
Special Sessions | Industrial change

[1D04-04]Special Panel: Industrial change

2022年4月29日(金) 13:00 ~ 14:30 Room D (Zoom)

13:00 ~ 14:30

[1D04-04-01]Advanced Technology and the Sustainable Development of Thai Society

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Since the birth of modern science, the growth of human society has been driven forward by the development of science and technology. The energy revolution that depended on oil and electricity, the mechanization of production systems and transportation, the spread of modern medicine, and the ICT revolution of recent years have transformed not only our lives and work, but also international politics and the market economy. Consequently, economic development has spread throughout the various regions of the world, reducing poverty, and enhancing the health of people. However, as indicated by the United Nations' Sustainable Development Goals, many negative aspects have also been experienced in the science- and technology-driven growth of human society. Global environmental problems are now reaching a critical situation, and widening economic disparities are giving rise to social divisions. In Southeast Asia, the spread of renewable energy, the effective use of biomass resources, and the prevention and mitigation of increasingly devastating natural disasters are becoming especially urgent issues. Further development of science and technology is essential for the resolution of these problems, but the development of science and technology must not create new difficulties. For human society to achieve sound and sustainable growth, it is necessary to position the development of science and technology within the context of both the growth of human society as a whole and the growth of individual communities, and to develop cutting-edge technology that will act as public goods and social goods. The purpose of this panel will therefore be to promote dialogue between advanced science and technology researchers and researchers of the politics, economy, society and culture of Thailand to discuss possibilities for appropriate science and technology for the sustainable growth of Thai society. We will also focus on science, technology and innovation coordinators who can play the role of catalysts for such interdisciplinary dialogues and collaboration.

Introduction by prof. Eiji Nawata

paper abstract#1

Change Detection of Floating Vegetation in Nong Han Lake, Sakon Nakhon Province, Thailand using THEOS images

Puvadol Doydee

Nong Han Lake is the second largest freshwater lake in northeast of Thailand with area about 12,300 ha.

The Lake is located in Sakon Nakhon Province, which connecting with lower Mekong River. This lake has a serious problem with floating aquatic plants particularly water hyacinth (*Eichornia crassipes*). Water bodies infested by floating vegetation due to discharging of agricultural fertilizers and waste water from community in the lake without proper water treatment. Floating vegetation widespread has ecological and socio-economic impacts on society of Sakon Nakhon. Remotely sensed data of THEOS (Thailand Earth Observation System) was used to investigate the area of floating vegetation and its changes. Satellite imagery was acquired on March 4, 2016 and on March 2, 2018 from GISTDA. ER mapper software was employed for digital image processing associated with maximum likelihood supervised classification technique and pixel-based (15 m x 15 m) calculation for extracting the features. The results showed that floating vegetation area decreased 26.13 % (980 ha) from existing of 3,266.67 ha. This is because the flash flood that happened in study area during 28-31 July 2017, which removed them into the rice field. The results of the present study implied obvious benefit of flood phenomena and shall help the decision-makers not only focus on removing flood vegetation, but to consider others issues, for example local participation and lake rehabilitation to improve livelihood of society and balance aquatic ecosystem.

paper abstract#2

The Role of Academic Institution in the Development of Local Community

Hathaithip Sintuya, Nuttiya Tantranont, Chayanon Sawatdeenarunat, Surachai Narrat Jansri, Worajit Setthapun

Asian Development College for Community Economy and Technology (adiCET), Chiang Mai Rajabhat University has focused on the development of community environment and energy. adiCET Smart Community was developed based on sustainability concept which aimed to reduce energy, food, and water resources utilization, as well as waste generation. The knowledge obtained from research and academic service was integrated to build the adiCET Smart Community which is the real living laboratory where students and visitors can experience and learn the sustainable way of living with 100% renewable energy. This will be the source of inspiration for people to go back and implement in their household and community. In addition, the Smart Community concept has been implemented to the local communities through the collaboration with local government. The project concepts are from several sources such as workshop, conference, government institution, and community needs. Communities, lectures, researchers, and graduate students work together to solve problems and respond to the community requirements. From the experience of adiCET, community leader, human resources and public participation are found to be the key factors for the driving of community development. Moreover, national policy, direction and regulation are found to play an important role in the decision of community leader and people.

paper abstract#3

Development of a novel biomass conversion method for solving problems

concerning treatment of the agricultural waste and PM2.5 emission

Dr Ryuichi Ashida

A new method of highly efficient biomass power generation is expected to achieve efficiencies of 55% or more, far exceeding the efficiencies of 10-30% achieved by biomass power generation using

conventional heat engines. It would be more effective to realize this method in Southeast Asian countries where the potential of biomass energy is high, rather than in Japan, in order to contribute to a low-carbon society from a global perspective. On the other hand, in continental Southeast Asia, such as Thailand, Laos, and Myanmar, PM2.5, an air pollutant caused by the burning of rice straw, rice husk, and sugarcane lees, is a longstanding and complex transboundary issue that spreads to urban areas due to monsoon winds, causing respiratory diseases among citizens. This is a serious problem that local communities have been trying to solve for years, even more so than the recent spread of the new coronavirus. In cooperation with researchers in Thailand, Laos, Myanmar, etc., we will conduct interviews in rural areas, etc., and simultaneously investigate the possibility of a new lifestyle change to reduce PM2.5 emissions from field burning by introducing a new biomass conversion method. This approach of co-creating solutions to complex social issues with diverse stakeholders outside of academia is a method that crosses the border of international and interdisciplinary fusion, which has been the focus of attention in OECD policy reports as transdisciplinary co-creational research.

paper abstract#4

Biorefinery as a new S-curve industry for transforming Thailand towards BCG economy

Verawat Champreda, Ph.D

Thailand is currently one of the world's leaders in agricultural product export and biofuel production. Based on the abundance of 1st G edible (sugar, starch, oil) and 2nd G non-edible (cellulosics) raw materials with the established biofuel industries, biorefinery is placed as one of the new S-curve industries to transform the country's economy towards the more sustainable and competitive BCG (Bio-/ Circular-/ Green-) Economy. At present, molasses, cassava, and palm oils are used for production of bioethanol and biodiesel mostly for local use. These raw materials will be utilized for production of new products with higher values, for examples, biochemicals, bioplastics, biomaterials, functional ingredients, and biopharmas in bio-production plants and bio-complexes. The advancement in developing competitive biorefinery industry is expedited by policies from the governmental sector and strong interest from major local and international companies. At BIOTEC, we work together with our partners in NSTDA, local universities and international institutes to develop multi-disciplinary and integrated technologies for valorization of potent agricultural raw materials in the country. The research covers pretreatment and fractionation of the starting lignocellulosic materials and conversion of the separated lignocellulosic components to a range of bio-based products using enzymatic, fermentation and catalytic processes. The work is also focused on utilization of wealth microbial diversity in the country collected at the Thailand Bioresource Research Center (TBRC) which contains >90,000 strains of microbial strains isolated in the country and acts as the focal point linked to culture collection network in Southeast Asia. Together with the advancement in synthetic biology and bioprocess technology, this leads to development of various microbial products, e.g. enzymes, specialty biochemicals, biocontrol agents, and bioactive compounds from the country's biodiversity. The development of bio-industry and biorefinery in the country will be promoted by the investment from the governmental sector to establish the new world-class pilot plant facilities in the Eastern Economic Corridor of Innovation (EECi) which will allow up-scaling of bio- and chemical processes for technology evaluation and further technology transfer. With strong interest from the private sectors, this will lead to development of the new biorefinery industry in Thailand, which will greatly add value to the agricultural raw materials in the country and strengthen the country's industry with economic competitiveness for the next decades.