readiness competencies. Students were able to access a manuscript collection providing advice and guidance on education, training and work opportunities as well as future employment trends in an effort to help them acquire information to identify career options, and to narrow down choices in order to make a decision on an initial career path. In addition, career guidance videos covering such topics as interview techniques and resume writing were made available to students to help them achieve the goal of getting a desired job that provides a decent living.

### Psychological Measurement Promotes Productive Employment and Learning

A sustainable workforce starts with an individual's awareness of his or her knowledge, skills, attitude, and professional-personal goals. The Faculty of Psychology provides a wide range of psychological services to help individuals achieve a better understanding of themselves. Creating psychological measurements for recruitment and staffing and assessing future competencies are also part of the faculty's contribution to development of a sustainable workforce.

The Faculty of Psychology joined the Thai Red Cross Society and Engineering Faculty, Chulalongkorn University to conduct the Med-Asa project. The project aims to integrate automation provided by computing programs from engineering faculty with psychological fit (between persons and jobs) assessment from Faculty of Psychology in order to match the volunteers from the Thai Red Cross Society who have specialized knowledge with volunteer activities where that knowledge can be highly beneficial. The outcome of this project is a recruiting-staffing apparatus on an automatic, user-friendly platform that supports productive employment. This recruiting-staffing apparatus is able to match the personal characteristics of prospective volunteers to the demands of the activities. Accordingly, medical personnel and volunteer organizations can place volunteers into the activities most relevant to their personal goals and long-term development.

The Faculty of Psychology also worked together with Advanced Info Services (AIS) Academy to conduct a research study on developing a future competencies measurement (open access). This research study aimed to identify key competencies for the future and utilize the results to group and select subsets of the competencies for the purposes of developing psychological constructs and measures, planning for organizational changes, preparing the current workforce, and assessing prospective workforce for the future. The outcome of this research study is a group of seven competencies for the future workforce and the psychological instrument to assess these competencies: a) Networking and Partnering, (b) Lifelong Learning, (c) Creativity, (d) Agility, (e) Leadership, including Empowering and Inspiring others, (f) Complex Problem Solving, and (g) Digital Literacy. Thus, the workforce in Thai communities are able to access these measurements in order to assess and understand themselves and their specific needs for further development.





# Industry, Innovation and Infrastructure

## อุตสาหกรรม นวัตกรรม และโครงสร้างพื้นฐาน

### Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

พัฒนาโครงสร้างพื้นฐานที่พร้อมรับการเปลี่ยนแปลง ส่งเสริมการปรับตัวให้เป็นอุตสาหกรรมอย่างยั่งยืนและก้าวหน้า และสนับสนุนนวัตกรรม

#### CU Social Innovation Hub (CU SiHub)

Chulalongkorn University aims to be one of the world's leading universities in the sharing of knowledge and innovation and also aims to affect the society in accordance with the United Nation's Sustainable Development Goals. As part of its mission as a comprehensive university, the Chulalongkorn University Social Innovation Hub (CUSiHub) was established in November 2020 to support the social sciences, humanities and arts education and research, and to act as an incubator for a new generation of researchers.

Located on the ground floor of Wisit Prachaupmor Building, the CUSiHub provides a platform to enable leading innovations for a sustainable society. The ultimate goals of the CUSiHub are to support multi-disciplinary research activities that help solve complex societal problems, to build intellectual capital and technological know-how, and to establish physical forums for exchanging ideas on campus between the university's staff and students, and public sectors. In FY2021, many programs were offered, including the CU Enterprise Social Innovation Pitching Deck, the Chulalongkorn University Design for Society Center (CUD4S) Social Enterprise, the Sustainable Community and Creative Tourism Applied Research Group, and Art and Humanities for Sustainability.

#### Chula Innovations for Sustainable Society

Today, universities have become places to discover new truth at the highest standards of excellence. Moreover, universities are working to apply these discoveries to the task of addressing local and global challenges facing industry and society in pursuit of intellectual and socio-economic enhancement.

Chulalongkorn University contributes to the greater good by grooming future leaders, participating in research addressing SDGs, and committing to the development of sustainable society movements. We strive daily to build the perfect environment for starting and scaling up a business, improving and expanding our skills, collaborating, experimenting, and getting ready for the changing future.

"Innovations for Society" is a university strategy that requires the engagement of society at large. To date, more than 300 innovation driven teams have been founded in an effort to develop innovative solutions that improve people's quality of life. This effort affects over 52 provinces (80% of Thailand) and is scaling up its contributions in other Asian countries. One such example is Baiya Phytopharm, a Chula startup incubated by CU Innovation Hub that is producing plant-based vaccines against COVID-19 at the first plant of its kind in Asia.

Successful innovation needs a robust ecosystem regardless of where we are on the SDG pathway. The integrated efforts of those at Chulalongkorn University have transformed how Thai live, learn and play. With so many people working together, innovation driven enterprise can go far in the effort to secure the happiness of our citizens and our bright collective future. Examples of Chulalongkorn University's innovations in 2020-2021 can be found in the following page.





**สุนัขดมกลิ่น**  
หาผู้ติดเชื้อโควิด  
ครั้งแรกในประเทศไทย

สภามหาวิทยาลัยราชภัฏวรา



**หุ่นยนต์ปันโต**  
หุ่นยนต์ขนส่ง  
พร้อมระบบสื่อสารทางไกล  
ช่วยแพทย์ดูแลผู้ป่วย

สภามหาวิทยาลัยราชภัฏวรา



**Cure Air Sure**  
หน้ากากกรองฝุ่นพิษและเชื้อโรค  
เพื่อลมหายใจสะอาด

สภามหาวิทยาลัยราชภัฏวรา



**Shield+  
Protecting Spray**  
สเปรย์หน้ากากผ้ากรองฝุ่น  
ป้องกันไวรัส COVID-19

สภามหาวิทยาลัยราชภัฏวรา



**ตู้ความดันลบ**  
เก็บสิ่งส่งตรวจจากผู้ป่วย  
เพื่อความปลอดภัยในการ  
ตรวจเชื้อ COVID-19

สภามหาวิทยาลัยราชภัฏวรา



**บริการตรวจคัดกรอง  
เชื้อ COVID-19**  
แม่นยำ ทราบผลไว  
ได้มาตรฐาน  
โดย คณะสหเวชศาสตร์

สภามหาวิทยาลัยราชภัฏวรา



**รถ CU กองหนุน**  
รถความดันบวก ปลอดภัย 100%

สภามหาวิทยาลัยราชภัฏวรา



**หน้ากากอนามัย 2 in 1**  
กันฝุ่นและไวรัส  
เพื่อสุขภาพชีวิตวิถีใหม่

สภามหาวิทยาลัยราชภัฏวรา



**LUNG CARE**  
แอปพลิเคชันเช็คสุขภาพปอดด้วยตนเอง

สภามหาวิทยาลัยราชภัฏวรา



**Chula MOOC**  
คอร์สเรียนออนไลน์  
เพิ่มทักษะได้ง่ายๆ ที่บ้าน

สภามหาวิทยาลัยราชภัฏวรา



**วัคซีนใบยา**  
วัคซีนป้องกัน COVID-19 จากใบพืช

สภามหาวิทยาลัยราชภัฏวรา



**Chula COVID-19  
Strip Test**  
ชุดตรวจคัดกรองความเสี่ยง  
COVID-19 เบื้องต้น

สภามหาวิทยาลัยราชภัฏวรา

# Reduced Inequalities

## ลดความเหลื่อมล้ำ

### Reduce inequality within and among countries

#### ลดความเหลื่อมล้ำทั้งภายในและระหว่างประเทศ

#### Protection of Migrants

COVID-19 has deepened existing problems with inequality, and has left vulnerable communities such as migrant workers to bear the brunt of the crisis, which has significantly increased unemployment and slashed workers' incomes. Waves of COVID-19 infections in Thailand have taken a serious toll on migrant workers in Thailand due to health risks and economic losses. According to the Ministry of Public Health, three million foreigners living in Thailand have the same right to equal access to vaccinations as Thais. The government's policy is to ensure that everyone in Thailand, including both Thais or foreigners, will have access to healthcare without discrimination.

As a part of the university's social engagement program, many units of Chulalongkorn University have responded to the issue of potential inequality to ensure that no one is left behind. For example, the Faculty of Allied Health Sciences provides a healthcare service with a negative pressure mobile unit for COVID-19 testing of five thousand legally registered immigrants. The Chulalongkorn Business School together with JWD Group launched a public campaign to help with the management and distribution of donated essential food and medical equipment to needy people. Lastly, the Faculty of Arts held a public seminar focused on grants to support assistance for foreign migrant workers (primarily from Myanmar) in Samut Sakhon, to increase awareness of inequalities.

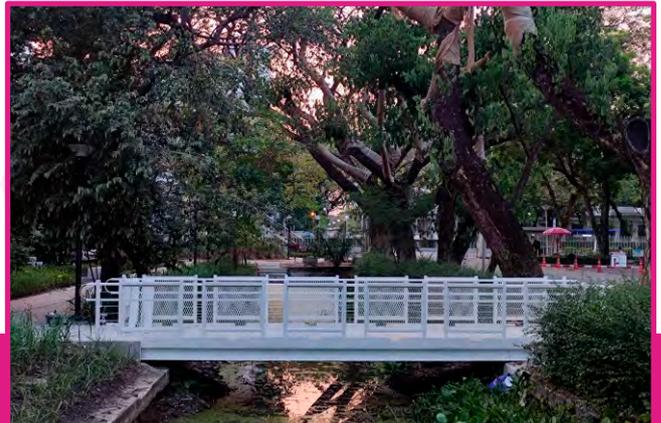
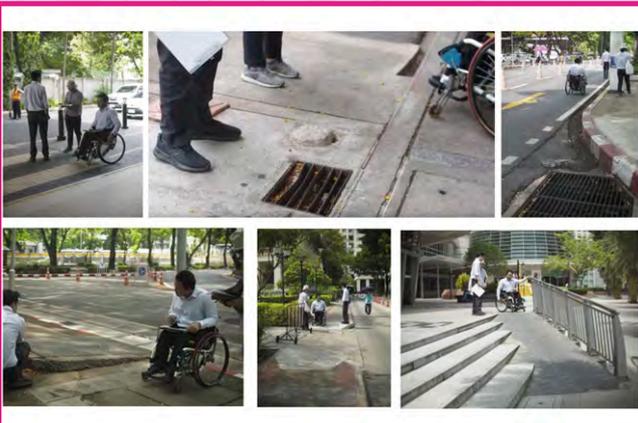
#### The Equality for All: HEAL BiP Improves Facilities in Chula's Campus for Equal Access for People with Physical Challenges

In the current era, people are eagerly recognizing and embracing diversity in all forms. The way society views differences is essential to moving society toward a more egalitarian vision.

Assoc. Prof. Pavadee Anusinha and others from the Healthy Environment and Landscape & Biophilic Planning (HEAL BiP) research group of the Faculty of Architecture saw the number of students with mobility disabilities and elderly personnel in the campus growing, and wanted to ensure that better access could be provided to these people with diverse disabilities. Based on the CU Covered Walkways & Sky Walk of the SMART MOBILITY paradigm, the "Landscape Universal Design Master plan (Phase 1)" was undertaken.

It wasn't the university's first effort to make the campus more friendly for people with disabilities. The university has always provided equal access with all required facilities in the premises, under the previous regulations and guidelines promoting mobility for people with disabilities regulated by the Thailand Building Control Act and the Department of Empowerment of Persons with Disabilities. However, some provisions may fall short of covering the outdoor areas.

HEAL BiP conducted the field survey to acknowledge the obstacles to access for those with disabilities and carry out primary data collection about the needs of people with physical difficulties on the Chula campus. A road map was then designed for developing areas around the campus; the collective action plans included upgrading the surface water drainage design, providing more ramped accesses, and creating suitable rest areas for wheelchair users.



### Reducing Inequities through Community Collaboration

Income inequality has increased nearly everywhere in recent decades. It is on the rise, and global solutions are required to improve the regulation and monitoring of financial markets and institutions, with policies designed to empower lower income earners.

Ban Thon Tron community, Phatthalung province, although abundant in natural resources, was recognized as a low-income community due to a lack of outside demand for locally produced goods. The price of agricultural products and rubber had fallen, and the community had been struggling with rising drug use in recent years.

To tackle these issues, the Faculty of Economics in collaboration with the Well-being Foundation for Muslim Thais, with support from the Thai Health Promotion Foundation, launched a community-based project to improve the health conditions and increase the income of community members. To raise health and well-being awareness, many activities were launched, including the Quit Smoking program, the Sport Activities in Hari Raya Celebration, and the Healthy Food Competition. To increase income, with support from the local Pondok Institute, community members were introduced to alternative careers, such as oyster mushroom cultivation, raising native chickens, and organic vegetable farming.

Many local Muslim leaders participated in the project, increasing social interactions within the community, encouraging diverse community engagement, and resulting in a faith-based model for reducing disparities in the health and well-being of community members.

### Roadmap to Equality

The pledge to leave no one behind is seldom disputed in principle, but its practical implementation is often insufficiently acknowledged, and needs to be addressed. It is important to develop tools to assist policymakers, development practitioners, and donors to understand the dimensions of inequality.

As extreme inequality persists within countries and cities as well as across different regions of the globe, Chulalongkorn University Social Research Institute and Center for Peace and Conflict Studies (CPCS), in collaboration with Sustainable Development Solutions Network (SDSN), Thailand held an academic forum entitled "Roadmap 2030 as Governance for a Shared Future: Role of Knowledge Integration" to address opportunities for sustainable development during the recovery from COVID-19, following 3 concepts: Automation, Artificial Intelligence and Algorithms.

CPCS worked cooperatively with the Asian Research Center for Migration, School of Agriculture Resources and the Korea Foundation for Advanced Studies (KFAS) to host an online seminar on ways to overcome barriers to sustainable development, and to develop a tool to showcase initiatives carried out by multi-stakeholder partnerships aimed at exchanging knowledge and experience in order to ensure equal opportunity with the purpose of leaving no one behind.

### Adolescents' Health Matters

Inequalities are deepening for vulnerable groups such as adolescents, especially in countries with more complex health issues, since they have an array of needs that seem invisible to others, including sexual and reproductive health.

The group, Adolescents' Health Matters, responded to this through public campaigning, community services and youth engagement, and launched its first project, "HIV Run 2019" to celebrate the appointment of Her Royal Highness Princess Somsawali Krom Muen Suddhanarinatha of Thailand as the UNAIDS Goodwill Ambassador for HIV Prevention for the Asia-Pacific Region, World AIDS Day. Princess Bajrakitiyabha Narendira Debyavati graciously opened and took part in this event, which was also attended by senior ministers from the Ministry of Public Health and the President of Chulalongkorn University, as well as by more than 3,000 runners.

In addition to this campaign, the Department of Pediatrics, Chulalongkorn University initiated a "community adolescent service" that proactively engages HIV at-risk adolescents in urban areas to provide them with health knowledge and care. In collaboration with the adolescent health NGO Path2Health, a health fair was also held in Siam Square One that attracted over 500 adolescents from more than 30 schools who joined in the activities. Furthermore, medical consultations delivered online are provided as mobile health technologies. This program is set to expand in future operations, with national and international stakeholders to produce sustainability and promote high-level impacts, in accordance with age.



Make cities and human settlements inclusive, safe, resilient and sustainable

ทำให้เมืองและการตั้งถิ่นฐานของมนุษย์มีความปลอดภัย ท้าวมถึง พร้อมรับการเปลี่ยนแปลง และพัฒนาอย่างยั่งยืน

### Redesigning for Global Age-Friendly Cities

Living longer is a blessing, yet it comes with a cost. After a few decades of preparation to enter the aging society - defined as one in which 20% of the total population comprises those aged over 60 - Thailand has turned into a full-fledged aging society in 2021. The number of retirees is expected to increase in the future, with no sign of a flattening trend. The rapid increase in the age of the population has become one of the country's priorities, and the impacts of this rapid change are multifaceted. Led by Associate Professor Trirat Jarutach from the Faculty of Architecture, The Center of Excellence in Universal Design (CEUD), Chulalongkorn University is aware of the urgency of issues connected to our aging population, and started a project called the Development of Age-Friendly City to invest in a healthier world for the senior citizens in the Khlong Phlapphla community.

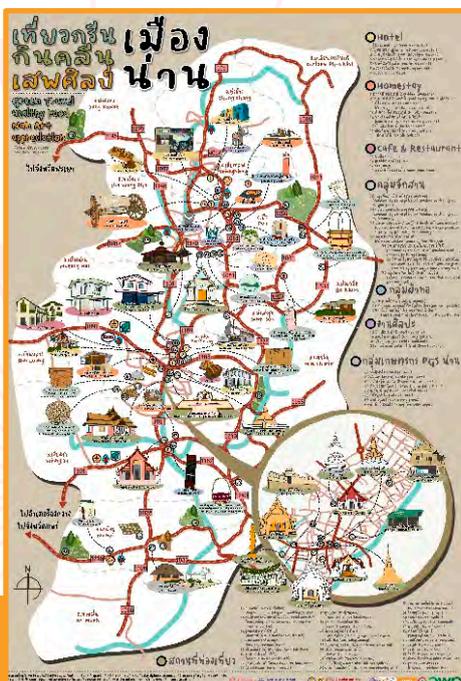
The assessment of the Bangkok senior quality of life showed that the residences and the outdoor spaces and buildings did not reach the standards of the age-friendly cities checklist. Therefore, the project set out to raise standards and offer knowledge of how urban planning can help elderly people age in place gracefully. A design guideline was developed, and 10 case study houses were physically adjusted to meet with the guideline. In addition, the open spaces of the Khlong Phlapphla community were renovated to accommodate the needs of the community's older adults. Overall, the satisfaction of senior residents at Khlong Phlapphla with the age-friendly home modifications provides a new milestone in the creation of a prosperous society, and the continuing efforts to create sustainable cities and communities for all.

### Smart City, Smart Mobility - Key to Sustainable Campus

Chulalongkorn University has set a goal of creating a pleasant and livable campus environment suitable for its community members. One of the initiatives involved in this effort is the development of "Chula Smart City", which was chosen as a pilot project as part of "Samyan Smart City." These developments aim to sustain local community and social-ecological systems with "Smart7" concepts: Smart Environment, Smart Mobility, Smart Energy, Smart Living, Smart Economy, Smart People, and Smart Governance

In 2020, the Smart Mobility concept achieved its goal with many new commuting strategies. The Office of Physical Resources Management and the Property Management of Chulalongkorn University devised seamless transportation options between nearby mass-transit systems and the campus core area. The "first mile and last mile" commuting options led to more sustainable mobility in connecting commuters to travel options in both the campus and surrounding commercial areas through environmentally-friendly public transportation, e.g., EV Bus (CU POP Bus), E-Scooter, CU-Bike, and EV car sharing (Ha:mo). First launched in Chulalongkorn University, the EV Tuk Tuk (MuvMi) has also become a hugely successful start-up company that serves as an on-demand ridesharing service model for other areas in Bangkok.

Although the campus has been periodically closed due to the COVID-19 outbreak, the new developments for smart mobility in Chulalongkorn University continue. For example, the CU Smart Mobility Research Center of the Faculty of Engineering utilized IoT, AI, Robotics and 5G innovations and developed the prototype Connected and Autonomous Vehicle and used CU campus as testbed. Such efforts will entail Chulalongkorn University adaptation to a "new normal" lifestyle while promoting sustainable mobility for the future.



### Toward a Sustainable Tourism in Nan Province

The research program of “Creating Nan City toward Sustainable Green Tourism” by the Environmental Research Institute, the School of Agricultural Resources, the Faculty of Fine and Applied Arts, and the Faculty of Architecture aims to build the capacity of Nan city to enhance sustainable green tourism management through utilization of the Bio-Circular-Green Economy model (BCG) and Participatory Action Research (PAR). The objectives of this research are to 1) build participation of stakeholders related to green tourism development, 2) build capacity of Nan province in sustainable green tourism management, and 3) create green tourism maps and green travel programs for Nan city.

The program consists of five sub-activities including 1) the tourism organic waste treatment (green cone food-waste digester) project, 2) the waste is not wasted project (recycling of waste cooking oil into cleaning detergent), 3) the bamboo wicker product for substitution of one-time use plastic bags, 4) the development of the Participatory Business Model for Organic Agrotourism in Nan province, and 5) the Processing of Fashion Lifestyle Products from Sustainable Fiber Innovations.

Results from all research projects are presented through the green tourism map entitled “Green Travel, Healthy Food, Nan Art Appreciation Map” which was created with the participation of all stakeholders, including communities, farmers, HORECA entrepreneurs (hotel, restaurant, and cafe) and other organizations in Nan province. These cooperative green activities are building the capacity of Nan province to achieve sustainable tourism.

### Learn-Do-Share for Sustainable Society

As part of the university’s objective to develop innovations and transfer knowledge in order to solve problems in society and promote sustainable development, the “Road to Chula Engineering Journey – Learn Do Share” is a project that allows engineering faculty members to gain hands-on experience in developing sustainability for local communities.

All faculty members are encouraged to learn, do, and share knowledge under the concept of sustainable development for the Huai Hong Khrai community of Chiangmai province. Utilizing these three steps, the university provided community members with the chance to learn how to create forest fire protection lines, and actual fire protection lines were built in a cooperative effort with the community. Furthermore, a climatic-innovation that uses air quality monitors to measure PM2.5 levels in the area and provide alerts, known as “Sensor for All”, was introduced, which helped raise awareness of air pollution in an effort to reduce the risk from pollution-related diseases and improve life for local residents.

### Urban Lighting Design for the Promotion of Night-Time Cultural Tourism in Nan Old Town

Nowadays, most of the tourism activities in Nan old town take place only during the daytime because most of the locations lack of appropriate lighting systems. Nocturnal tourism has not been emphasized. In an effort to promote nocturnal cultural tourism in Nan old town, the project entitled the Study on Development of Lighting System Detail Design for the Promotion of Night-time Cultural Tourism in Nan Old Town was proposed. The project funding was provided by the Social Development and Human Security research cluster of Chulalongkorn University and the Japan International Cooperation Agency (JICA) as a part of the Office of the National Economic and Social Development Council’s Project for Promoting Sustainability in Future Cities of Thailand.

In this project, Assistant Professor Dr. Vorapat Inkarojrit from the Faculty of Architecture utilized a participatory design approach and proposed a three-kilometer night-time tourism route under the concept of “transcending the culture of living old town”. A total of seven major sites including Wat Phumin, Wat Phra That Chang Kham Varavihara, the National Museum of Nan, Wat Hua Khuang, Wat Ming Muang, Wat Sri Panton, and the old city wall were surveyed. Proposed lighting design schemes were simulated with a computer simulation program and partially tested onsite for assessment of the desired effect. Finally, the urban lighting design master plan for the promotion of night-time cultural tourism was developed. Currently, the lighting design master plan is being considered by the local municipality and organizations for actual future implementation.

### Digital Arts District

Rapid urbanization has created challenges in the efforts to build sustainable livable cities. Art reminds us that our most valuable resource for achieving livability is our creativity, which allows us to develop strategically policies and create ongoing opportunities for sustainability.

The Faculty of Fine and Applied Arts (FAA) announced the online launch of its groundbreaking FAAMAI Digital Arts Hub, a digital art competition, and the commissioning of digital artworks for the international launch of the project in early 2021. FAAMAI is the result of a collaboration between FAA, Property Management of Chulalongkorn University (PMCU) and Pico (Thailand) PCL with hopes of encouraging local digital artists and contributing to the development of the economy.

Moreover, FAAMAI has launched a coding competition, the FAAMAI 360 Mapping Competition, to present and showcase the potential for interactive art and science in a unique setting to encourage local and international artists and enable the transformation of the Samyan district into the Kingdom’s first Digital Arts District.



### Ensure sustainable consumption and production patterns

#### รับรองแผนการบริโภคและการผลิตที่ยั่งยืน

#### CU Zero Waste

Waste management is perhaps one of the most difficult problems for a city campus like Chulalongkorn University. In 2016, the data showed that the university as a whole produced about 200 tons of waste per month. Food, paper, and plastic were found to be the most common types of waste produced. The university administration realized the problem and initiated the CU Zero Waste Project, which is a 5-year waste management action plan. Various workplans were generated using the cradle-to-grave approach in which waste was treated from generation to disposal, and strategies included waste prevention and segregation at source, campus waste collection and waste treatment, organic waste treatment, baseline data collection and policy establishment, and development of workplans for education and curricula on sustainable waste management.

The CU Zero Waste project was initiated by the Office of Physical Resources Management in collaboration with the Environmental Research Institute, the Petroleum and Petrochemical College, and the Center for Safety, Health and Environment of Chulalongkorn University.

During the 4 years of operation, prior to the COVID-19 pandemic period, the accumulated waste reduction had amounted to 493 tons, of which approximate 50% was the result reduction in food waste, the use of Zero Waste biodegradable cups, and the promotion and use of personal bags and cups. Approximately 1.24 million fewer plastic bags were used per year. A total of 35 campus units joined the CU Green Office program. And most importantly, the success of the program has become a role model for waste management practices in other education facilities.

#### Arts for the Environment

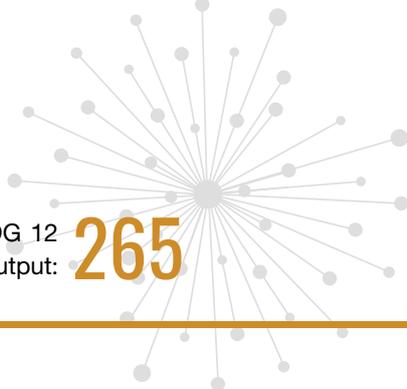
To ensure that people everywhere have the relevant information about responsible consumption and production, the Faculty of Fine and Applied Arts recently rebranded the Chula Art for Community (Art4C), its gallery and creative learning space, under the slogan: "Art for Life, Sustainability" to increase public awareness of the need to adjust consumption habits through adoption of sustainable development and lifestyles.

The rebranding and launch of several exhibitions included art that highlighted the scourge of plastic marine pollution and specifically discussed issues related to the exhibition, Plastic Sea, an interactive installation created by activist artist Witaya Junma and curated by Haisang Javanalikhikara. Junma utilised a 'vortex machine' to visually present plastic waste data about Thailand's coastal waters from the Department of Marine Resources.

Many Thai environmental artists have also discussed ways to be creative through sustainable art practices such as, for example, a fashion show using recycled Thai fabrics, Recycle Rising by Lalalove, and new fashion photography, Anusorn Mah Hua Nau (Memorial Outcast) by Akin Kanjanapokin (Teeprang), Ecological Expansion by Fabritt and MeClass, and Incarnate, highlighting the fact that animals and natural habitats in Khao Yai National Park are being destroyed by human behavior, by Wishulada.

The objective underlying all of these ambitious creative projects is to empower people to see that the environmental issues we face are truly severe, and that creative and supportive engagement is needed to deal with these critical environmental and ecological issues in order to develop and deepen people's understanding of the need for change.





#### Production of Biochar from Agriculture Waste to Improve Soil

For an agricultural country such as Thailand, converting agricultural waste into biochar, a charcoal-like substance that's made by burning organic material from agricultural and forestry wastes, offers a potential solution to the problem of managing massive quantities of crop residues following harvest. The use of agricultural residues as feedstock for biochar production is, therefore, of interest for use as a soil enhancement, with potentially significant environmental, production and economic benefits.

The Institute of Biotechnology and Genetic Engineering, Chulalongkorn University used basil straw as the raw material for its study of biochar as a substitute for sawdust of Sajor-Caju mushroom lumps.

Biochar also provides a conducive habitat for beneficial soil microorganisms. Study findings indicate that soil incorporation of biochar produced from agricultural crop residues can enhance food security and mitigate the contribution of the agricultural sector to climate change impacts.

#### Cello-gum: From Biotechnology to Bioeconomy

The bioeconomy is primarily made up of renewable biological resources that, with technological advancement, can be converted into human food, animal feed, biological products, and bioenergy. Assoc. Prof. Dr. Hathaikarn Manuspiya of the Petroleum and Petrochemical College realized the potential for creating biomaterials from food manufacturing waste, and, therefore, initiated a project to further the bioeconomy.

In this project, Nata de coco or bacterial cellulose (BC), a food manufacturing waste, is extracted and converted into a value-added material known as microcrystalline cellulose (MCC). Additionally, using a simple and high-quality manufacturing process that can be scaled up to pilot scalability, BC can be chemically modified with a carboxymethyl group to produce a food stabilizer or carboxymethyl cellulose (CMC), which is marketed as "Cello-gum", which is an effective food stabilizer used in a variety of industries such as pharmaceuticals, cosmetics, and others.

This project not only adds value to waste from Nata de coco production and substitutes for imports, but it is also Thailand's primary "Cello-gum" exporter, driving the bioeconomy, generating revenue, and promoting Thailand's bio-economy to the world. Furthermore, pharmaceuticals, cosmetics, food, and beverages are the industries that most commonly use food stabilizers in their manufacturing processes. Our contributors are Ampol food processing Co., Ltd. (coconut product manufacturer), CDIP Thailand (food supplement and cosmetic developer), Yamamori Trading Co., Ltd (Japanese soy sauce manufacturer), Sappe Public Co., Ltd (healthy beverage manufacturer), Malee group (beverage manufacturer), and Kovic Kate International Thailand (supplement and cosmetic OEM).

#### From Waste to Wonder: Concrete Bricks from Demolition and Oil Palm Waste

Thailand is a successful agricultural society due to the country's well-endowed natural resources. Unfortunately, more agricultural activities also leads to more agricultural waste, which is generated in large quantities in many areas. The benefits of recycling agricultural waste include reduction of greenhouse gas emissions and promotion of the green economy.

With the support from the Electricity Generating Authority of Thailand (EGAT), Associate Professor Dr. Nuta Supakata of the Faculty of Science launched the project "Circular Management of using Flue Gas Desulfurization Gypsum, Construction and Demolition Waste, and Oil Palm Trunk Waste to Produce Concrete Brick for Setting Up a Future Small-size Community Enterprise". This is a case study of managing waste from a power generation plant and a nearby community in Krabi province. The project aims to study the utilization of waste from power plants, construction and demolition, and agriculture by varying the ratios of flue-gas desulfurization (FGD) gypsum, construction and demolition waste (CDW), and oil palm trunks (OPT) as raw materials for concrete production. After a 28-day curing period, a 15 cubic meter brick from recycled materials is ready for use.

To provide recommendations for how concrete brick manufacturing can be more eco-friendly, the environmental impact of the concrete brick was analyzed in terms of abiotic depletion, acidification, global warming, ozone layer depletion, human toxicity and terrestrial ecotoxicity. After intense study, the product from the project was registered for a petty patent in 2020.

#### Crushed Bottle Bank Innovation at the Chulalongkorn Demonstration School

Single-use plastic products have become an integral part of our daily lives. While plastic has many valuable uses, reliance on single-use plastics can have severe environmental consequences. Research estimates that about 60% of all plastic ends up in either a landfill or in the natural environment, and that the amount of plastic waste produced rose more in a single decade than it had in the previous 40 years.

To help solve the plastic waste issue, young innovators from Chulalongkorn University Demonstration Elementary School created an exciting innovation: the Crushed Bottle Bank, which won a gold medal from the Seoul International Invention Fair 2019, and a Special Award from the World Intellectual Property Organization. At the collection site, a vending machine is designed to crush PET bottles and then measure the weight of the bottles and convert the value of those bottles into digital coins. The value represented by those coins would be deposited on a student card for use within school.

Currently, the project is being supported by the Chulalongkorn University Technology Center (UTC) and the Suthirat Yoovidhya Foundation, who hope to produce a prototype for actual use, which will support the bio-circular-green economy. Students awareness of environmental problems and solutions can be increased through education. It is expected that the waste management activities and knowledge gained from environmental education will help in changing human behavior towards a sustainable environment.

### Take urgent action to combat climate change and its impacts

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#### Low-Carbon Lifestyles: Implementation at the Household Level, Nonthaburi

Limiting global temperatures to 1.5°C above pre-industrial levels requires transformative systemic change. Community engagement is seen as key in lowering local households' overall Greenhouse Gas (GHG) emissions.

Envisioning Future Low-Carbon Lifestyles and Transitioning Instruments is a demonstration project through the United Nations' One Planet Network. Funded by the Government of Japan through its contribution to the 10YFP Trust Fund (UNEP), this project is led by the Institute for Global Environmental Strategies (IGES) in collaboration with Hot or Cool Institute, D-Mat, ICLEI Japan, the National Institute for Environmental Studies, Japan (NIES) and implementation partners across five countries. The implementation project in Nonthaburi, Thailand, led by Asst. Prof. Dr Pasicha Chaikaew of the Faculty of Science, encompassed scientific-based carbon footprints from six lifestyle domains (food, housing, mobility, consumer goods, leisure, and services) and local living labs in order to tackle the issue of transformative change.

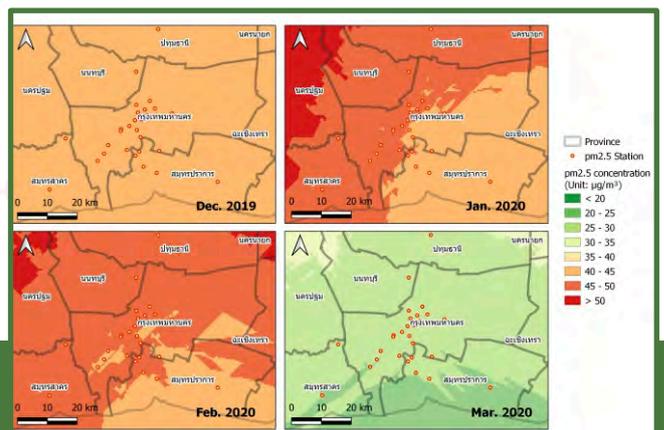
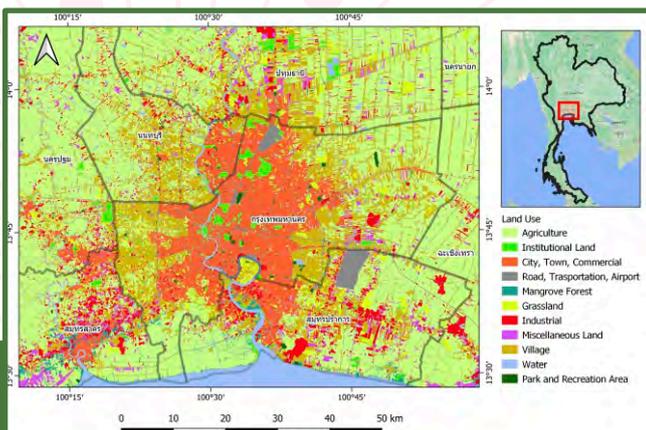
The top-5 highest carbon intensive impacts in kg-CO<sub>2</sub>e/cap/yr unit are restaurants (477) > clothing (305) > private cars (268) > beverages (259) > meat (147). After the real-life household experiment, the maximum potential carbon footprint reduction and actual reduction were expressed in an effort to define a realistic vision of a sustainable lifestyle scenario for ordinary people. Serious policy support exists that offers potential opportunities for household carbon footprint reduction.

#### Carbon Stock Analysis of University Areas in Bangkok and Surrounding Provinces Using Information Technology

Nowadays, one of the largest environmental effects of human population growth and rapid urbanization is the problem of global warming. While urban areas have always been identified as being central to the carbon cycle, uncontrolled population changes in the future could significantly increase the production of greenhouse gases. Nowadays, the annual peak of CO<sub>2</sub> emission already reaches dangerous milestones, affecting people of every economic stratum. Providing more urban forestry in city areas is one of the techniques that can potentially help solve the problem.

Analysis and assessment of carbon sequestration of green areas among universities in Bangkok were conducted by the Faculty of Architecture, Chulalongkorn University. The project, led by Asst. Prof. Dr. Sutee Anantsuksomsri, sought to create tree cover mapping, showing green regions of universities in graphics and identifying green space data resources that can be beneficial in further urban planning. The data were collected by a drone flying over selected university areas. The extensive data about carbon sequestration were used to calculate and create campus aerial mapping of green vegetation covering areas of various universities in Bangkok.

Carbon storage in urban forests and green spaces is a consequence of greenhouse gas reduction. In addition, green spaces provide recreational sites and reduce the heat effects that have an adverse impact on residents in urban areas. The output from this project has provided an essential tool for use in developing green spaces in Bangkok, particularly throughout university campuses.



### Development of PM 2.5 Transportation Source Management Framework in Bangkok and Metropolitan Region

The problems of air pollution, especially fine particulate matter (PM), which seriously affects people's health, is a growing concern to the government and the general public. Fine particulate pollution comes from various sources, including industrial, agricultural, and transportation sectors. To mitigate the problem, the Chulalongkorn University Transportation Institute (CUTI) conducted research necessary to understanding the emission sources of PM2.5.

The objective of this research is to determine the specific sources of PM2.5 in the transportation sector, and the study area is Bangkok, where the problem of PM2.5 has been aggravated in recent years. The area is also served by several modes of public transport that provide alternatives to commuters, thus making driving restrictions a possible measure that can be implemented in order to control automobile emissions. This study analyzes PM2.5 data from monitoring stations throughout Bangkok to examine the impacts of traffic volume from various vehicle types in the areas surrounding each station. The results are then used to identify potential measures for transportation management, which are then proposed to various stakeholders, including commuters, government officials, and logistics and transportation operators for consideration and feedback. It is expected that, ultimately, this project will provide policy suggestions and measures to reduce PM2.5 from transport sector that are acceptable by all related parties.

### Vegetation for Air Quality Management and PM2.5 Mitigation

The air pollution problem is largely unperceivable, and, although the health impact from PM2.5 is severe, it is not sudden, which makes it difficult to raise public awareness, especially in low-income neighborhoods or public housing projects, where environmental injustices are perpetual. Realizing that green spaces do not only provide an aesthetic function but also serve ecological functions, one research project by the Faculty of Architecture aims create design guidelines for development of green in communities. It is increasingly clear that green spaces improve health and wellbeing, so the relationship between green spaces and air pollution is examined in this research. The study consists of two parts. First, it collects air quality data, focusing on PM2.5, and compares green area ratios and leaf volumes in selected locations. The data collection relies on 20 air quality monitoring sensors placed at different locations in Bang Chalong National Housing Authority Project, where PM 2.5 data are collected during the months with the highest PM 2.5 levels. The second part of the study examines residents' perceptions of air pollution. The study tries to answer whether people are aware of air pollution problems.

### The Development of Land Use Regression Model (LUR) for Predicting PM2.5 Levels in Bangkok and Vicinity

In the past few years, Bangkok and other provinces in Thailand have experienced a very severe problem of air pollution, especially particulate matter with an aerodynamic  $\leq 2.5 \mu\text{m}$  (PM2.5). The daily concentration of PM2.5 has exceeded the guidelines of the WHO, the United State Environmental Protection Agency, and The Pollution Control Department of Thailand. It has clearly led to a deterioration in the ambient air quality, and, consequently, has had both acute and long-term effects on the health of residents.

Various factors contribute to high concentrations of PM2.5, including agricultural activities, open field burning, traffic, construction, and urban planning. Moreover, natural disasters such as forest fire and transboundary pollution from neighboring countries also contribute to high concentrations of air pollution. Some factors related to human activities can be controlled to reduce the generation of ambient air pollution.

A study being conducted by Dr. Kraiwuth Kallawicha of the College of Public Health Sciences focuses on the effect of land utilization on PM2.5 level. The land use regression model (LUR) is applied to investigate the association between meteorological parameters and land utilization on the level of PM2.5 in Bangkok and vicinity. Although the main interest predictor variables are meteorological and land utilization data, the study also incorporates other remote sensing data such as greenness index, building index, and surface temperature in order to construct the regression model. It is anticipated that the final model will provide useful data about the type of land use that affects the level of ambient PM2.5 in Bangkok and vicinity. This information will help authorities such as the Land Development Department to plan land utilization more effectively. Moreover, the final model is expected to help health-related researchers to estimate the exposure level of affected residents in order to better understand the effects of PM2.5 exposure and associated health outcomes.



### Conserve and sustainably use the oceans, seas and marine resources for sustainable development

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#### Ecological Risk Assessment of Coal Contamination in the Marine Ecosystem of Sichang Island

Thailand has experienced increased importation of coal to support generation of electricity required for development of the national social and economic programs. Coal transportation occurs mainly in the Inner Gulf of Thailand, where Sichang Island is an important load-discharge area for cargo shipments, and coal particles lost during transit are unavoidable. The study of contaminants and effects of marine transportation, particularly bulk cargo ships, can provide valuable knowledge required to evaluate ecological services as well as risk assessment in Sichang Island; such knowledge is necessary for proper management planning. Funded by the Thailand Research Fund (TRF) and the Electricity Generating Authority of Thailand (EGAT), research conducted by the Aquatic Resources Research Institute (ARRI) included both field surveys and laboratory experiments that focused on 1) environmental and ecological situations in the loading areas, 2) properties of coal particles after deposition in seawater, and 3) effects of coal contamination on local organisms. The data were used for risk assessment of coal contamination and coal transportation near Sichang Island. The results from this project were presented to local organizations, especially the Koh Sichang Subdistrict Municipality, to assist in the development of good practices or management plans for sustainable utilization of natural resources, conservation and restoration issues.

#### Development of a Crude Oil and Relevant Oil Product Fingerprint Library in Thailand

Oil spills continue to affect the marine resources and marine ecosystem of Thailand. In 2017-2018, oil lumps and oil stains were found offshore and on major tourist beaches of Surat Thani, Chumphon, and Rayong Province of Thailand on more than 10 different occasions. Unfortunately, the origins of those tar ball and oil stains could not be identified.

The Petroleum and Petrochemical College (PPC), therefore, has worked cooperatively with 10 other government offices and private organizations such as the Department of Pollution Controls, the Department of Marine and Coastal Resources, the Synchrotron Light Research Institute, and PTTGC to develop an oil fingerprint database. The project aims to analyze and categorize the chemical composition of crude oil and relevant oil products in the Gulf of Thailand. The developed database supports the tracking of the origin of oil spills by comparing the "fingerprint" of the spill with those stored in the database.

#### Improving Quality of Life for Sea Turtles

Sea turtles are listed as an endangered species by the International Union for Conservation of Nature (IUCN) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES I). Sea turtles with amputated limbs have been found regularly; the amputations are due to various causes such as physical damage from entanglement (i.e., fish net, rope, propeller), wounds from predators (shark, human), or severe infections (i.e., bacteria, virus, fungus, etc.). The complications after limb amputation are impaired locomotion and diving ability, and impaired ability to compete for food. These turtles are also easily attacked by predators. Therefore, these turtles with amputated limbs often must be kept and fed separately in captivity. However, prosthetic flippers have been developed which enhance conservation efforts and improve the sea turtles' quality of life.

The extreme plus sea turtle prosthesis project was initiated by The Veterinary Medical Aquatic Animal Research Center of Excellence (VMARCE), the Faculty of Veterinary Science in collaboration with the Faculty of Engineering, Department of Marine and Coastal Resources, Sirindhorn School of Prosthetics and Orthotics (Mahidol University), Petroleum Authority of Thailand Public Company Limited, and PTT Global Chemical Public Company Limited. The prosthetic flipper was designed using technology from limp prostheses in humans, hydrodynamics and motion analysis theories. The prostheses are made of carbon fiber filled nylon and acrylate derivatives (photo-monomer), and constructed using 3D Printer technology. The prosthesis consists of 3 sections: socket, joint, and flipper, and it is fitted with silicone. Of course, all materials are safe for the animal and its environment.



### Innovareef for Recovery and Rehabilitation of Coral Reef Ecosystems

Currently, artificial reefs are designed and produced using a variety of materials such as concrete, metal, natural, and waste materials, and these reefs play an important role in restoring damaged marine habitats and fisheries. However, there is still a need for a more natural design that is compatible with the natural marine environment to reduce or eliminate visual pollution under the sea. Therefore, the Faculty of Veterinary Science, the Department of Marine and Coastal Resources, and the Siam Cement Group Public Company Limited (SCG) initiated the Innovareef project for recovery and rehabilitation of coral reef ecosystems.

"Innovareef" is a new type of artificial reef that boasts the same beauty as its natural counterpart. Structural materials are designed and adjusted to be environmentally-friendly to marine organisms, and the artificial reef is constructed using 3D Cement Concrete Printer, making it highly durable with a long life expectancy. In order to shorten the time required for restoring natural coral reef ecosystems in the sea and increase the ability for transplanted coral to grow on the reef surface, Nano-precipitated Calcium Carbonate (NPCC) is added to the Innovareef to adjust the pH value of material to be as close as possible to the range of natural seawater.

Innovareef is an outstanding product innovation that can be easily transported. The use of Innovareef will increase biodiversity and species diversity, as well as create a positive impact on socioeconomic factors and methodical efficiency for marine ecosystem-based management.

### The conservation of Himantura Chaophraya Stingrays and the lowlands of Mae Klong River

Himantura Chaophraya Stingray is a freshwater fish that lives in the lowlands of the Mae Klong River which flows through 9 provinces. The Himantura Chaophraya Stingray is seen frequently, especially in clean water areas, and academics have classed it as an Indicator Species for the imbalance of the freshwater ecosystem because this fish is sensitive to toxins and changes in its habitat. For this reason, Chulalongkorn University via Faculty of Veterinary Science, which has a mission to develop, pioneer, and carry out exploratory research while applying knowledge for the benefit of society, started to research the living conditions, biology, and ecology of this specific stingray.

The collaboration between Chulalongkorn University via the Faculty of Veterinary Science, the National Geographic Society, and the Department of Fisheries of Samut Songkhram province has provided benefits in relation to the conservation of the lowlands of Mae Klong River by bringing skills, knowledge, and experience together to conduct in-depth research into freshwater stingrays while exchanging knowledge on a national level and laying down measures to help the long-term conservation of the Himantura Chaophraya Stingrays.

### Revitalization of Sea Nomad Cultures and Community-Based Tourism

Initiated by the Social Research Institute, the projects on Revitalization of Chao Lay (Former Sea Nomad) Cultures and Community-based Creative Tourism have received generous funding from various sources, and, thus, will be able to continue research and field activities for several years. In the past year, the work has focused on Krabi Province in southern Thailand, where Chao Lay youth are trained in the interpretation and expression of cultural heritage and the development of livelihood activities that can be integrated into creative tourism.

Being always in the background of Andaman coast and island tourism, Chao Lay have traditionally gained little benefit from the industry. Moreover, economic growth is constantly pushing the proliferation of real estate businesses; as a result, waterfront plots that Chao Lay have traditionally relied on for temporary shelters for themselves and their boats and fishing equipment are increasingly occupied by outsiders. In several communities, tourism development entails further poverty and threats for Chao Lay livelihoods.

The projects, therefore, create and promote involvement of Chao Lay in community-based tourism. With niche tourism markets increasingly focused on creative and experiential tourism, Chao Lay communities that have been equipped with the knowledge and skills on transforming their marine livelihoods and indigenous knowledge to tourism activities will be ready to participate as active agents of alternative and sustainable tourism development. As a result, the projects contribute to the revitalization of Chao Lay cultures, building community cohesion and pride, alleviating poverty, and maintaining sustainable marine livelihoods.



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

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### Land Degradation neutrality (LDN) in Agricultural Lands

To combat land desertification under the SDG target 15.3, funded by Chulalongkorn University, a research team led by Asst Prof Dr Pasicha Chaikaew from the Faculty of Science undertook to make the concept of Land Degradation Neutrality (LDN) a reality. The project worked closely with regional officers from the Land Development Department and local farmers. This research estimated the LDN status for agricultural land in Saraburi Province using three indicators: land use/land cover (LULC) change, land productivity (LP) change, and soil organic carbon (SOC) change. The results from this research highlighted alarming signs of soil degradation in the agricultural economic zone. Over three years (2017-2020), the study metrics indicated net loss in land use/land cover and soil organic carbon stocks, though the NDVI, a dimensionless index that describes the difference between visible and near-infrared reflectance of vegetation cover, remained unchanged. Disturbingly, however, negative changes occurred in two of the three indicators, which indicates a tendency towards the degradation of soil capital in the long run. Counterbalancing measures to achieve equivalent losses and gains should be implemented as quickly as possible.

### Revealing the University Network Acting as Guardian of the Wetland Forests of the Mekong River Basin

The wetlands in Thailand are currently being continuously threatened by developmental and invasive activities in various forms including agriculture, fisheries, urban expansion, and industrial development. This has caused the areas of wetland to be rapidly destroyed, similar to the wetlands of the Mekong River basin which even though there are still areas of wetland left, but it is currently facing deterioration and negligence of conservation and proper management.

Chulalongkorn University via the Department of Biology, Faculty of Science, was able to realize and foresee the importance of the issue mentioned above and therefore sought a way to revive and conserve the area of wetlands as a whole. This was done by signing an agreement to create The University Network for Wetland Research and Training in the Mekong Region which was founded in the year 2545BE and is comprised of 8 founding universities from 4 different countries.

The University Network for Wetland Research and Training in the Mekong Region has a mission to organize educational training about wetland ecosystems, both in theory and in practice, partnering with universities within the network by taking turns to host the training in each country. Furthermore, the network members also demonstrate how to use wetland management tools, especially in areas that are covered by the Ramsar Convention, which is a treaty for the conservation and sustainable use of wetland areas. Chulalongkorn University has also used this experience of working in collaboration with an international network to integrate and improve the content in their Biology Laboratory subject, which is taught to first year students, by using documents containing the evaluation of ecological services in wetlands.



### A Long-term Monitoring System Established for Water and Carbon Fluxes in Tropical Forests

Forests provide water to downstream ecosystems and mitigate high-CO<sub>2</sub>-induced climate change impacts. However, forests are being threatened by various environmental changes, which, in turn, affect these ecosystem services. Monitoring changes in forest water and carbon fluxes in response to environmental and climate change is a way to effectively manage forests and green areas for sustainable ecosystem services. In November 2020, a researcher from the Faculty of Science set up two flux towers in an old-growth forest (>200 years old) and a secondary forest (5 years old) in Khao Yai National Park, a UNESCO heritage site, for long-term (>5 years) data monitoring.

This project is part of a three-year project, jointly funded by the Swedish Research Council and the National Science and Technology Development Agency of Thailand. The project aims to assess the vulnerability of successional forests to climatic water stress in Southeast Asia. Currently, the towers house multiple sensors that continuously measure standard weather variables and water flow rates in trees at 30-minute intervals. They are also equipped with several other sensors, such as one tracking the amount of CO<sub>2</sub> absorbed and water vapor lost from forest canopy. These data will be used to track changes in water and carbon fluxes from these forests, providing insights into climate change impacts on the functions of forests as climate regulators and atmospheric CO<sub>2</sub> mitigators. Such information is currently still unavailable for modeling future impacts of climate change on terrestrial ecosystems.

### New Species of Invertebrates in 2020-2021

Several new species of invertebrates were discovered by a team of researchers from Animal Systematics Research Unit (ASRU), Department of Biology, Faculty of Science, Chulalongkorn University, along with other partner universities. The team was led by Prof Dr Somsak Panha of the Department of Biology, who is also director of the Center of Excellence on Biodiversity and member of Academy of Science, The Royal Society of Thailand. ASRU focuses on the research of several terrestrial and freshwater invertebrate fauna, including land snails, earthworms, millipedes, centipedes, leeches and freshwater prawns in Thailand and surrounding areas in Southeast Asia. A total of 67 new species were discovered and formally described in high-level scientific journals of international reputation during 2020-2021. These new species include 41 land snail, 20 millipede, three freshwater shrimp, two earthworm and one freshwater leech species.

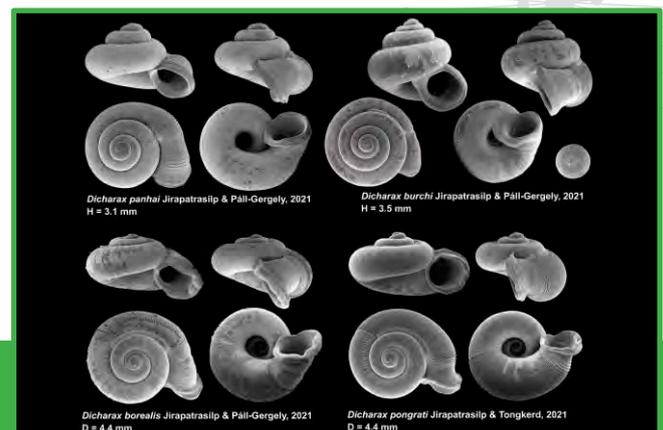
The notable new species of land snails are those in the new crown snail genus *Taphrenalla* endemic to Southern Thailand, a new genus and species *Pseudoquantula lenticularis* from Phanom Dong Rak Range and a new shiny snail genus and species *Khmerquantula leipo* from Cambodia. The notable new species of millipedes are those in the new genus *Coxobolellus* and *Burmaxytes* from Thailand and Myanmar, respectively, and two new species of fantastic pill millipedes *Zephronia phrain* and *Zephronia lannaensis* from Northern Thailand. New species of the remaining invertebrate groups include three new freshwater shrimp in the genus *Macrobrachium*, a new freshwater leech *Hirudinaria thailandica* from Thailand, new giant terrestrial earthworm *Amyntas whitteni* and new semi-aquatic earthworm *Glyphidrilus whitteni*, both of which are from Myanmar.



*Hirudinaria thailandica* Jeratthitikul & Panha, 2020



*Khmerquantula leipo* Pholyotha & Panha, 2021



*Dicharax panhai* Jirapatrasilp & Páll-Gergely, 2021  
H = 3.1 mm

*Dicharax burchi* Jirapatrasilp & Páll-Gergely, 2021  
H = 3.5 mm

*Dicharax borealis* Jirapatrasilp & Páll-Gergely, 2021  
D = 4.4 mm

*Dicharax pangrati* Jirapatrasilp & Tongkerd, 2021  
D = 4.4 mm

# Peace, Justice and Strong Institutions

สงบสุข ยุติธรรม และเป็นสถาบันที่เข้มแข็ง

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

ส่งเสริมสังคมสงบสุข ยุติธรรม ไม่แบ่งแยก เพื่อการพัฒนาอย่างยั่งยืน

## Experiential Legal Education Platform (LawLab)

In 2021, the Faculty of Law has placed an emphasis on the concept of "Future Lawyers". This concept denotes a new generation of law students who are not only equipped with legal knowledge, but also have developed an intellectual awareness of Sustainable Development Goals. This is being achieved through the "Chula LawLAB" project, which offers a learning space for students to tackle practical legal issues and work in collaboration with qualified lawyers and practitioners in the social sector. The project is divided into three groups. Firstly, the "LawLAB for Startup" aims to encourage the application of legal knowledge to support new start-ups. Secondly, the "LawLAB for Clean Air" offers a participatory space for a publicly-sponsored draft bill for the fundamental right to clean air. Finally, the LawLAB for Human Rights has the goal of creating an awareness of, and encouraging participation in, various human rights issues, including the right to public assembly and the right to judicial process in human rights cases. Moreover, the LawLAB for Human Rights has also undertaken research in collaboration with the Securities and Exchange Commission (the SEC) in order to encourage the private sector, under the SEC's supervision, to disclose information regarding corporate human rights responsibilities.

In addition, there are several other projects under the auspices of the Faculty of Law, in partnership with other institutions, that aim to encourage public participation in the SDGs. For instance, SDG Citizens: Let's Drive SDGs to the Next Normal, which aims to increase public engagement in the SDG goals in their daily lives; the Moonlight for Moth project, which supports the publication of books for the blind; and the LawChula Moving Forward project, which offers legal advice to those who are affected by the Covid-19 pandemic.

## Shaping Our Shared Destiny: University's Partnership with United Nations' Sustainable Development Goals

The Sustainable Development Goals (SDGs) embody the global framework for human development with key targets for the period 2015-2030. Their 17 Goals are closely aligned with the potential of Universities in propelling the preferred path to the future. The heart of this momentum is to build the capacity of students as global citizens to respond actively to the 5 P's underlined by the SDGs: People, Planet, Prosperity, Peace and Partnership.

Importantly, Chulalongkorn University is integrating those Goals substantively into the learning process with an all-embracing and innovative approach which is reflective of the interrelationship between human rights, democracy, peace and sustainable development. In essence, it aims to nurture not only excellence among students but also care and consideration for global-local concerns. In this regard, the COVID-19 pandemic, compounded by global warming and environmental degradation, has highlighted the challenges awaiting humanity with a sense of immediacy and urgency. Yet, it is both a calamity and an opportunity.

The University's work is exemplified by its Faculty of Law whose activities underline the concept of "Future Lawyers", giving traction to a new generation of law students not only equipped with legal knowledge but also committed to the SDGs. To highlight human rights and access to justice under SDG 16 and partnership-building under SDG 17, the Faculty is implementing the "Chula LawLAB" project enabling students to work with key lawyers and practitioners in the social sectors.

At the heart of this partnership between actors and actions is the dynamic shaping of a shared destiny, calibrating the call to humanity with a sense of inclusivity and empathy.

(Vitit Muntarbhorn – Professor Emeritus, Faculty of Law, Chulalongkorn University; KBE; formerly UN Independent Expert and member of UN Commissions of Inquiry on human rights; UN Special Rapporteur on Cambodia; Recipient of UNESCO Human Rights Education Prize)



### Inclusive Water Governance for a Sustainable Mekong River

The Mekong-Lancang River flows from headwaters in the Qinghai-Tibetan Plateau through Yunnan province of China, Myanmar, Laos, Thailand, Cambodia and Vietnam. While there remains a close relationship between rural communities' livelihoods and the river's natural resources, since the early 1990s the river has been transformed from a free-flowing river to one that is increasingly engineered by large hydropower dams. These changes – alongside other development projects including several for navigation and large-scale irrigated agriculture - have evoked both cooperation and tensions between states, as well as communities, civil society, and the private sector, at scales ranging from local to transboundary.

In transboundary river basins, water data and information sharing are the foundation of trust building, evidence-based cooperation, and water diplomacy between states, as well as with riparian communities and civil society. In August 2021, the Center for Social Development Studies (CSDS) published a study titled: "Strengthening Water Diplomacy Through Water Data Sharing and Inclusive Evidence-Based Transboundary Governance" that was prepared in collaboration with the Cambodia Development Research Institute and researchers from Ubon Ratchathani University and Mae Fa Luang University in Thailand, and Chongqing University, China. The study presents a review of international best practice on water data sharing in international law, outlines existing institutionalized water data sharing arrangements in the Mekong-Lancang basin, analyzes how the availability of water data and its analysis influenced hydropolitics and geopolitics during the 2019-2020 drought, and presents recent empirical evidence from North and Northeast Thailand on riparian communities' access to water data. The study identified policy options on three themes: comprehensive and accessible scientific water data, diversity of water knowledge, and deepening water diplomacy and institutionalizing transboundary accountability. This research has been the basis for contributing presentations to five regional forums during 2021.

Recent research by CSDS has also highlighted the important role that "reciprocity" plays in international law, institutions and international relations, including its role in the principle of Equitable and Reasonable Utilization (ERU) that is the cornerstone of international water law. Yet, how reciprocity is applied in practice in transboundary water governance is not well understood, and has been a focus of our research activities in the Mekong-Lancang basin, including hosting a two-day Deep Dive in Bangkok in September 2019. Based on this research, and complementing the publication of an academic article and policy brief, CSDS launched an online role play game in November 2020 titled "Reciprocity in Riverbank City" for students and practitioners to explore for themselves how different forms of reciprocity might influence decision-making over development alternatives for water ([www.csd-chula.org/reciprocity-game](http://www.csd-chula.org/reciprocity-game)).

### Promoting a Peaceful and Inclusive University for Sustainable Development

Chulalongkorn University has continuously worked to build an effective, accountable, and inclusive institution. Openness and transparency are key ingredients in developing and maintaining the accountability and trust that are necessary for good governance.

Nowadays, the world is interconnected via the internet. Data transparency is becoming increasingly important, along with the development of channels for auditing and preventing corruption. Chulalongkorn University has adopted the solution developed by The National Anti-Corruption Commission of Thailand (ITA: Integrity and Transparency Assessment) for monitoring information openness and accessibility to justice for all students and staff. For FY2021, Chulalongkorn University earned a score of 91.08, which is an "A" ranking, on the ITA assessment. This success was due to the cooperation and unity on display in the Chula community along with the support of external university patrons.

Currently, the COVID-19 pandemic is causing significant loss of life, having killed over three million people. Furthermore, socioeconomic disruption has forced over 50,000 Chulalongkorn University students and staff to shift to an online mode of working and learning. The University recently introduced a digital solution called CUNEX to mitigate risk of corruption and abuse of power during the crisis by using live facial recognition technology to control clock-in and clock-out activities and connect directly with the employee compensation system.

In addition, Chulalongkorn University has actively supported the development of professional skills in creating peace through the establishment of the Rotary Peace Center in 2002 in order to identify and train highly qualified professionals to become agents of peace. The center is one of eight Rotary Peace Centers established at prestigious universities throughout the world; it offers Rotary Peace Fellows a rigorous program of study in areas relating to peace and conflict resolution. The Rotary Peace Centers draw from Rotary's long, unwavering commitment to peace, seen in projects that address the root causes of conflict.



# Partnerships for the Goals

หุ้นส่วนความร่วมมือสู่ทุกเป้าหมาย

Strengthen the means of implementation and revitalize the global partnership for sustainable development

สร้างพลังแห่งการเป็นหุ้นส่วนความร่วมมือระดับสากลต่อการพัฒนาที่ยั่งยืน

## CU-UNESCO Futures Literacy Project

The COVID-19 pandemic has revealed the vulnerability of the world that we live in. It has painfully shed light on systematic flaws in our societies, be they social inequality, deep-rooted racial discrimination, or the unsustainability of global capitalism. The health and economic crises brought about by the pandemic have also heightened geopolitical tensions, prompting us to critically re-think what defines leadership, and global leadership in particular. While the difficult realities of the pandemic linger on, they also present us with an opportunity to understand the challenges we face in a much more holistic manner. The pandemic reminds us of the importance of nurturing future leaders with a global mindset, leaders who can work beyond national interests toward common good.

Futures Literacy, a universally accessible skill that builds on the innate human capacity to imagine the future, offers a clear, field tested solution to poverty-of-the imagination. Being “futures literate” enables people, together, to appreciate the world more fully, and to use the future to innovate in the present (Miller, 2015). Chulalongkorn University joined the Futures Literacy movement initiated by UNESCO and has been participating in several modalities of action including the UNESCO High-Level Futures Literacy Summit 2020, and a global dialogue forum via “Group of Friends for Futures Literacy” led by 13 ambassadors across the globe. Chula has been nominated as “UNESCO Chair for Resource Governance and Futures Literacy” to promote Global Commons via teaching, research, and engagement. Chula will start to conduct Futures Literacy Lab workshops for students, faculties, and community members in collaboration with UNESCO and other visionary partners holding UNESCO Chairs.

## Civic Engagement 4.0: Dignity ~ Justice ~ Sustainability (CE4.0)

CE4.0 is a regional platform for mutual learning, action, and advocacy, working toward achieving dignity, justice and sustainability in Southeast Asian society. Recognizing that sustainability is attainable only through active participation of citizens and radical changes in the ways in which people think, act, and relate to each other, Chulalongkorn University launched this regional platform in 2018 in collaboration with civil society organizations, local governments and academic institutions of the region and beyond. This platform aims to facilitate connectivity of initiatives, especially reaching out to smaller organizations and creating space for those who are not on the “usual radar” of engagement, thus, motivating people and connecting them in a process of co-learning and co-designing practices for sustainable society.

In 2019, CE4.0 organized an international forum and mayors’ symposium in Solo, Indonesia, which inspired enhancement of mayors’ direct engagement with citizens in Asia. Moreover, CE4.0 recently published “Civic Engagement in Asia: Lessons from Transformative Learning in the Quest for A Sustainable Future”, containing 24 chapters, written by 31 on-the-ground changemakers who are civic engagement activists. The volume was published by Yayasan Obor Indonesia as a joint endeavor between Chulalongkorn University and Research Center for Climate Change of Universitas Indonesia, with the support of the Asia-Pacific Network for Global Change Research. The online version will be published by Springer Nature in 2022. Additionally, a virtual conference, “Co-Designing Resilient Global Communities”, was organized in July 2021, which also served as a book launch.



**Social Innovation Student Competition**

Engaging our FUTURE

APPLY NOW!

23 JULY submission DEADLINE

31 August 10 finalists announced

3 September 14 shortlisting for the finalists

22 October Pitching competition Award ceremony

Prize money: US\$ 10,000 (winner), US\$ 5,000 (runner-up), US\$ 1,000 (top 3)

Engaging our FUTURE Mentors to our Finalist Teams

Mr. Christian Walker Executive Director of UNICEF	Ms. Zohir Hussain Executive Director of UN Women	Ms. Nisha Ghosh Executive Director of UN Women
Ms. Yee Chu Executive Director of UN Women	Ms. Aphisa Stewart Executive Director of UN Women	Ms. Catrin Mackenzie Executive Director of UN Women
Mr. Jeff Hamilton Executive Director of UN Women	Mr. George Murray Executive Director of UN Women	Mr. Matthew Kavanagh Executive Director of UN Women

Engaging our FUTURE

- Total 116 submitted projects
- 1,539 students involved
- Views on the admission platform
- 70 direct inquiries / conversations
- Countries mentioned:
  - Australia (4)
  - Bangladesh (2)
  - Bhutan
  - Canada
  - China (4)
  - Ecuador (2)
  - France
  - Germany
  - Hong Kong (5)
  - India (2)
  - Indonesia (2)
  - Malaysia (2)
  - Myanmar (1)
  - Nepal
  - Nigeria
  - Pakistan (2)
  - Philippines (2)



**UNESCO FUTURES LITERACY SUMMIT 2020**

8-12 DECEMBER

unes.



### Social Innovation Competition

Universities can be catalysts for creating connectivity among members of society, serving as knowledge platforms to address complex challenges in the social, economic, political, environmental, and other value systems of our time. Chulalongkorn University conducts various engagement programs as part of such efforts. Engaging Our Future!—Innovation Challenges for Sustainable Society was a global engagement program launched by Chulalongkorn University in partnership with SDGx, the United Nations Development Programme (UNDP), and the Yunus Foundation that encouraged university students from around the globe to work together in a team spirit towards SDGs. The program enabled student social innovators to learn about the SDGs at deeper level by engaging with invited experts and experienced/committed practitioners of social innovation through webinars and mentorship.

### Chula ARI

Chula ARI is an interdisciplinary and transdisciplinary platform designed to enhance preparation for the multiple transformations ahead in the ageing society, including expected transformations in labor markets, housing, social protection, and medical services. As such, its work reaches beyond immediate considerations of how to care for the elderly. Research efforts focus on empowering present and future older persons to be independent and self-reliant for as long as possible. The platform envisions achieving an enhanced level of holistic human security in which life-long learning is promoted so that people can age with good quality of life, and older people can continue to comprise a vital part of the society. Chula ARI's partners include the Ministry of Interior, the Department of Older Persons, the Office of the National Economics and Social Development Council, the Bangkok Metropolitan Administration, the Thai Red Cross Society, the Thai Health Promotion Foundation, and the United Nations Development Programme (UNDP), among others.

### Prince Paramanujitjinoros Day

Hosted by the Department of Thai, Faculty of Arts, together with Wat Phra Chetuphon (widely known as Wat Pho or The Temple of the Reclining Buddha), Prince Paramanujitjinoros Day is annually held from December 9th to 11th. The main purpose is to honor HRH Prince Paramanuchitchinorot, the 7th Supreme Patriarch of Ratanakosin (Bangkok), a nationally renowned poet whose achievements were recognized by UNESCO in 1990 for his remarkable contributions to the world culture.

Prince Paramanujitjinoros Day has been under the Royal Patronage since the beginning. The event comprises various activities that highlight and celebrate Thai language and literature and Buddhism. The various activities include academic discussions, quizzes on Thai language and literature, and competitions for poetry writing, storytelling, and calligraphy. These educational activities involve students from schools across the country, and the event is considered one of the driving forces in promoting awareness of the importance of Thai language and literature and Buddhism in Thai society.



# Chulalongkorn University

## Sustainability Report 2020-2021

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