AIT
Asian Institute of Technology

2023

ANNUAL RESEARCH REPORT

ASIAN INSTITUTE OF TECHNOLOGY

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PRESIDENT'S MESSAGE

Professor Pai-Chi Li
President
Asian Institute of Technology (AIT)

I am pleased to announce the release of the Report on Annual Research 2023, which provides a comprehensive overview of the research activities conducted across the institute throughout the year.

Despite facing various adversities and challenges, AIT has successfully consolidated its research efforts, gaining rich experiences and knowledge that have been integrated back into our classrooms. We take great pride in the substantial progress we have made in conducting research that pioneers solutions addressing the region's most urgent challenges. This progress is a testament to our collective efforts and the vibrant spirit we have fostered.

With a renewed focus on our research and development agenda under AIT's thematic areas of strength, this year has witnessed the successful implementation of research initiatives and projects, scaling up sustainable technological and social solutions to real-life challenges. Our research is already making a positive societal impact across South and Southeast Asia, playing a crucial role in the development of technologies, scientific competence, and capacity by acting as a bridge between the global, regional, and local.

Our achievements are reinforced through strengthened regional and international partnerships, enabling our research community to address both regional and global challenges and make a significant and lasting impact on our communities.

The accomplishments of this year are a testament to our shared commitment to pioneering solutions for the region's most pressing issues. I would like to take this opportunity to thank the entire AIT community for their wholehearted efforts in achieving our research objectives and to our partners for their continued trust and support.

VICE PRESIDENT'S MESSAGE

Professor Nitin K. Tripathi
Vice President Academic Affairs
Asian Institute of Technology (AIT)

It is with great pride that we present the Annual Research Report for 2023, showcasing the significant advancements and achievements of our research over the past year. This report highlights our vibrant collaborations, and the impactful research work carried out in 2023 across our five key thematic areas: Climate Change, Smart Communities, Infrastructure, Technology, Policy, and Society, and Water-Energy-Food.

Our dedicated researchers, faculty and staff in collaboration with our esteemed partners have demonstrated exceptional commitment and innovation, pushing the boundaries of knowledge and addressing some of the most pressing challenges of our time. The multidisciplinary approach adopted by our teams has allowed us to leverage our existing strengths while exploring new, complementary areas, resulting in groundbreaking projects and initiatives.

This year, we have seen remarkable progress in developing sustainable solutions, fostering resilient communities, and advancing technological innovations that promise to make a tangible difference and shape a better future for all. The interconnected and overlapping nature of our research themes has enabled us to nurture innovation, cross traditional boundaries, and deliver research with a profound and lasting impact.

We extend our heartfelt gratitude to all the researchers, faculty, partners, and supporters who have contributed to this year's successes. Your dedication and hard work are the driving force behind our commitment to becoming the leading institution for sustainability in the region.

I believe this Report provides a comprehensive repository of AIT's research initiatives accomplished in year 2023 serving as a valuable resource for promoting collaborative research and development projects within our fields of expertise. I also feel happy to inform that due to our projects in climate change and sustainability and our missions related to green campus initiatives, AIT has received the International Green Gown Award 2024 on Climate Action. I would like to extend my gratitude to SCPU and the various AIT units for their invaluable contributions and support in preparing this Report.

CHAPTER 1: INTRODUCTION

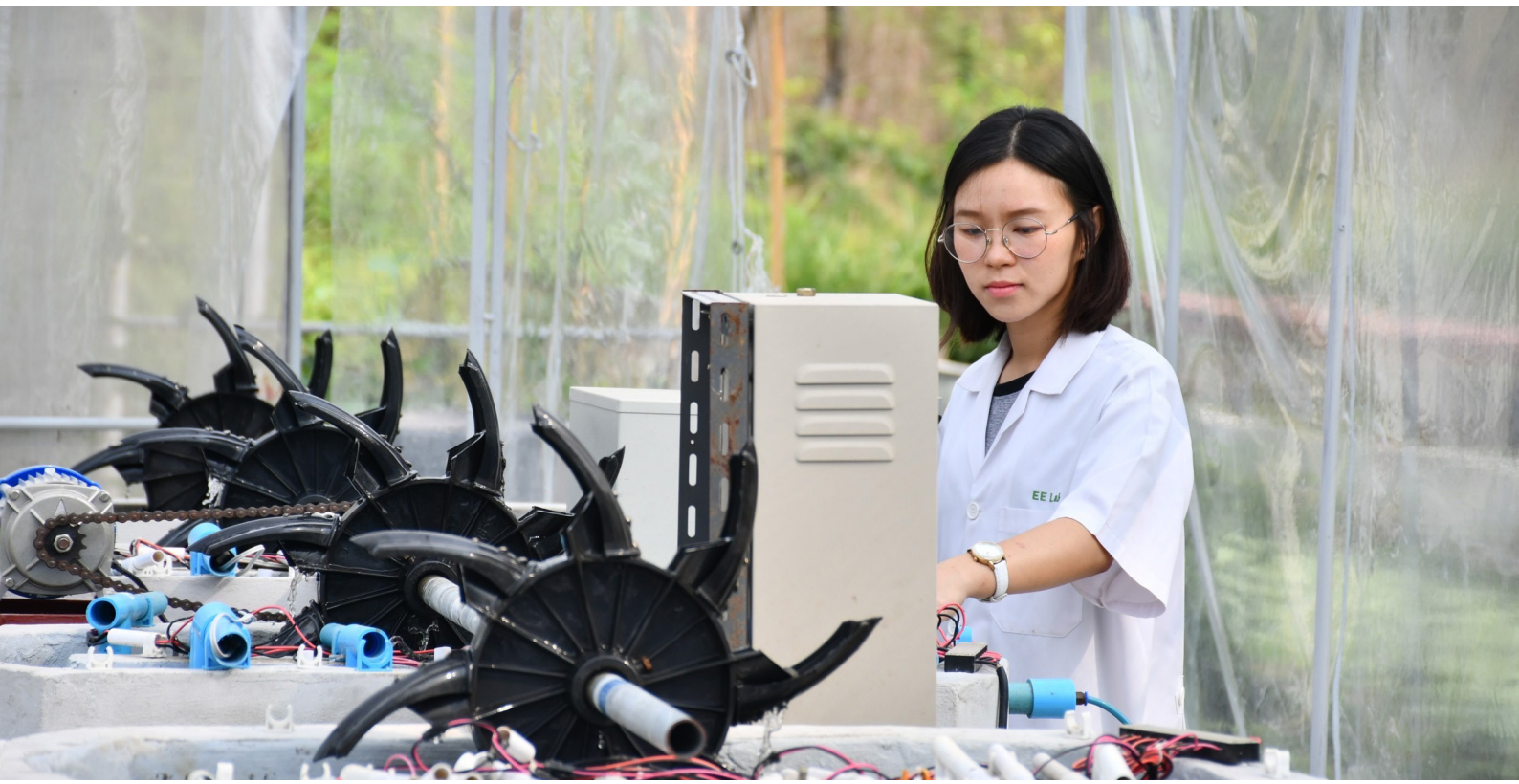
AIT MISSION

The Asian Institute of Technology promotes technological change and sustainable development in the Asian-Pacific region through higher education, research, and outreach. Established in Bangkok in 1959, AIT has become a leading regional postgraduate institution and is actively working with public and private sector partners throughout the region and with some of the top universities in the world. Recognized for its multinational, multi- cultural ethos, the Institute operates as a self-contained international community at its campus located 40 km (25 miles) north of Bangkok, Thailand. Besides the usual laboratories and academic buildings, the main campus includes housing, sports, and medical facilities, a conference center, and a library with over 230,000 volumes and 830 print and on-line periodicals. All serve to fulfill the AIT mission to develop highly qualified and committed professionals who play leading roles in the region's sustainable development and its integration into the global economy.

AIT RESEARCH

Recognized as one of the leading academic institutes in the field of sustainability in Asia, AIT through its research projects, thrives to take-on new research frontiers to build a better knowledge base and facilitate actions towards the sustainable development of the region. With an aim to make a significant and lasting difference to the communities, AIT's research projects are designed to bolster technology development and application, environmental conservation, policy innovation thus promoting sustainability and sustainable development around Asia and beyond.

AIT research is importantly aligned to all 17 SDG's, contributing to the sustainable development of the region, strengthening the knowledge development and business capacity, and supporting communities with their economic development and integration into the global economy. AIT focuses on assisting stakeholders build their capacity to promote sustainability through appropriate technology, relevant and applied research, sustainable frameworks for development and planning, informed policy making and practice applications in the region. AIT's academic programs are implemented through its three schools, the School of Environment, Resources and Development (SERD), the School of Engineering and Technology (SET), and the School of Management (SOM). AIT through its various Institute Wide outreach centers and departments jointly carry out number of research, consultancy, and capacity development projects under internationally funded projects of the Asian Development Bank (ADB), the World Bank, the Foreign, Commonwealth & Development Office (FCDO UK), GIZ, UN Agencies, USAID, UKRI, UNU, ISCU, AAC etc. AIT pursues excellence in research, within the five thematic areas of focus namely, Climate Change; Smart Communities; Infrastructure; Technology, Policy, Society and Water-Energy-Food. These all five research themes are interconnected and each of which is essential to creating a sustainable future for humans and the planet.



GRANTS AND SPONSORED PROJECTS AT A GLANCE

The research projects of AIT contribute to promoting technological change and sustainable development. As of 31 December 2023,

2023

157 sponsored and contracted projects

380 MILLION THB Budget

PROJECTS INITIATED UNDER AIT SCHOOLS AND OUTREACH CENTERS

AIT Schools and outreach Centers jointly implement research and development projects under their respective areas of expertise with a multidisciplinary approach towards addressing real-life challenges in a holistic manner. The following graphs give an overview of the projects together with its project value, carried out by different Schools and outreach Centers in 2023

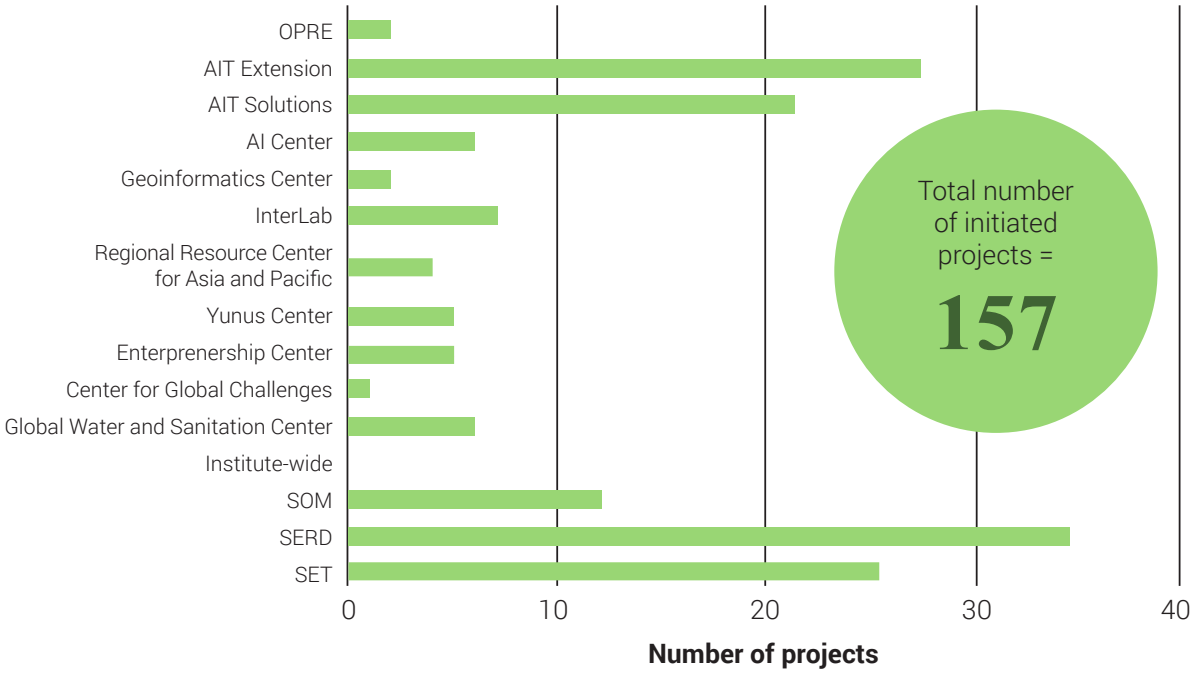


Figure 1. Projects initiated in 2023 by AIT Schools and outreach Centers

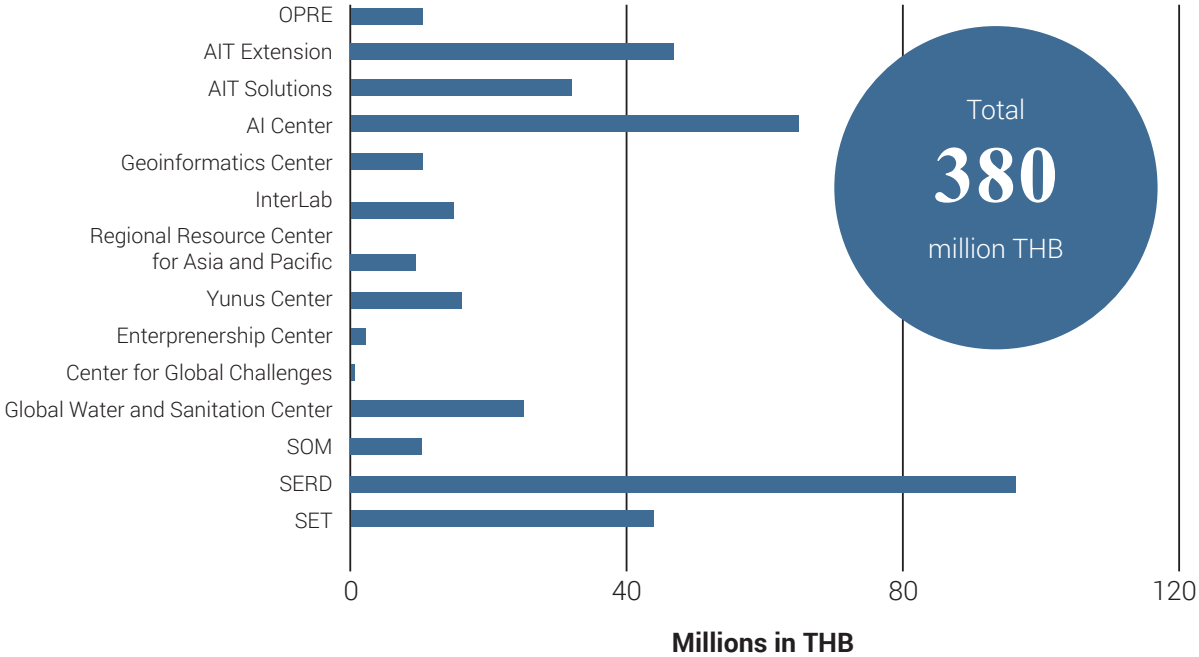


Figure 2. Value of projects initiated in 2023

PROJECTS INITIATED UNDER RESEARCH THEMES

Research at AIT is aligned under five thematic areas of focus namely: i) Climate Change ii) Smart Communities iii) Infrastructure iv) Technology, Policy and Society and v) Water-Energy-Food. The following chart[1] gives an overview of all projects initiated under five thematic areas in the year 2023.

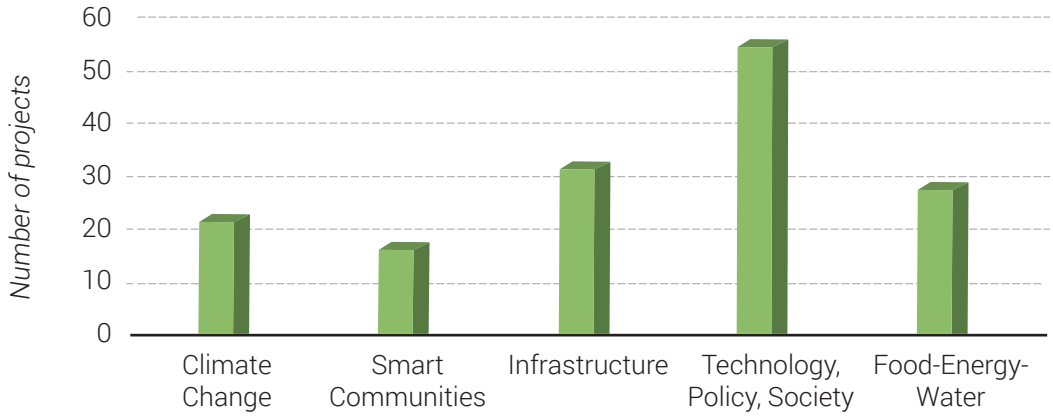


Figure 3. Projects initiated under research themes in 2023

The total value of all projects initiated in 2023 amounts to 380 million Thai Baht (THB), as shown as shown in the below chart giving an overview of cumulative budget for each thematic area.

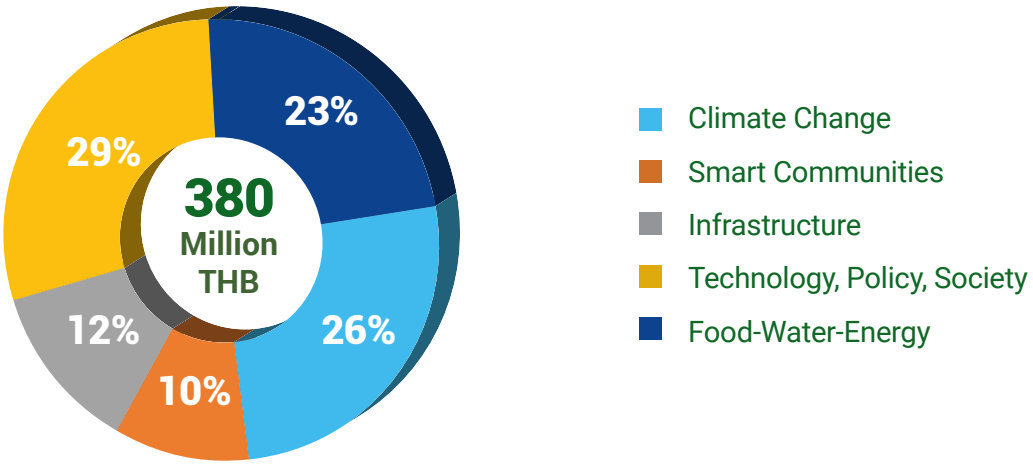


Figure 4. Value of projects initiated under research themes in 2023

[1] As the five research themes are interconnected and overlapping, crossing their traditional boundaries, the charts in this section (Projects initiateed under Research Themes) are presented based on the indicative number of projects that fall under their most relevant (single) research themes.

AIT PUBLICATIONS

The report presents the publications available from SCOPUS database for 2023. Grouping under five thematic research areas, the chart below[2] shows the publications in 2023, reaching a total of 409 publications.

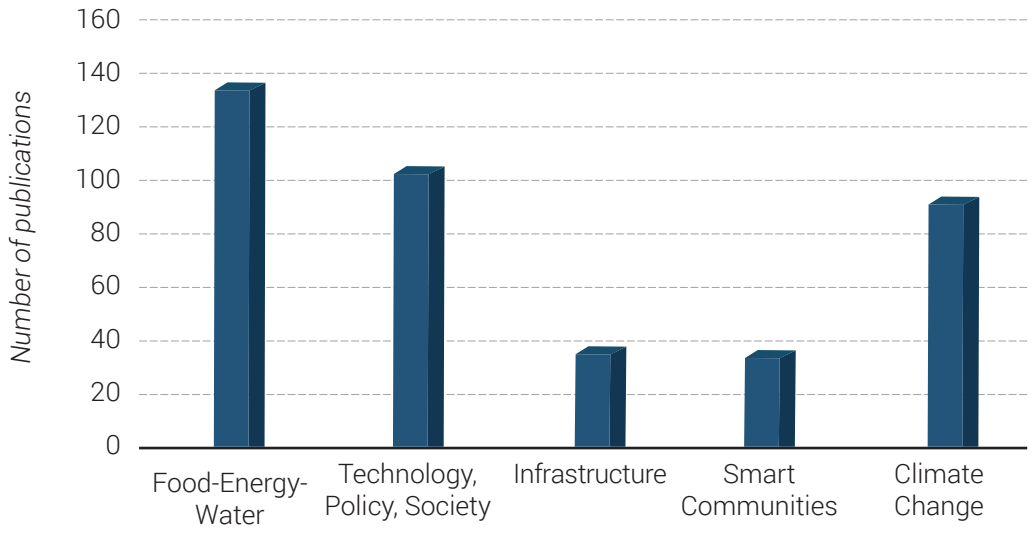


Figure 5. Publications associated with the research themes

[2] As five research themes are interconnected and overlapping, crossing their traditional boundaries, the charts in this section (AIT Publications) aim to give an indicative overview of the publications that fall under their most relevant (single) research themes.

CHAPTER 2: RESEARCH THEMES

CLIMATE CHANGE

AIT conducts cutting-edge and solution-oriented research in climate change in an interdisciplinary setting. Research addresses the issues of how human activities and changing climate affect each other and explores the technology and policy options needed towards low carbon development and improve the climate resilience for sustainability. Through interdisciplinary approach taken, AIT research examines the greenhouse gas emissions and the impacts of climate change from social, environmental, and technological perceptive. The climate change research theme aims to help determine and support development of effective solutions with appropriate mitigation and adaptation strategies including economic, social, and ecological approaches that are also complementary to other challenges such as Sustainable Development Goals.

Sub-themes

1. Transition towards Net Zero Emissions
2. Climate Change and Ecosystem
3. Enabling Technology and Innovations
4. Societal Dimension of Climate change
5. Cities and Climate Change
6. Climate Change Adaption and Resilience

TRANSITION TOWARDS NET ZERO EMISSIONS

With the continued rise of global greenhouse gas emissions at the present time that have caused global warming already at 1.1^{0}C from the pre-industrial times, ignoring the transition to net-zero emission is no longer an option. The climate emergency requires the swift and ambitious action to reduce emissions urgently. Rapid energy transitions to renewable energy, addressing the deforestation, the large-scale investment and innovation are needed to provide technologically viable and economically competitive alternatives to reduce GHG emissions across all sectors of the economy. In view of this, AIT research focuses on analysis of the transition pathways to low-carbon energy system, and low carbon climate resilient communities. It includes greenhouse gas (GHG) accounting and the mitigation actions and policy options – encompassing study of emission sources and monitoring of GHG emissions in key sectors of energy, agriculture, forest and land use; sustainable forest management (REDD+); effective waste management; renewable energy such as solar, bioenergy and biofuel; energy storage technologies and its applications; clean coal technologies; carbon capture and storage; smart grids and microgrids; and climate policies, carbon pricing and carbon markets.

CLIMATE CHANGE AND ECOSYSTEM

Climate change threatens all ecosystems such as freshwater ecosystem, grassland, forests ecosystem, coral reefs, agro-ecosystems, and communities' livelihoods dependent on these cosystems. Human and social systems also play a key role in both causing and responding to climate change. The drastic change in global climate and the earth's temperature is increasingly influenced by human-driven actions such as GHG emissions, land use/cover changes, deforestation, urbanization, etc. The climate change impact on ecosystems is to be exacerbated in ecosystems that already are under pressure from human activities, including air and water pollution, habitat destruction. The interactions between ecosystem vulnerability and human activities, and human well-being are the important aspects that should be emphasized in face of the growing population of the present time. Understanding the causes of climate change, ecological dynamics of climate impacts, has never been more important to pave the way for effective solutions in tackling climate change and its impacts.

AIT's research under this sub-theme focuses on climate change and its interaction with human activities and ecosystem. It addresses the practical

challenges in ensuring the sustainable use of natural resources, land, soil, water, and environmental management. The innovative ways of adapting to, mitigating, and reducing the impacts of climate change on vulnerable ecosystems are also explored. The topics covered under sub-theme include, among others, the impact analysis and adaptation to climate change in water, land, agriculture sectors; modelling for future climate projections and ecosystem services, climate financing for adaptation and mitigation; the circular economy; micro- biology and the environment.

ENABLING TECHNOLOGY AND INNOVATIONS

In the face of changing climate and its adverse effects, the development and adoption of new technology is an essential element of response actions to global climate change. These problems cannot be addressed without technology. Technology continues to play an even more significant role as we pursue efforts through adopting climate-friendly technology for mitigation and adaptation. In view of technological solutions playing a key role towards mitigating and adapting to impacts of climate change, the research under this sub-theme focuses on technology, policy options and strategies through AIT's leadership role to Technological Needs Assessments (TNA) in over 25 countries of Asia with United Nations Environment Program (UNEP) and technology enabling through UN Framework Convention on Climate Change (UNFCCC)'s CTCN programme, as well as other innovative mechanisms from technological, managerial, and institutional aspects in mitigating and adapting to the climate change. Some of the AIT's areas that have covered this sub-theme, are, for example, geospatial technologies (GIS, remote sensing, AI based approaches) in environmental monitoring and resource management such as water resource and air quality under changing climate conditions; climate smart agriculture technologies and practices; farm green innovation; early-warning and climate information services; innovative climate risk financing; technology clinic for Agro-food SMEs, data driven approaches in environmental research landscape, and the role of inclusive social media and digital platforms for climate adaptation and resilience building in Southeast Asia.

SOCIETAL DIMENSION OF CLIMATE CHANGE

Climate change affects people's lives from several aspects of economic, social, and environmental dimensions. Certain social groups of the society with vulnerability to the climate crisis including women, children, persons with disabilities and the elderly face disproportionate impacts of climate change despite being the least contributor to the crisis. The social crisis caused by climate change highlights the need to step up the efforts in addressing the core issues of inequality on many levels between rich and poor, women and men. Climate actions thus need to take a holistic approach addressing the social drivers of climate change across disciplines and sectors.

AIT's research seeks to understand the social factors and conditions that make social systems less vulnerable and resilient to climate change; and examine opportunities to adapt social systems in ways that are fair and sustainable. With a focus on

social impacts and climate change, research covers a wide range of areas encompassing the role of economic, social, and institutional resources in building resilience to climate change. That includes social learning and networking, health, livelihoods, gender, migration, lifestyle changes, civil society organizations and NGOs, and inclusive strategies for climate mitigation and adaptation support system.

CITIES AND CLIMATE CHANGE

The cities are increasingly consuming natural resources at large scale while producing growing amount of waste and emissions, which leads to negative impacts on the environment and the climate. Cities contribute to over 70% of global CO2 emissions but they have enormous potential to incorporate strategies for reducing the root causes of climate change by changing people's lifestyles, enhancing resource efficiency, and other actions. At the same time, as climate change continues, the growing effects of climate change are also increasingly felt by the cities – including the impacts of climate induced disasters such as flooding, intense rainfall, landslides, and strong typhoons, etc. It is thus critical to make cities an integral part of the solution in combating climate change. AIT's research addresses urban carbon accounting, pathways to low carbon city development and analysis of city climate actions. Practical application of urban resilience approaches and promoting green city concepts are further key areas addressed under the sub-theme. This includes urban resilience assessment to disasters and climate risks, urban cooling for heat island mitigation, urban ecosystem services exploration and valuation, climate change impact scenarios on cities, climate-resilient urban planning and design including green infrastructure, infrastructure resilience planning, smart energy building, circular economy, responsible consumption, urban water-energy-food nexus including groundwater vulnerability and resilience assessments, the policy analysis and options for harnessing the innovation potential in cities to foster resilience and sustainability.

CLIMATE CHANGE ADAPTATION AND RESILIENCE

In the face of climate crisis, the efforts to adapt to the changing climate and reduce the climate-induced disaster risks have become a global priority. Promoting resilient societies to the climate risks require a range of complementary approach from climate change adaptation and disaster risk reduction concepts to prevent massive loss of life and destruction of infrastructure and hard-won development gains. The incomplete and uncertain knowledge bases, interplay of multiple actors for effective integration of disaster risk reduction and climate change adaptation in the development work are the issues that need to be urgently addressed. AIT's research focuses on climate change adaptation, disaster risk reduction and resilience building for sustainable society through risk-sensitive polices, practices and tools. Among other topics covered under sub- theme, are the role of governments, NGOs in climate change adaptation; early warning systems and tools for detection of natural disaster; risk, vulnerability, and impacts assessment of floods, droughts, tsunami; solutions to overcome extreme seasonal events of floods and droughts, social vulnerability analysis; multi-hazard risk assessment; community-based disaster risk reduction; remote sensing and GIS in disaster risk reduction; risk sensitive land use planning; risk perception and implication on risk governance.

HIGHLIGHTED PROJECTS UNDER CLIMATE CHANGE

The following lists some examples of projects that highlight AIT's global, regional, and country development experience under *"Climate Change"* thematic area during 2023.

Are City Climate Plans Adequate for Mitigating Weather Extremes? An Investigation of Southeast Asian Cities

Project budget- 1.25 million THB

Project duration- September 2022- June 2024

Donor- Curtin University

The project collects existing climate action plan and policies, status of NDCs in Bangkok including national and local climate change sectoral plans of the city. Activities include field survey/interviews and review of the climate action plans developed by the partners. The project also organized the workshops and events findings as a pivotal

platform for stakeholders to exchange ideas, share best practices, and chart a course toward more sustainable and resilient urban futures.

Greenhouse Gas Reduction in RICE: MICRO-biome climate smart applications

Project budget- 4 million THB

Project duration- December 2020– November 2023

Donor- National Higher Education Science Research and Innovation Policy Council (NXPO)

This project, under the Joint Funding Scheme (JFS) for collaborations between Europe and Southeast Asia, is the consolidation of an international consortium with Thailand as lead partner and collaborators in Germany, Spain, and The Netherlands for the development of knowledge exchange, creation of cutting-edge science, and the transfer of capacity development to Thai-based institutes. The main goal of this project is the development of knowledge oriented to mitigate GHG emissions from Rice Agriculture, through climate-smart microbial applications towards improving agricultural yields for the benefit of Thai agricultural sector. This project focuses on using the native methane-munching microbial community of rice soils to mitigate GHG emissions in Thai paddy soils. Furthermore, it involves characterizing and enhancing plant-growth-promoting microorganisms to decrease fertilizer use and increase yield.

Establishing a Knowledge Hub and Building Capacity on Urban Ecosystem-Based Adaption (EbA) in Lao PDR

Project budget- 2.9 million THB

Project duration- September 2023- May 2025

Donor- Ministry of Natural Resources and Environment (MONRE), Lao PDR

The objective of this partnership with National University of Laos (NUOL) is to strengthen the Knowledge Hub and support the delivery of the Knowledge Hub activities including joint development of long term EBA curriculum for the National University of Laos; designing and conducting joint research on urban EbA; and producing knowledge products including technical reports, guidelines, research papers and policy briefs. The project activities target generating information, tools, and method to contribute to address the barriers identified to the implementation

of integrated climate-resilient flood management in Lao PDR including lack of data for modelling climate impacts, integrated climate resilient flood management approaches, and fill in the knowledge gap.

PROJECTS INITIATED UNDER CLIMATE CHANGE

Below is the list of research, consultancy and capacity development projects initiated under *"Climate Change"* by various Institute wide outreach centers and departments during 2023.

1. **Are City Climate Plans Adequate for Mitigating Weather Extremes? An Investigation of Southeast Asian Cities**
   - *Duration*: 1 September 2022 - 30 June 2024
   - *Project Investigator(s):* Mokbul Morshed Ahmad; Thi Phuoc Lai Nguyen
   - *Sponsor*: Curtin University, Australia
   - *Total contracted amount*: 1,248,000
2. **Expansion & Integration of Database Development for Flood Simulations in Decision Support System in Sindh Flood Energency Rehabilitation Project**
   - *Duration:* 6 January 2023 - 31 December 2024
   - *Project Investigator(s):* Mongkol Ekpanyapong; Furqan Ali Shaikh
   - *Sponsor:* The World Bank
   - *Total contracted amount:* 30,605,971
3. **Safeguarding the Regional Food Security under Climate Change impacts via mainstreaming Nature-based Solutions-centered adaptation strategies (NAFOS)**
   - *Duration:* 1 October 2022 - 30 September 2024
   - *Project Investigator(s):* Ho Huu Loc; Sangam Shrestha; Mohana Sundaram Shanmugam; Mokbul Morshed Ahmad
   - *Sponsor:* Asia Pacific Network on Global Change Research (APN)
   - *Total contracted amount:* 3,009,707
4. **Circular Economy Integration for Sustainable Education in the Built Environment and Other Discipline**
   - *Duration:* 1 January 2023 - 31 December 2024
   - *Project Investigator(s):* Indrajit Pal
   - *Sponsor:* ProSPER.Net
   - *Total contracted amount:* 114,700
5. **Development of Unique Carbon Storage capacity of the 3R Freshwater Mangrove Museum at AIT**
   - *Duration:* 1 March 2023 - 31 March 2024
   - *Project Investigator(s):* Dieter Wilhelm Trau
   - *Sponsor:* AirTrunk Singapore Holding Pte Ltd
   - *Total contracted amount:* 635,406
6. **Greenhouse Gas Reduction in RICE: MICRO-biome climate smart applications**
   - *Duration*: 1 April 2023 - 31 March 2026
   - *Project Investigator(s):* Simon Guerrero Cruz
   - *Sponsor*: National Higher Education Science Research and Innovation Policy Council (NXPO)
   - *Total contracted amount*: 4,000,000
7. **Climate Resilient Agriculture and Sustainable Farming using Cutting-Edge Technology**
   - *Duration*: 14 May 2023 - 30 November 2023
   - *Project Investigator(s):* Md. Zakir Hossain
   - *Sponsor*: Palli Karma-Sahayak Foundation (PKSF)
   - *Total contracted amount*: 1,536,450
8. **Development and Integration of Kirthar Medel and Operations And Maintenance of Data Center Under Sindh Flood Emergency Rehabilitation (SREFP)**
   - *Duration*: 1 April 2023 - 31 March 2026
   - *Project Investigator(s):* Furqan Ali Shaikh; Mongkol Ekpanyapong
   - *Sponsor*: The World Bank
   - *Total contracted amount*: 26,484,249
9. **Technology Needs Assessment Project IV - Support to the countries**
   - *Duration*: 1 May 2023 - 30 June 2024
   - *Project Investigator(s):* P. Abdul Salam Rajendra Prasad Shrestha
   - *Sponsor*: UNOPS
   - *Total contracted amount*: 1,592,448
10. **Enhancing the Climate Resilience of Vulnerable Smallholder Farmers: Lessons from Cambodia**
    - *Duration*: 5 June 2023 - 8 December 2023
    - *Project Investigator(s):* Narumon Wangnai
    - *Sponsor*: International Fund for Agricultural Development (IFAD)
    - *Total contracted amount*: 768,000
11. **Planning, Design and Management of Climate Resilient Water Infrastructures**
    - *Duration:* 6 June 2023 - 6 December 2023
    - *Project Investigator(s):* Fazle Karim
    - *Sponsor:* Water Infrastructure Division under MoIT
    - *Total contracted amount:* 221,136

12. **International Symposium on Disaster Resilience and Sustainable Development 2023**
    - *Duration*: 3 July 2023 - 31 December 2024
    - *Project Investigator(s):* Indrajit Pal
    - *Sponsor*: Registration fees of the participants.
    - *Total contracted amount*: 395,437

13. **Air Quality Improvement Program in Thailand (AQIP-Thailand)**
    - *Duration*: 20 February 2023 - 28 February 2025
    - *Project Investigator(s):* Nguyen Thi Kim Oanh; Ekbordin Winijkul; Lai Nguyen Huy
    - *Sponsor*: The Agence Francaise de Developpement (AFD)
    - *Total contracted amount*: 2,830,920

14. **Enhancing and scaling up the joint AIT and UNEP's efforts for air quality management**
    - *Duration*: 7 August 2023 - 30 January 2024
    - *Project Investigator(s):* Ekbordin Winijkul; Nguyen Thi Kim Oanh
    - *Sponsor*: UN Environment Programme
    - *Total contracted amount*: 2,000,000

15. **Research and Proposal Writing Workshop on Environmental and Natural Resource Economics**
    - *Duration*: 1 April 2023 - 31 August 2023
    - *Project Investigator(s):* Kristine Mendoza Perez; Naharuethai Supakarn; Bayasgalan Sanduijav
    - *Sponsor*: Innovations for Poverty Action Myanmar (IPA), Myanmar
    - *Total contracted amount*: 542,590

16. **Climate Change Adaptation in Crop Production using Smart Farming Techniques**
    - *Duration*: 8 September 2023 - 7 September 2028
    - *Project Investigator(s):* Avishek Datta; Sushil Kumar Himanshu; Farhad Zulfiqur
    - *Sponsor*: Indian Council of Agricultural Research (ICAR)
    - *Total contracted amount*: 2,782,364

17. **Technology Needs Assessment IV – Workshop**
    - *Duration*: 1 May 2023 - 30 June 2024
    - *Project Investigator(s):* P. Abdul Salam Rajendra Prasad Shrestha
    - *Sponsor*: UNOPS
    - *Total contracted amount*: 3,249,056

18. **Support to the Global Strategy for SCP, the GO4SDGS, and the Sea Circular in Asia**
    - *Duration*: 1 September 2023 - 15 September 2024
    - *Project Investigator(s):* Chotiros Mongkolchotirat
    - *Sponsor*: United Nations Environment Programme
    - *Total contracted amount*: 2,950,000

19. **Atmospheric Brown Cloud (ABC)**
    - *Duration*: 1 July 2023 - 31 August 2025
    - *Project Investigator(s):* Ram Lal Verna
    - *Sponsor*: Stockholm University
    - *Total contracted amount*: 3,189,719

20. **Assessment of Natural Resources, Land Degradation, Biodiversity and Climate change impacts using Geospatial Technologies and Building Capacities**
    - *Duration*: 3 August 2023 - 30 November 2024
    - *Project Investigator(s):* Manzul K. Hazarika, Rajendra P. Shrestha
    - *Sponsor*: Food & Agriculture Organization of the United Nations (FAO)
    - *Total contracted amount*: 4,827,900

21. **Establishing a Knowledge Hub and Building Capacity on Urban Ecosystem-Based Adaption (EbA) in Lao PDR**
    - *Duration*: 11 September 2023 - 30 May 2025
    - *Project Investigator(s):* Rajendra P.Shrestha, Indrajit Pal; Vilas Nitivattananon
    - *Sponsor*: Ministry of Natural Resoruces and Environment (MONRE), Lao PDR
    - *Total contracted amount*: 2,924,000

22. **Assessment of SLCP from Forest Fire and Open Burning in the LMS to Support the ASEAN Haze Control**
    - *Duration*: 16 November 2023 - 31 December 2024
    - *Project Investigator(s):* Ekbordin Winijkul
    - *Sponsor*: UN Environment Programme
    - *Total contracted amount*: 1,400,000

23. **Development of 2 E-learning Materials for Adaptation**
    - *Duration*: 24 October 2023 - 31 May 2024
    - *Project Investigator(s):* Ramesh Soysa Bayasgalan Sanduijav; Hnin Lai Win; Natanat Sittichaiyakarn; Naharuethai Supakarn
    - *Sponsor*: Institute for Global Environmental Strategies (IGES)
    - *Total contracted amount*: 1,850,000

SMART COMMUNITIES

Due to rapid urbanization, urban rural disparity, growing environmental footprint and inequality, the communities are facing economic, environmental, and social challenges. However, they are also trying to leap-frog through grasping the new opportunities presented by the smart technologies, the digital revolution and the policy innovation that are rapidly emerging. Especially, experiences of smart urban and rural communities are supported by a wide range of information and communication technology (ICT) systems that provide advanced and innovative services that span all sectors. AIT's research focuses on transition to smart communities by leveraging the innovative technologies and practices for the community. Within the changing context of smart communities from infrastructure & supply-oriented to improving citizens' quality of life, the research is conducted in multi- and interdisciplinary way— integrating the different dimensions of development such as technology, environment, socio-economic, and the governance.

Sub-themes

1. Emerging Technologies for Inclusive Development of Rural and Urban communities
2. Ecosystem-based Environmental Solutions for Communities
3. Digital Transformation for Economy and Businesses

EMERGING TECHNOLOGIES FOR INCLUSIVE DEVELOPMENT OF RURAL AND URBAN COMMUNITIES

As technology becomes more prevalent, the technological infrastructure serves as an enabling platform providing essential services for the benefits of the community. Digital technologies bring the great benefits to the communities through innovative services and solutions to the challenges facing the fast-growing cities and communities — such as climate change, urbanization, issues of mobility, food, and water security.

It is important to note that smart communities concept application is considered not only in the urban area and its development, but also enabling each community's requirements to be identified and addressed to raise the standard of living for all. While the technology continues to advance, society needs to be properly prepared for using their functionalities to effectively use the opportunities related to the development of modern technologies. This sub-theme recognizes the social implications along with the development of smart communities including digital divide; disparities among different communities in access and use of technology, geography (rural and urban areas), gender, and economic status.

AIT's research examines a wide variety of socio-technical aspects that bring the interconnected view of technology and the human systems that operate and interact with it. It encompasses the areas including community applications of

different emerging technologies (artificial intelligence, Internet of Things, block chain, 5G, machine learning); tools and smart devices that affect human activities and capacities. Research also explores the social implications of digital communities and the analysis of policies and regulations for communities that promote innovation and investment through technologies. The topics include, among others, ICTs application in delivering better education, health care, traffic management, real-time monitoring and management including air, water quality, renewable energy performance, and solid waste measurements (smart waste solutions); AI/IoT application in Geo-Engineering; telecommunication services; digital traceability in value chain; data protection and privacy; accessibility gap between urban and remote areas; and the factors that foster the digital inclusion.

ECOSYSTEM-BASED ENVIRONMENTAL SOLUTIONS FOR COMMUNITIES

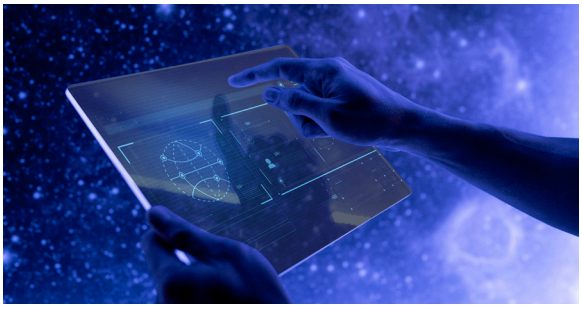
While the 'smart communities' uses information and communication tech-nologies (ICTs) to provide innovative and efficient services for the communities, it is important to step up the efforts in reducing the human impact on the environment and promote the sustainability. The growth of urbanization and human settlements, coupled with limited planning are adversely affecting the natural resources and puts cities and communities at risk from climate change. These challenges have highlighted the critical need to respond to sustainability issues by incorporating environmental sustainability as one of the key important aspects to urban and rural planning. Realizing the increasing negative impact of urbanization on wider ecological systems, the

research promotes nature-based solutions in dealing with increasing complexity of environmental burdens in both urban and rural contexts. It explores the options to meet socio-

ecological system needs in ways that promote healthy ecosystems, human well-being, and viable economies. Under this sub-theme, AIT's research promotes the socio-ecological systems approach to address a range of environmental issues related to energy, water security, land use, waste – such as sustainable land use planning and management, environmental systems analysis and sustainability assessment, adaptation approaches to disaster risks and climate change (nature-based flood management), waste management and circular economy, sustainable metropolitan development, green and inclusive buildings with a focus around ecosystems.

DIGITAL TRANSFORMATION FOR ECONOMY AND BUSINESSES

While technology continues to bring changes in our daily lives, it has the substantial impact on the economy from several aspects of policies, innovation, productivity, growth, and employment. While the use of digital technology can solve business problems and make business processes more efficient and effective, it is also necessary to understand the impact of emerging technologies on economies from political and social aspects to ensure a sustainable and equitable economic growth. AIT's research seeks to understand the process of digital transformation of businesses that drives the transformative change in economic efficiency, policy, and competitiveness including the adoption of digital financial services. The financial and social implications in response to technological advancement such as AI and IoT are further key issues addressed under this sub-theme. The areas covered include, for example, the impact



analysis of AI/IoT on economic policies, technological applications in production, operation, management, and marketing; communities' digital transaction; data-driven organizational management and business development; digital marketing and skills for the digital workplace; innovations and entrepreneurship in Agribusinesses including digital precision farming; marketing and traceability tool.

HIGHLIGHTED PROJECTS UNDER SMART COMMUNITIES

The following lists some examples of projects that highlight AIT's global, regional, and country development experience under *"Smart Communities"* thematic area during 2023.

Training Program on Geospatial Technologies and Data Analytics for Sustainable Development of Urban Areas in Belt and Road Region




Project budget- 1 million THB

Project duration- August 2023- December 2025

Donor- Alliance of International Science Organizations (ANSO), China

The major goal of this training is to work together to strengthen geospatial skillset at all levels - local, national, regional, and global and to fully realize the potential of geospatial knowledge services by developing novel, practical, and scalable solutions to problems related to achieving selected SDGs related to urban studies and applications. It will expand the opportunities available to the participants, assist them in developing their skills in geospatial technologies, to enable them to use these toolsets for achieving SDGs, and advance the process of global economic integration.

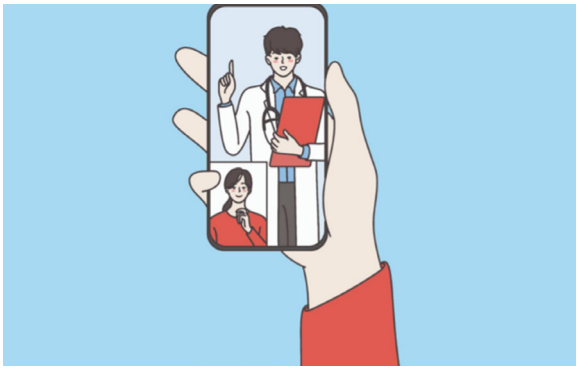
Telehealth Monitoring and Assistive Systems for Elderly and Disabled People

Project budget- 14.8 million THB

Project duration- January 2023- May 2025

Donor- Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP)Office of the National Broadcasting and Telecommunications Commission (NBTC)

The objective of this project is to research and develop a telehealth monitoring and assistive system for elderly and disabled individuals. This project focuses on developing various systems, including non-invasive blood glucose monitoring, fall detection, bimanual rehabilitation, and data analytics and visualization. By integrating these systems, the project aims to improve the quality of life for the elderly and disabled, enhance safety,



and reduce the caregiving burden. The research outcomes will be shared with healthcare institutions, the Ministry of Public Health, and other relevant organizations for broader implementation.

Development of Artificial intelligence (A.I.) of Diagnostic Neuroradiology of Dementia diseases

Project budget- 3.3 million

Project duration- April 2023 – August 2024

Donor- Mahidol University; National Research Council of Thailand (NRCT)

Developing AI-Based Tools for Alzheimer's Disease Diagnosis and Prognosis: the primary objective of this research project is to harness the power of artificial intelligence (AI) to advance our understanding of Alzheimer's disease and improve diagnosis and prognosis. The expected social impact of the project includes improved Quality of Life: More accurate and early diagnosis, along with personalized care plans, can significantly improve the quality of life for Alzheimer's patients and their families; reduced Healthcare Burden. By aiding in the early detection and management of Alzheimer's disease, the project will help reduce the burden on healthcare systems, potentially lowering healthcare costs.

PROJECTS INITIATED UNDER SMART COMMUNITIES

Below is the list of research, consultancy and capacity development projects initiated under *"Smart Communities"* by various Institute wide outreach centers and departments during 2023.

1. **Technology Advancements Toward Sustainable Development of Horticulture and Forestry**
   - *Duration*: 9 January 2023 - 8 January 2026
   - *Project Investigator(s):* Avishek Datta; Sushil Kumar Himanshu; Farhad Zulfiqur
   - *Sponsor*: UNOPS
   - *Total contracted amount*: 1,635,959
2. **Smart Farming and Innovative Postharvest Technologies for Sustainable Agriculture Systems**
   - *Duration*: 1 January 2023 - 31December 2025
   - *Project Investigator(s):* Sushi Kumar Himanshu, Avishek Datta, Dr.Farhad Zulfiqar
   - *Sponsor*: Indian Council of Agricultural Research (ICAR)
   - *Total contracted amount*: 1,699,202.75
3. **Telehealth Monitoring and Assistive Systems for Elderly and Disabled People**
   - *Duration*: 1 June 2022 - 16 May 2025
   - *Project Investigator(s):* Chutiporn Anutariya
   - *Sponsor*: The National Broadcasting and Telecommunications Commission (NBTC)
   - *Total contracted amount*: 14,847,715.90
4. **Smart Farming Technologies for Sustainable Agricultural**
   - *Duration*: 13 February 2023 - 12 February 2027
   - *Project Investigator(s):* Avishek Datta; Sushil Kumar Himanshu; Farhad Zulfiqur
   - *Sponsor*: Indian Council of Agricultural Research (ICAR)
   - *Total contracted amount*: 2,001,699
5. **Innovative Smart Technologies for Sustainable Farm Management**
   - *Duration*: 11 March 2023 - 10 March 2027
   - *Project Investigator(s):* Sushi Kumar Himanshu; Avishek Datta; Farhad Zulfiqar
   - *Sponsor*: Indian Council of Agricultural Research (ICAR), India
   - *Total contracted amount*: 2,363,717.20
6. **Asian Internet Engineering Conference 2023**
   - *Duration*: 9 January 2023 - 8 January 2026
   - *Project Investigator(s):* Kanchana Kanchanasut Adisorn Lertsinsrubtavee
   - *Sponsor*: Researchers/Engineers who interested in Internet Technologies
   - *Total contracted amount*: 800,000
7. **Training Service - AI Socialization**
   - *Duration*: 21 February 2023 - 30 June 2023
   - *Project Investigator(s):* Mongkol Ekpanyapong; Matthew N. Dailey
   - *Sponsor*: International Telecommunication Union, Switzerland
   - *Total contracted amount*: 317,988
8. **Safely Managed On-site Sanitation: Technological Solutions for City Dwellers and Authority Dhaka North City Corporation (DNCC)**
   - *Duration*: 3 January 2023 - 31 December 2023
   - *Project Investigator(s):* Thammarat Koottatep, Kavinda Gunasekara
   - *Sponsor*: UNICEF Bangladesh
   - *Total contracted amount*: 4,077,110
9. **Modern Automotive Technology**
   - *Duration*: 19 April 2023 - 25 October 2023
   - *Project Investigator(s):* Fazle Karim
   - *Sponsor*: SUSL, Sri Lanka
   - *Total contracted amount*: 4,077,110
10. **Innovation Camp and Mobility**
    - *Duration*: 1 July 2023 - 31 March 2025
    - *Project Investigator(s):* Nitin Kumar Tripathi
    - *Sponsor*: Various partner universities and/ or prospective partner
    - *Total contracted amount*: 2,250,000
11. **Training Program on Geospatial Technologies and Data Analytics fro Sustainable Development of Urban Areas in Belt and Road Region**
    - *Duration*: 1 August 2023 - 31 December 2025
    - *Project Investigator(s):* Sarawut Ninsawat; Chitrini Mozumder
    - *Sponsor*: Alliance of International Science Organizations (ANSO), China
    - *Total contracted amount*: 1,016,551.75

12. **International Conferences in Smart Learning, Computing and Data Science & Artificial Intelligence**
    - *Duration*: 1 September 2023 - 31 August 2024
    - *Project Investigator(s):* Chutiporn Anutariya
    - *Sponsor*: Some sponsorship from Leiden University, Netherlands and MHESI, Thailand for conference activities
    - *Total contracted amount*: 500,000
13. **Precision Agriculture with Smart Farming Technologies**
    - *Duration*: 19 September 2023 - 18 September 2028
    - *Project Investigator(s):* Sushi Kumar Himanshu, Avishek Datta, Farhad Zulfiqar
      Sponsor: Indian Council of Agricultural Research (ICAR)
    - *Total contracted amount*: 2,246,419.50
14. **intERLab IoT Development 2023**
    - *Duration*: 1 October 2023 - 31 December 2024
    - *Project Investigator(s):* Adisorn Lertsinsrubtavee
    - *Sponsor*: Asian Institute of Technology
    - *Total contracted amount*: 1,000,000
15. **Sign Language Production using Deep Learning**
    - *Duration*: 3 November 2023 - 28 February 2025
    - *Project Investigator(s):* Chantri Polprasert
    - *Sponsor*: AIT Research Initiation Grant
    - *Total contracted amount*: 150,000
16. **Development of Artificial intelligence (A.I.) of Diagnostic Neuroradiology of Dementia diseases**
    - *Duration*: 20 April 2023 - 19 August 2024
    - *Project Investigator(s):* AI Center PI; Mongkol Ekpanyapong
    - *Sponsor*: Mahidol University; National Research Council of Thailand (NRCT)
    - *Total contracted amount*: 3,305,000

INFRASTRUCTURE

Infrastructure systems play a critical role in social and economic activities, and function as critical lifelines for connecting communities, industries, markets, goods, and services as well as for efficient governance. Infrastructure forms the backbone of any social and political development of communities and countries. Hence, investments in infrastructure are increasing rapidly, especially in developing countries to meet the increasing demand for reliable and efficient transportation, power, tele-communication, and water, often termed as the basic services essential for human and social well-being. However, across the world, millions of people are still facing severe absence and shortages of such systems. Unreliable power grids, inadequate water supply and sanitation systems, poor transportation networks are still a key bottleneck in many developing nations. The improvement and resilience of infrastructure systems and services have become vital in the path towards sustainable development and for resilient and prosperous societies. In responding to the future trends and challenges with the rapidly growing communities, it is essential to ensure that infrastructure system and facilities are designed in sustainable, resilient, and inclusive approach. With technology expanding at the fast rate, it is now, infra-structures need to be flexible to adapt to technological improvements and incorporate better solutions as they become available. AIT's infrastructure theme represents the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions. That includes transportation systems and networks including roads, bridges, and mass transit; housings, buildings, and facilities; electrical grids, ICTs networks including telecommunications.

Sub-themes

1. Planning and Management
2. Water Infrastructure
3. Digital (ICTs) Infrastructure

PLANNING AND MANAGEMENT

Economic growth and prosperity of the countries largely depend on the sustainable and resilient infrastructure and services which facilitate the daily social and economic activities to be more productive and efficient. Effective planning and management is therefore crucial in creating a resilient and sustainable infrastructure facilities which are the primary prerequisite for development.

Well-planned infrastructure system strengthens the sustainability and livability of our cities and communities while moving towards a greener, equitable future. AIT's research focuses on the processes necessary for the planning and development of new infrastructure in a cost-effective manner, and on maintaining and operating mature infrastructure for sustainability while integrating economic, social, environmental and policy aspects along these processes. It addresses the issues related to city systems and network, transportation, environmental and social aspects, financing and investment, logistic and supply chain management, construction engineering & management including sustainable construction, quality and safety improvement, bridge engineering, maintenance management. Specific topics addressed in relation to planning and management include the effective strategies for infrastructure development and project management; climate resilient, earthquake resistant urban infrastructure; appropriate costing

methods of climate change adaptation in infrastructure development (roads); safety, and security measures for public/private schools and hospitals; traffic engineering such as traffic and road safety; highways and pavements designs; infrastructure financing options; financial and risk management in infrastructure development; operation and maintenance of facilities; geo-engineering aspects in civil engineering issues; the rural-urban interconnected infrastructure and the infrastructure sustainability. Recently completed infrastructure resilience projects are related to coastal critical infrastructure resilience index in Thailand and implementing pilot demonstration project "Climate Resilient Infrastructure for Social Transformation and Adaptation (CRISTA)" providing solution to the pressing gaps in infrastructure resilience towards climatic hazards in Nepal and Bangladesh.

WATER INFRASTRUCTURE

The water system is an essential infrastructure providing the basic services to growing populations. But rapid population growth, urbanization and economic development are increasing the demand for water bringing enormous pressure on water

resources and supply. With this growing pressure on the water sector, investing in building resilience of water infrastructures to the adverse effects of climate change and emerging global health issues (pandemic) requires a comprehensive approach and a long-term outlook that contributes to economic productivity and environmental sustainability. AIT's research on water related infrastructure addresses the issues related to planning, design, implementation, operation, and maintenance of water infrastructures – critically exploring the technology solutions and policy

options to improve the water use efficiency, productivity, and security in context of changing environmental conditions. A wide variety of topics are explored under sub-theme such as water supply and distribution infrastructure in urban and rural areas; sanitation system services; wastewater treatment and disposal systems;

impact of COVID-19 on waste water management, irrigation and drainage system; real-time hydrological information systems for urban flooding and drainage; innovative approaches for resilient water infrastructure including innovative water conservation technologies, climate smart WASH technology, climate friendly wastewater treatment, nature based solutions and transformative adaptation for water security; and analysis of the policies and business models applied to improve the water resource infrastructure planning and management.

DIGITAL (ICTS) INFRASTRUCTURE

The development of Information and Communication Technology (ICT) infra-structure has brought significant changes and impacts to our everyday lives from many aspects. The ICTs has become the part of every individual's life as the essential infrastructure to connect the people, share the information through a wide range of digital applications, services and solutions on which society and businesses rely.

Recognizing the ICTs as a key enabler to the social and economic development, AIT's research seeks to ensure that the application, services, and investments of ICT based systems and processes are efficient and sustainable for businesses, industries, communities, and the governments. Key areas of the research include - telecommunications, information systems and management, mobile phone applications, and ICTs applications for information society. The

topics covered under sub-theme, include, among others, telecom market dynamics including service quality control and resource management; data modelling and management; data-driven organizational systems and management, data-driven approaches in methods in environmental research and urban issues, ICTs application in built environment and transport network system including road and traffic control management.

HIGHLIGHTED PROJECTS UNDER INFRASTRUCTURE

The following lists some examples of projects that highlight AIT's global, regional, and country development experience under "Infrastructure" thematic area during 2023.

Thailand Earthquake Research Center

Project budget- 5 million THB

Project duration- April 2023 – August 2024

Donor- National Research Council of Thailand (NRCT)

Thailand Earthquake Research Center will promote the collaboration among researchers and various key stakeholders in mitigating earthquake risk. The TERC is a neutral national research center where researchers from various institutions in Thailand can contribute and work together on critical issues related to earthquake risk. The activities include, for example, organizing conferences and training workshops, conducting

earthquake reconnaissance surveys, developing one-stop data & knowledge digital platform for researchers and general public, developing a system to share research facilities among various institutions, etc.

Landscape architecture design for a smart microgrid system

Project budget- 3.4 million THB

Project duration- October 2022 – July 2023

Donor- Provincial Electricity Authority (PEA), Thailand

The project aims to improve the landscape of the Smart Microgrid installation site, and the area of about 500 square meters will be used as the installation area for the experimental set. The project creates the conceptual design to be presented to the client (Concept Design), link spaces by identifying activity zones and connecting with items, and finalize the design layout, and carries out the Tender Package, Construction CAD

Drafting, and monitoring and supervision of construction operations according to approved layout.

Wind tunnel testing of Astalla Residences

Project budget- 1.8 million THB

Project duration- April 2023- April 2026

Donor- DMCI

The AIT Solution in-house team works closely with project engineers and developers to enhance the reliability and cost effectiveness of the structural design thereby ensuring occupant comfort, façade design optimization, and improving pedestrian comfort.

PROJECTS INITIATED UNDER INFRASTRUCTURE

Below is the list of research, consultancy, and capacity development projects initiated under "*Infrastructure*" by various Institute wide outreach centers and departments during 2023.

1. **Expertise and well-being of construction expatriates**
   - *Duration*: 20 December 2022 - 19 December 2025
   - *Project Investigator(s):* Djoen San Santoso
   - *Sponsor*: CSCEC
   - *Total contracted amount*: 990,000
2. **Professional Master Project Manangement in NayPyiTaw,Myanmar**
   - *Duration*: 2 January 2023 - 31 December 2024
   - *Project Investigator(s):* BHW Hadikusumo
   - *Sponsor*: Ministry of Contruction, Myanmar
   - *Total contracted amount*: 127,755 (USD)
3. **Structural design review of CV bridge**
   - *Duration*: 10 Jauuary 2023 - 9 January 2026
   - *Project Investigator(s):* Mr.Thaung Htut Aung
   - *Sponsor*: Ministry of Contruction, Myanmar
   - *Total contracted amount*: 1,451,680
4. **Development of CUDA-based Applied Element Method to Analyse the Pounding of Building during Earthquakes**
   - *Duration*: 1 February 2023 - 1 February 2024
   - *Project Investigator(s):* Chaitanya Krishna
   - *Sponsor*: Asian Institute of Technology (AIT)
   - *Total contracted amount*: 100,000
5. **Hydraulic Model Tests of Pumping Station**
   - *Duration*: 15 February 2023 - 31 August 2023
   - *Project Investigator(s):* Arturo G. Roa; Supot Thammasittirong
   - *Sponsor*: Cisco Engineering Co.,Ltd.
   - *Total contracted amount*: 415,000
6. **Urban Cooling Services and Blue-Green Infrastructure Planning toward Mitigating Urban Heat Island and City Sustainability: A case study of Bangkok**
   - *Duration*: 1 January 2023 - 31 March 2024
   - *Project Investigator(s):* Malay Kumar Pramanik
   - *Sponsor*: Asian Institute of Technology Initiation Grant
   - *Total contracted amount*: 150,000
7. **Landscape architecture design for a smart microgrid system**
   - *Duration*: 22 October 2022 - 30 April 2023
   - *Project Investigator(s):* Mongkol Ekpanyapong
   - *Sponsor*: Provincial Electricity Authority (PEA)
   - *Total contracted amount*: 3,393,020
8. **PBD of Forum**
   - *Duration*: 6 February 2023 - 5 February 2026
   - *Project Investigator(s):* Mr.Thaung Htut Aung
   - *Sponsor*: SY^2 + Associates, Philippines
   - *Total contracted amount*: 5,735,800
9. **Peer review of BPI Isabel**
   - *Duration*: 6 February 2023 - 5 February 2026
   - *Project Investigator(s):* Mr.Thaung Htut Aung
   - *Sponsor*: SY^2 + Associates, Philippines
   - *Total contracted amount*: 3,393,020
10. **PBD of Azure North Tower 3**
    - *Duration*: 7 February 2023 - 6 February 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 506,100
11. **PBD of District M**
    - *Duration*: 7 February 2023 - 6 February 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 674,800
12. **PBD of 947 Sky Tower**
    - *Duration*: 7 February 2023 - 6 February 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 1,687,000
13. **Reanalysis PBD of Museum of Architecture**
    - *Duration*: 7 February 2023 - 6 February 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 202,440
14. **PBD of Avida Wyeth Tower 3**
    - *Duration*: 7 February 2023 - 6 February 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 404,880

15. **Structural design review of Solmera Coast project**
    - *Duration*: 7 March 2023 - 6 March 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: DMCI
    - *Total contracted amount*: 911,520
16. **Wind tunnel testing of Menarco Tower 2**
    - *Duration*: 14 March 2023 - 13 March 2026
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: Menarco Development Corporation
    - *Total contracted amount*: 902,720
17. **Wind tunnel testing of Copacabana 03**
    - *Duration*: 22 March 2023 - 21 March 2025
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: 535 Engineering Consultant Co., Ltd
    - *Total contracted amount*: 900,000
18. **Thailand Earthquake Research Center**
    - *Duration*: 19 April 2023 - 18 April 2024
    - *Project Investigator(s):* Pennung Warnitchai
    - *Sponsor*: National Research Council of Thailand (NRCT)
    - *Total contracted amount*: 5,000,000
19. **Development of a Catastrophe Model for Evaluating Seismic Losses and Impacts (Year 2)**
    - *Duration*: 30 April 2023 - 29 April 2024
    - *Project Investigator(s):* Pennung Warnitchai
    - *Sponsor*: National Research Council of Thailand (NRCT)
    - *Total contracted amount*: 3,874,000
20. **Car Accident Investigation Project: Year 2022**
    - *Duration*: 31 December 2022 - 31 December 2023
    - *Project Investigator(s):* Kunnawee Kanitpong
    - *Sponsor*: Toyota Daihatsu Engineering & Manufacturing Co., Ltd.
    - *Total contracted amount*: 342,238
21. **Wind tunnel testing of Astalla Residences**
    - *Duration*: 27 April - 26 April 2026
    - *Project Investigator(s):* Mr.Thaung Htut Aung
    - *Sponsor*: DMCI
    - *Total contracted amount*: 1,779,440
22. **Physical Hydraulic Model Investigation on the Impacts of Artificial Reef Structures from Retired Wellheads to Water Level, Flow Velocity and Water Ci**
    - *Duration*: 1 July 2023 - 30 June 2024
    - *Project Investigator(s):* Arturo G. Roa; Supot Thammasittirong
    - *Sponsor*: Kasetsart University
    - *Total contracted amount*: 1,855,000
23. **Structural peer review of Observatory (Residential Tower 1)**
    - *Duration*: 21 June 2023 - 20 June 2026
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: Federal Land, Philippines
    - *Total contracted amount*: 2,697,310
24. **Structural peer review of Anissa Heights**
    - *Duration*: 3 August 2023 - 2 August 2024
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: DMCI
    - *Total contracted amount*: 1,496,400
25. **Structural Evaluation for Cracks in Precast Wall Panels of Residential Buildings**
    - *Duration*: 3 August 2023 - 2 August 2024
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: Pruksa Real Estate Co., Ltd Thailand
    - *Total contracted amount*: 1,200,000
26. **Advisory Services for PBD of Asia Plaza**
    - *Duration*: 21 August 2023 - 21 August 2024
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: Quadstruct, Inc, Philippines
    - *Total contracted amount*: 704,600
27. **Construction Contract Management in Practice & Standard Turnkey/ EPC Contracts from 28 October to 28 November 2023**
    - *Duration*: 28 October 2023 - 31 December 2023
    - *Project Investigator(s):* Fazle Karim; Voravate Chonlasin
    - *Sponsor*: Advertised Course
    - *Total contracted amount*: 632,400
28. **Development of Sustainable Concrete and Damage Assessment of Existing Construction Practices in Thailand**
    - *Duration*: 17 Ocotber 2023 - 16 October 2025
    - *Project Investigator(s):* Chaitanya Krishna
    - *Sponsor*: Bodee Maneengamlert, CEMKRETE Co.,Ltd., Thailand
    - *Total contracted amount*: 150,000
29. **Root Cause and Failure Analysis dated 14-17 November 2023**
    - *Duration*: 14 November 2023 - 15 May 2024
    - *Project Investigator(s):* Narumon Wangnai
    - *Sponsor*: NTPC, Lao PDR
    - *Total contracted amount*: 384,000
30. **PBD of SM C Place**
    - *Duration*: 7 November 2023 - 7 November 2024
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: SY^2 + Associates, Philippines
    - *Total contracted amount*: 2,845,600

31. PBD of Le Pont

- *Duration*: 7 November 2023 - 7 November 2024
- *Project Investigator(s):* AIT Solution PI
- *Sponsor*: SY^2 + Associates, Philippines
- *Total contracted amount*: 1,430,400

32. PBD of Chinabank

- *Duration*: 7 November 2023 - 7 November 2024
- *Project Investigator(s):* AIT Solution PI
- *Sponsor*: SY^2 + Associates, Philippines
- *Total contracted amount*: 894,000

TECHNOLOGY, POLICY, AND SOCIETY

The future of economic prosperity and inclusive societal transformation depends on how we address the key societal issues benefiting from emerging innovative technologies and policies. The application of digital technologies, bio-process techno- logies, environmental technologies, energy technologies, and nanotechnologies holds the greatest potential for competitiveness and sustainable growth of the countries if can be used appropriately. Despite the major technological advancements, the complexity of technologies and the implications they have for many aspects of social life still need to be fully understood and issues of disparity, divide and inequality remain. Understanding of the ongoing digital transformation and consequences of these new and emerging technologies is important to improve the individual and societal outcomes, particularly in the face of increasing societal pressures.

AIT's Technology-Policy-Society research theme is focused on technology development and application, policy innovation, and development and societal issues including the nexus between them. The theme recognizes the growing need of bridging the gap between technology and policymaking that requires the understanding of the policy tools required for modern society and the modern technologies. In view of this, the research explores how social science and technology interact with everything from environmental issues to public policies, and better understanding on the impacts of emerging technologies (artificial intelligence, internet of things, big data, etc.) from societal and policy dimensions while moving forward to inclusive and sustainable development.

Sub-themes

1. Digital Technology Solutions and Societal Transformation
2. Innovative Policies for Coping with Rapid Transformation taking place in the Region
3. Information, Communication Technologies (ICTs) and the Environmental Management
4. Equitable Societal Change and Inclusive Development
5. Gender and Forced Displacement

DIGITAL TECHNOLOGY SOLUTIONS AND SOCIETAL TRANSFORMATION

Modern digital technologies, information, and communication technologies (ICTs) services are fundamental in all areas of society today, and extremely important for social development. Technological advancements have brought major changes to our daily lives – changing the way we work, communicate, and do businesses. Artificial Intelligence (AI) is set to play an even more important role in every aspect of our daily lives in the future. It is thus important to look more closely at how these new and emerging technologies will affect social equity, in particular gender dynamics and power relations. It is important to understand the potential opportunities and risks associated with these technologies and recognize their potential to make positive changes in societies, for example challenging oppressive gender norms. It is necessary for societies to be able to adapt to the social changes that technology will continue to bring in future.

AIT research under this sub-theme addresses the societal consequences of new and emerging technologies from the multidisciplinary approach. It provides a landscape for critical inquiries about technology and its intersections with socio-economic drivers. Research covers a wide range

of areas – including information systems and management for health care, education, and transport, businesses sectors; nanotechnology focusing on application of nano particles (e.g., nanostructured anti-reflective coating for solar panels); application of AI and big data for agricultural productivity including aquaculture value chain; natural resources management using conventional and modern temporal and geospatial technologies; digital inclusion such as inclusive AI development; technological impacts on cultural and social aspects such as fake news, depression; digital policies and governance.

INNOVATIVE POLICIES FOR COPING WITH RAPID TRANSFORMATION TAKING PLACE IN THE REGION

Recent decades have seen the increasing role of innovative policies in the areas of development and emerging technologies to generate solutions for the challenges such as climate change, and other emerging societal issues. While these rapid changes with emerging technologies present a significant opportunity to achieve the sustainable development, they also raise a major ethical, legal, economic, policy and social issues especially inequality - posing new challenges for policymakers to meet the goals of sustainable development. The focus of policies has broadened significantly not only for the economic growth or sectors, but also to addressing the challenges of inter-connected issues and synergies between environmental sustainability and sustainable development. Such shifting policymaking environment highlights a critical need for policymakers to use multiple policy framings in dealing with the complex challenges and adapting to shifting social realities. Just as technology and innovations are central elements of modern societies, it is equally important to recognize the

role of innovative policies with government initiatives by integrating the scientific and technological knowledge into public policies to foster the strategic growth. The sub-theme seeks to understand the policy approaches, which will help guide the direction of future policies and facilitate transformative change. AIT's research examines the question of how governance structures and their policies deal with the emerging challenges related to social, environmental, developmental, and technological

aspects, and how they can have far-reaching impacts. It focuses on understanding the effectiveness of policy approaches, policy evaluation and impact analysis with a particular emphasis given on approaches that benefit low-income and other marginalized communities. The research focus areas in relation to innovative polices include science, technology, and data, gender and development, poverty reduction,

business, and regulations, social develop- ment; environment and energy sustainability; resilient cities and communities; agricultural development policies and strategies. The topics include, among other, evidence-based policies for the sustainable use of energy resources in the Asia Pacific Region; Labor migration & human trafficking laws, regulations & policies; Mainstreaming ecosystem services in national policies for sustainable management of freshwater ecosystems in South & Southeast Asia; and Strengthening ASEAN Member State Policies with Environmental Health Data on Costs of Inaction and Co-Benefits.

INFORMATION, COMMUNICATION TECHNOLOGIES (ICTS) AND THE ENVIRONMENTAL MANAGEMENT

While the increasingly widespread use of ICTs enables socio-economic development, ICTs are also a growing enabler for effectively addressing climate change and environmental issues, and transition to circular economy. Focusing on the ICTs and its impacts on the environmental sustainability, AIT's research focuses on how ICT development with the frontier technologies, systems and applications can be harnessed for tackling environmental challenges including climate change. Specific topics addressed are, for example, the data-driven natural resource management (water resources, air quality, land use); emerging technologies and tools (AI, IoTs, big data, machine learning) applied

for climate and environmental monitoring and management such as climate information system, early-warning, disaster relief communications and AI based energy management including microgrid platforms; GIS and remote sensing applications in agriculture and natural resource management.

EQUITABLE SOCIETAL CHANGE AND INCLUSIVE DEVELOPMENT

Social equity and inclusion across all our communities is driven by the several factors of change including access to and control over resources, gender, education, technology, and the policies. Achieving social justice and equality requires long term and sustainable action to close the inequity gap among demographic and socio-economic segmentations. For instance, the digital literacy gap is present between women and men, in addition to the unique barriers of women and girls in accessing to and use of digital tools and services.

In wake of growing recognition on importance of social equity to sustainable development, research under this sub-theme, addresses the drivers that determine equity and social inclusion – examining how they have shaped our identity, communities, and the role they play in promoting the inclusive sustainable development. This systematic understanding of drivers will support the development of policy priorities, decisions,

and development programming to accelerate the poverty reduction and achieve the sustainable development. AIT's research focuses on behavioral, social, and physical barriers and opportunities for equity including policy options to ensure that individuals, groups, and communities participate fully in meaningful ways in society. Moving towards the achievement of the inclusive development, AIT research addresses the issues from several aspects of social, cultural, economic, political dimensions. The areas covered under sub-theme include, among others, gender relations in the issues of migration, forced displacement, labour, agriculture, fisheries; cultural influence, human resource, and leadership development; women and political participation, influencing factors on entrepreneurship, social capital in sustainable agriculture, equitable access to resources and technologies, policy interventions, the role of media and public perception on equitable social change.

GENDER AND FORCED DISPLACEMENT

Asia is witness to both on-going and emerging pressures that drive forced displacement in contexts where political systems range from unstable democracies to full-blown dictatorships. The Region is also one of the most vulnerable to disasters and the impact of climate change; and continues to undergo rapid infrastructure development including dams, roads, ports, and Special Economic Zones that displace populations. Existing research and responses remain surprisingly gender blind, which in turn, results in poor policy and programmatic responses. In addition, gender is often understood in limited terms, focusing on impacts, or on women as victims in forced displacement. This hides many gender dimensions of forced displacement. For instance, the focus on impacts fails to highlight how drivers of displacements have strong gender dimensions, including policies designed by male-dominated political systems or conflict and gender-based violence being a cause of displacement or overlapping drivers. Or that a discourse of women as victims, reinforces stereotypes which negate women's agency and participation and contribute to less effective responses. Narrow understanding of gender obscure gender patterns where men can be victims, e.g., where men and boys have been forced into combat, or targeted as civilians; or hides potential where men can engage and contribute as agents of change and solidarity. Finally, our understanding with regards to sexual orientation and gender identity and expression (SOGIE) in forced displacement is extremely limited, making diverse SOGIE groups invisible in research and policy processes. AIT hosts the IDRC funded Center on Gender and Forced Displacement. The Center and affiliated research activities bring attention to the ongoing imperative to center gender issues globally. The research under sub-theme addresses

the gap between important drivers of forced displacement in the region with needed knowledge and policy responses when it comes to gender dimensions of forced displacement. It examines the drivers of forced displacement influenced by gender dynamics and the gender dimensions in experiences of forced displacement; and analyze the policy responses and the gaps in addressing the gender dimensions of forced displacement in the region at these different levels. Under this sub-theme, the areas focused include, among others, strengthening knowledge, evidence use and leadership on forced displacement; the impact of political trends, climate change and investments on drivers of forced displacement and their gender dynamics; displaced people and their vulnerabilities in various stage of displacement, and the effort in addressing gender needs in forced displacement.

HIGHLIGHTED PROJECTS UNDER TECHNOLOGY, POLICY, AND SOCIETY

The following lists some examples of projects that highlight AIT's global, regional, and country development experience under "*Technology, Policy, and Society*" thematic area during 2023.

Making NbCS in aquaculture monitoring more gender responsive in Southeast Asia: What gets measured gets done. (Gena Project)

Project budget- 28.3 million THB

Project duration- September 2023 – September 2027

Donor- IDRC-AQUADAPT, Canada

The GeNA project aims to develop a Gender Monitoring Schema (GMS) to capture the processes by which women and men participate in and benefit from Nature-based Climate Solutions (NbCS) aquaculture and provide a transformative process for greater equity and sustainability despite climate change. The project will develop a gender monitoring schema to ensure integration of gender equity and social inclusion in nature-based climate solutions in aquaculture systems and projects. The project will strengthen the design and usage of monitoring to ensure the integration of gender equity and social inclusion in nature-based climate solutions in aquaculture systems and projects. The monitoring will assess how women's role in decision-making and policy processes for seaweed and rice fish farming in Thailand, Cambodia and the Philippines can be strengthened, as women build their capacities to have a voice in value-chain and environmental decisions and to take advantage of broader policy processes. This project is part of the Nature-based Climate Solutions in Aquacultural Food Systems in Asia-Pacific initiative (AQUADAPT), which is co-financed by Global Affairs Canada and IDRC. AQUADAPT is

a four-year, CAD23-million initiative aimed at driving research action toward inclusive nature-based aquaculture solutions and at a better understanding of how such solutions can contribute to climate change adaptation, biodiversity conservation and food security across the Asia-Pacific region.

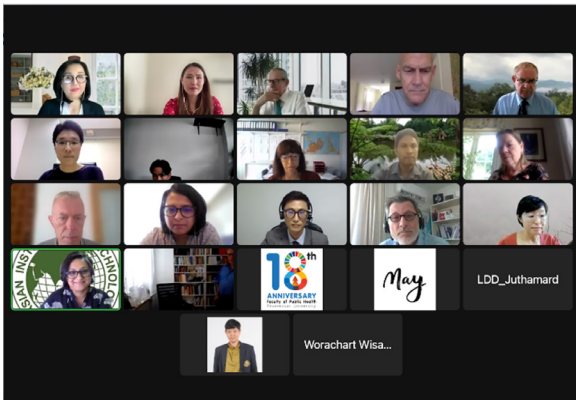
Transdisciplinary Higher Education for Global Wellbeing (THE-GLOW)

Project budget- 4.2 million THB

Project duration- January 2023-December 2025

Donor- European Union (ERASMUS + CBHE)

The project aims to strengthen capacities of Higher Education Institutions in Thailand and Europe, and eventually in countries neighboring Thailand, to develop and implement curricula that train graduate students in the transdisciplinary approaches and competencies required for the future workforce to address complex global problems.



Development Policies & Practices (DPP) Program at AIT

Project budget- 2.8 million THB

Project duration- June 2023- February 2024

Donor- The Swiss Development Cooperation

The project aims to provide facilities and logistical support for the DPP phase in Bangkok; and assist in arranging guest lecturers and field visits. It also assists in the admission of students, and to assign a Coordinator who will be the main contact person to work with the Geneva Graduate Institute and support marketing activities for this program in 2023-2024.

PROJECTS INITIATED UNDER TECHNOLOGY, POLICY, SOCIETY

Below is the list of research, consultancy and capacity development projects initiated under "*Technology, Policy, and Society*" by various Institute wide outreach centers and departments during 2023.

1. **Support for Social Research Capacity in Myanmar**
   - *Duration*: 15 December 2022 - 31 December 2023
   - *Project Investigator(s):* Kyoko Kusakabe
   - *Sponsor*: The SecDev Foundation
   - *Total contracted amount*: 720,000
2. **CUHK MBA business field trip**
   - *Duration*: 27 November 2022 - 28 February 2023
   - *Project Investigator(s):* Roger Levermore
   - *Sponsor*: CHUK Business School
   - *Total contracted amount*: 127,755 (USD)
3. **International weeks-Loyola University New Orleans, USA**
   - *Duration*: 1 January 2023 - 31 March 2023
   - *Project Investigator(s):* Roger Levermore
   - *Sponsor*: The College of Business, Loyola University New Orleans, USA
   - *Total contracted amount*: 887,536
4. **International Training Program on Development Administration (Batch 3)**
   - *Duration*: 16 January 2023 - 9 August 2023
   - *Project Investigator(s):* Voravate Chonlasin
   - *Sponsor*: MoPA, Bangladesh
   - *Total contracted amount*: 4,965,000
5. **Leadership and Organizational Renewal**
   - *Duration*: 29 January 2023 - 22 June 2023
   - *Project Investigator(s):* Voravate Chonlasin
   - *Sponsor*: Nepal Telecom
   - *Total contracted amount*: 1,022,200
6. **AITX Strategic Investment 2023**
   - *Duration*: 27 November 2022 - 28 February 2023
   - *Project Investigator(s):* Roger Levermore
   - *Sponsor*: CHUK Business School
   - *Total contracted amount*: 127,755 (USD)
7. **AIRLAB Microsensors Challenge 2023**
   - *Duration*: 1 December 2022 - 30 January 2024
   - *Project Investigator(s):* Adisorn Lertsinsrubtavee
   - *Sponsor*: Clean Air Fund, the French Agency for Ecological Transition (ADEME), the French DevelopmentAgency (AFD), Bloomberg Philanthropies, and Atmo Hauts-de-France
   - *Total contracted amount*: 140,000
8. **AP* Retreat 2023**
   - *Duration*: 1 January 2023 - 31 December 2023
   - *Project Investigator(s):* Kanchana Kanchanasut
   - *Sponsor*: The Community of Asia Pacific Internet Organizations
   - *Total contracted amount*: 464,500
9. **IT Services 2023**
   - *Duration*: 1 January 2023 - 31 December 2023
   - *Project Investigator(s):* Viraphan Samadi, Kanchana Kanchanasut
   - *Sponsor*: Asian Institute of Technology
   - *Total contracted amount*: 9,792,429.50
10. **AIT Internal Development and Maintenance 2023**
    - *Duration*: 1 January 2023 - 31 December 2023
    - *Project Investigator(s):* Viraphan Samadi, Kanchana Kanchanasut; Adisorn Lertsinsrubtavee
    - *Sponsor*: Asian Institute of Technology
    - *Total contracted amount*: 2,000,000
11. **AI Technical service**
    - *Duration*: 15 January 2023 - 14 January 2024
    - *Project Investigator(s):* Mongkol Ekpanyapong
    - *Sponsor*: ExternalClient (Mulitple)
    - *Total contracted amount*: 100,000
12. **Technological Innovations to Meet the Future Challenges of Agriculture and Allied Sectors**
    - *Duration*: 25 January 2023 - 24 January 2026
    - *Project Investigator(s):* Sushi Kumar Himanshu,Avishek Datta, Farhad Zulfiqar
    - *Sponsor*: Internal such as AI Center, Interlab
    - *Total contracted amount*: 1,500,650
13. **Machine Shop 4**
    - *Duration*: 26 January 2023 - 31 December 2023
    - *Project Investigator(s):* Mongkol Ekpanyapong
    - *Sponsor*: Indian Council of Agricultural Research (ICAR)
    - *Total contracted amount*: 100,000

14. **Unmanned Aerial Vehicle Training**
    - *Duration*: 16 February 2023 - 15 August 2023
    - *Project Investigator(s):* Sanit Arunplod
    - *Sponsor*: Thailand
    - *Total contracted amount*: 150,000
15. **Governance and Anti-Corruption: The Method and Tools behind an Effective Corruption-Eradication Strategy (Batch 1)**
    - *Duration*: 27 February 2023 - 2 September 2023
    - *Project Investigator(s):* Voravate Chonlasin
    - *Sponsor*: CIAA, Nepal
    - *Total contracted amount*: 1,262,997
16. **Management and Implementation of Development Projects**
    - *Duration*: 27 February 2023 - 6 September 2023
    - *Project Investigator(s):* Narumon Wangnai
    - *Sponsor*: PRMP Pakistan
    - *Total contracted amount*: 1,488,060
17. **Exposure Visit Program for Government of Balochistan**
    - *Duration*: 22 February 2023 - 28 February 2023
    - *Project Investigator(s):* Furqan Ali Shaikh, Voravate Chonlasin
    - *Sponsor*: World Bank
    - *Total contracted amount*: 635,710
18. **CSI Conference 2023**
    - *Duration*: 16 February 2023 - 15 August 2023
    - *Project Investigator(s)*:Naveed Anwar
    - *Sponsor*: Multi-Donor
    - *Total contracted amount*: 7,208,652.15
19. **DroneAcharya Aerial Innovations Ltd.**
    - *Duration*: 1 February 2023 - 1 February 2023
    - *Project Investigator(s):* DroneAcharya Aerial Innovations Ltd., India
    - *Sponsor*: Dieter Wilhelm Trau
    - *Total contracted amount*: 225,000
20. **Executive Development Program on Strategic Leadership in Banking**
    - *Duration*: 13 March 2023 - 31 August 2023
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: Public and Commercial Banks from Nepal
    - *Total contracted amount*: 1,064,880
21. **Governance and Anti-Corruption: The Method and Tools behind an Effective Corruption-Eradication Strategy (Batch 2)**
    - *Duration*: 20 March 2023 - 23 September 2023
    - *Project Investigator(s):* Voravate Chonlasin
    - *Sponsor*: CIAA, Nepal
    - *Total contracted amount*: 1,262,997
22. **Strategic Human Resource Management and Business Leadership**
    - *Duration*: 27 March 2023 - 31 December 2023
    - *Project Investigator(s):* Thaniya Jirasathitpornpong, Fazle Karim
    - *Sponsor*: Multi-Donor
    - *Total contracted amount*: 329,472
23. **Enhance Organization Efficiency through Effiective Human Resource Management and Leadership in Hydropower Industry; 28 March - 5 April 2023**
    - *Duration*: 28 March 2023 - 1 October 2023
    - *Project Investigator(s):* Kanchana Kanchanasut, Rey Padilla
    - *Sponsor*: Asian Development Bank (ADB)
    - *Total contracted amount*: 600,000
24. **Baengpun III Technical support for Baengpun deployment**
    - *Duration*: 1 March 2023 - 31 December 2023
    - *Project Investigator(s):* Kanchana Kanchanasut, Rey Padilla
    - *Sponsor*: Net2Home Social Enterprise
    - *Total contracted amount*: 500,000
25. **Small-Scale Funding from UNEP**
    - *Duration*: 1 March 2023 - 31 December 2023
    - *Project Investigator(s):* Dieter Wilhelm Trau
    - *Sponsor*: United Nations Environment Programme (UNEP)
    - *Total contracted amount*: 770,000
26. **The Exposure and Study Visit Program for Silangan Multipurpose Cooperative on "Financial Inclusion in Southeast Asia"**
    - *Duration*: 9 March 2023 - 31 May 2023
    - *Project Investigator(s):* Faiz Hassan Shah
    - *Sponsor*: The Silangan Multipurpose Cooperative, Philippines
    - *Total contracted amount*: 193,050

27. **International weeks-Department of Management Studies, IIT, Delhi**
    - *Duration*: 1April - 2023 - 31 May 2023
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: The Department of Management Studies, Indian Institute of Technology, New Delhi
    - *Total contracted amount*: 397,632
28. **Information Communication Technology**
    - *Duration*: 19 April 2023 - 25 October 2023
    - *Project Investigator(s):* Fazle Karim
    - *Sponsor*: Sri Jayewardenepura, Sri Lanka
    - *Total contracted amount*: 986,548.20
29. **Strategic Human Resurce Management & Leadership for Business Transformation**
    - *Duration*: 2 April 2023 - 31 December 2023
    - *Project Investigator(s):* Faiz Hassan Shah
    - *Sponsor*: OP Jindal Global University
    - *Total contracted amount*: 714,000
30. **Development Policies & Practices Program at AIT**
    - *Duration*: 1 Jne 2023 - 29 February 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: The Swiss Development Cooperation (SDC)
    - *Total contracted amount*: 2,773,509
31. **Executive Development Program on Centemporary Banking**
    - *Duration*: 5 June 2023 - 30 November 2023
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: Public and Commercial Banks from Nepal
    - *Total contracted amount*: 948,600
32. **Knowledge Exchange Visit Program on**
    - *Duration*: 28 May 2023 - 30 December 2023
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: Palli Karma-Sahayak Foundation (PKSF)
    - *Total contracted amount*: 1,172,500
33. **Self-Paced Online Capacity Building Programme on Occupational Health & Safety, 15 May to 08 September 2023**
    - *Duration*: 15 May 2023 - 31 March 2024
    - *Project Investigator(s):* Fazle Karim, Narumon Wangnai
    - *Sponsor*: World Bank-Pakistan
    - *Total contracted amount*: 750,000
34. **TRUNCATE-TB Regional Stakeholders Meeting-Workshop**
    - *Duration*: 1 May 2023 - 31 October 2023
    - *Project Investigator(s):* Dieter Wilhelm Trau
    - *Sponsor*: Vital Strategies Health Systems (Asia Pacific), Singapore
    - *Total contracted amount*: 389,656
35. **A portable prototype of measurement by Soil pH, Electrical Conductivity, and Nitrogen, Phosphorus, Potassium nutrients**
    - *Duration*: 1July 2023 - 31 December 2023
    - *Project Investigator(s):* Sanit Arunplod Kanchanasut, Dr.Adisorn Letsinsrubtavee
    - *Sponsor*: Land Development Regional2
    - *Total contracted amount*: 405,000
36. **Asian Summer School for Geoinformatics and Issues on Sustainable Development in Asia 2023**
    - *Duration*: 1July 2023 - 31 December 2023
    - *Project Investigator(s):* Sarawut Ninsawat
    - *Sponsor*: Chubu University
    - *Total contracted amount*: 250,000
37. **Effective Management Skills and Leadership**
    - *Duration*: 20 June 2023 - 31 December 2023
    - *Project Investigator(s):* Faiz Hassan Shah
    - *Sponsor*: Chubu University
    - *Total contracted amount*: 785,400
38. **CSi Bangkok - Software development**
    - *Duration*: 1June 2023 - 31 May 2025
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: CSI Bangkok
    - *Total contracted amount*: 3,850,000
39. **Effectiveness of Social Welfare Programmes and Policies for Urban Poor in Bangkok Metropolitan Area**
    - *Duration*: 1July 2023 - 30 November 2023
    - *Project Investigator(s):* Malay Kumar Pramanik, Vilas Nitivattananon
    - *Sponsor*: FES, Germany
    - *Total contracted amount*: 116,400
40. **Diagnosis of Aquatic Animal Diseases and Health Management Services**
    - *Duration*: 24 July 2023 - 31 December 2023
    - *Project Investigator(s):* Ha Thanh Dong
    - *Sponsor*: National and international donors
    - *Total contracted amount*: 500,000

41. **Gender Impact of Labor and Economic Policies**
    - *Duration*: 1 May 2023 - 31 October 2023
    - *Project Investigator(s):* Dieter Wilhelm Trau
    - *Sponsor*: Vital Strategies Health Systems (Asia Pacific), Singapore
    - *Total contracted amount*: 389,656
42. **Executive Masterclass Certification program (REAP- RMA Executive Acceleration Program)**
    - *Duration*: 1 July 2023 - 30 September 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: RMA Group Co.,Ltd
    - *Total contracted amount*: 1,655,040
43. **Leadership and Organizational Renewal Batch 2 dated 20 -30 August 2023**
    - *Duration*: 20 August 2023 - 22 December 2023
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: Nepal Telecom
    - *Total contracted amount*: 867,900
44. **Women's Leadership Development and Institutional Development of Women-Led Organizations in Bangladesh**
    - *Duration*: 15 September 2023 - 15 December 2024
    - *Project Investigator(s):* Julaikha B. Hossain
    - *Sponsor*: Women's Empowerment Organization
    - *Total contracted amount*: 850,000
45. **Executive Development Program on Contemporary Banking**
    - *Duration*: 1 September 2023 - 30 January 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: Public and Commercial Banks from Nepal
    - *Total contracted amount*: 729,300
46. **Project Management and Caregiving in Thailand and in Philippines, 20 September to 30 October 2023**
    - *Duration*: 20 September 2023 - 22 December 2023
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: Palli Karma-Sahayak Foundation (PKSF)
    - *Total contracted amount*: 1,949,900
47. **Making NbCS in aquaculture monitoring more gender responsive in Southeast Asia: What gets measured gets done**
    - *Duration*: 1 September 2023 - 30 September 2027
    - *Project Investigator(s):* Kyoko Kusakabe
    - *Sponsor*: IDRC-AQUADAPT, Canada
    - *Total contracted amount*: 28,363,034
48. **Center for Management Development**
    - *Duration*: 23 October 2023 - 30 November 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: Center for Management Development (CMD), USA
    - *Total contracted amount*: 975,000
49. **SOM Special Talks**
    - *Duration*: 21 July 2023 - 26 July 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: SOM
    - *Total contracted amount*: 389,656
50. **Understanding the Role of Consumer Wisdom in Sustainable Consumption Behaviour**
    - *Duration*: 25 September 2023 - 24 September 2024
    - *Project Investigator(s):* Muhammad Junaid
    - *Sponsor*: AIT Research Grant
    - *Total contracted amount*: 150,000
51. **Mr. Bhargab Mohan Das_Multidimensional Sustainability Enhancement**
    - *Duration*: 1 July 2023 - 1 July 2024
    - *Project Investigator(s):* Dieter Wilhelm Trau
    - *Sponsor*: Mr. Bhargab Mohan Das
    - *Total contracted amount*: 120,000
52. **APEC Strategic Foresight**
    - *Duration*: 28 August 2023 - 28 December 2023
    - *Project Investigator(s):* Deepak Sharma, Suwin Sandhu
    - *Sponsor*: National Higher Education, Science, Research, and Innovation Policy Council (NXPO)
    - *Total contracted amount*: 300,000
53. **CSI Bangkok - Knowledge Transfer**
    - *Duration*: 8 August 2023 - 6 August 2024
    - *Project Investigator(s):* AIT Solution PI
    - *Sponsor*: CSI Bangkok
    - *Total contracted amount*: 511,493.39

54. **Transdisciplinary Higher Education for Global Wellbeing**
    - *Duration*: 1 January 2023 - 31 December 2025
    - *Project Investigator(s):* Joyee S. Chatterjee, Kyoko Kusakabe
    - *Sponsor*: ERASMUS +, Afghanistan
    - *Total contracted amount*: 4,181,619
55. **Executive Development Program on Outcome Based Learning: Advanced Concepts and Practices**
    - *Duration*: 10 November 2023 - 31 January 2024
    - *Project Investigator(s):* Roger Levermore
    - *Sponsor*: ConnectED Learning and Development
    - *Total contracted amount*: 492,030
56. **Advanced Policy and Regulatory Framework in Insurance Business, 24-27 October 2023**
    - *Duration*: 24 October 2023 - 24 April 2024
    - *Project Investigator(s):* Narumon Wangnai
    - *Sponsor*: Green Delta, Bangladesh
    - *Total contracted amount*: 1,356,000
57. **Strategic Human Resource Management and Business Leadership**
    - *Duration*: 4 December 2023 - 28 June 2024
    - *Project Investigator(s):* Thaniya Jirasathitpornpong, Fazle Karim
    - *Sponsor*: WorkBank, Bangladesh
    - *Total contracted amount*: 475,200

WATER - ENERGY- FOOD (WEF)

Water, Energy and Food are of vital and critically important to the human societies. They are inextricably interrelated to each other and with other societal goals. Global challenges of climate change, ecosystem degradation, intensive economic growth, population growth, and urbanization are increasingly threatening the security and services of WEF systems. With the growing demands of WEF resources driven by these challenges, the social and environmental implications are increasing with unpredictable impacts for livelihoods and the environment. In order to reduce the negative impacts of and to across WEF nexus, effective solutions with integrated low carbon and multi-sectoral adaption strategies and policies are needed urgently. To achieve long-term water, energy and water security, there is also a need to step up the efforts dealing with technology development in addressing the main environmental issues. The AIT research encompasses the field of each domain of WEF resources, and the nexus approach considers all three different dimensions recognizing the inter-dependencies of different resource uses sustainably. The issues covered in relation to WEF sectors include efficiency, equity, resilience, and sustainability, as well as the key questions required to enhance adoption of technologies and policies to promote the strong synergies of food security, energy, and water investments.

Sub-themes

1. Food Security
2. Sustainable Energy
3. Water Management
4. Water- Energy-Food Nexus

FOOD SECURITY

The agri-food systems of present time are undergoing a series of profound changes brought by climate change, biodiversity loss, emerging technologies, and innovations. With the growing population, the need of more food to be produced to feed the world population is on rise. A well-functioning agricultural sector is essential to ensure food security, and agricultural livelihoods as the agriculture is the provider of food and feed to the world, and its products are a major source of income for the communities. It is thus crucial to improve production techniques and boost the resilience and sustainability of agri-food systems. With an emphasis given on different dimensions of food security such as availability, accessibility, utilization, and stability, AIT research addresses a wide range of aspects covering resilient food production, distribution, and consumption through environmental solutions, sustainable agricultural technologies, policy responses. AIT's research topics include, among others, sustainable agricultural development; climate smart agriculture; Agri-Food value chain management; technological innovations in Agribusiness such as

tech-clinic for Agro-food SMEs, AI driven precision agriculture; technological applications in soil, crop productivity, pests and disease management; food technology, food processing, food engineering; Food safety, and quality; biotransformation of Agro-industrial waste; market analysis; consumer behavior and practice; Nutrition, diet, and health; Aquaculture and aquatic resource management. The impact of economic and social forces on food security including public policies, programmes and services are also examined such as impact of property tax on food security.

SUSTAINABLE ENERGY

Sustainable Development Goals (SDGs 7 and 13), and the ambitious Paris Agreement on Climate Change have called for accelerated universal energy access combined with energy efficiency and deep-decarbonization for the energy sector. But the world today is yet on fossil-fuel pathways despite improving cost and efficiency of renewable energy technologies and facing energy crisis with the rising prices of gas, oils and growing demand on energy infrastructure driven by energy shortage problems resulted from countries' mismanagement and a post-pandemic rebound in demand. With the global deepening energy crisis, it is important to make efforts to dramatically increase the use of renewable energy while reducing the environmental impacts. Energy efficiency brings several benefits from environmental, and economic perceptive, including lower greenhouse gas emissions, decreased water uses and lower costs from daily utilities, and promoting job creation. Apart from the traditional energy sector, the transport sector is also converging onto the power sector via electrifying it for several reasons, so its potential and challenges need to be analyzed. The sustainable energy sector's transition phase needs societal change with new values, system thinking, technical and modeling skill, business, policy, and the governance.

AIT's research in relation to energy is conducted in an interdisciplinary approach - encompassing a wide range of areas such as clean energy transition technologies, energy policies and environmental management aspects. It addresses the issues related to the sustainable energy transition at the cities and national level for delivering a reliable, clean, affordable energy supply compatible with sustainable development. The topics covered under this sub-theme include, among others, climate change mitigation from the energy sector, bioenergy and biofuel development, application of AI, big data and machine learning in energy efficiency and barriers, policies for renewable energy and storage integration to the grid, waste to energy technologies, techno-economic assessment of renewable energy technologies, evaluation of

energy policies and stochastic analysis through energy and power sector modelling at smaller time scale, energy access and security assessments, regional electricity trade, barriers, and system integration; smart grids and microgrids, demand response. Moreover, a new dimension in the energy and transport sectors is emerging from integrating more intermittent renewable energy sources with the help of smart grid, demand response and energy storage, including hydrogen energy, to meeting the COP26 commitment by achieving carbon neutrality and net-zero GHG emissions goals.

WATER MANAGEMENT

The impact of rapidly growing population, economic growth, and environmental changes have brought enormous pressure on water security which is essential foundation to the peoples' lives and ecosystem services. The problems water sector faces today are daunting with the challenges in developing, conserving, and managing water resources, its safe and productive use, particularly with regards to sustainability and environmental impacts on both at supply and end-use sides. The increasing challenges and urgency to ensure water security in our time of unprecedented changes and shocks, highlights the critical need for a transformation in thinking and approach. Moving forward, the adoption of new management capitalizing on innovative technologies in water sector is necessary to ensure the water security. Innovation and technology have a vital role to play in combating water scarcity, water efficiency, utility operations, wastewater management, monitoring and treatment and data and analytics. The risk management of water resources is also critical to prevent the damage and loss from natural disasters such as flooding and drought.

AIT's research seeks to understand and respond to the issues related to the complexity of water use and water resources management including the water related risks influenced by climate extremes and human activities. It explores the new models and technological innovations covering the focus areas of agricultural water; coastal water; urban water; water resources; wastewater; and extreme

events and risk management. Research projects include, among others, the data-driven approaches and nature-based solutions in water management; transfor- mative adaptation for water security; water allocation planning; impacts of climate change and adaptation in water sector; integrated water resource management; water quality management; water recycling and resources recovery; groundwater governance and resilience; urban and rural water supply and distribution systems; irrigation and drainage system management; cropping systems; erosion and water quality problems; watershed management; social and environmental impact assessment of water resources. The extreme events and risk management including river flow analysis, flood control and mitigation, flood modeling and forecasting, flood plain development, and management, are also covered under this sub-theme.

WATER-ENERGY-FOOD (WEF) NEXUS

The complex interrelationships between the water, energy and food systems have clearly highlighted the need to transform the way we think in managing the complex challenges. In this context, the "business as usual" approach cannot achieve the realization of long-term water, energy, and food security. A new approach with nexus perception is necessary to better understand and systematically analyze the interactions between the natural environment and human activities. This paradigm shift is vital to achieving the sustainability development goals in an environment of global climate and economic change.

AIT's research focuses on the interconnectedness of WEF systems including the tradeoffs and synergies between different resource uses; the dynamics of WEF nexus interactions with climate change and human intervention. Specific topics covered include, among others, food production with efficient use of water, energy, and other

resources; innovative water conservation technologies for agriculture/horticulture productivity; energy and carbon footprint of urban and national water system; wastewater to resources/energy; resources nexus approach in addressing issues related to climate and environment; and the policy response options towards a more coordinated management of resources.

HIGHLIGHTED PROJECTS UNDER WATER-ENERGY-FOOD

The following lists some examples of projects that highlight AIT's global, regional, and country development experience under *"Water-Energy-Food"* theme during 2023.

Regenerative Agriculture in ASEAN: Promoting Nature-Positive Solutions for Rice Production (REGA-ASEAN)

Project budget- 9.9 million THB

Project duration- August 2023- July 2025

Donor- The Rockefeller Foundation, USA

The project aims to transition rice production in Cambodia, Lao PDR, and Thailand toward regenerative agriculture to enhance climate resilience and sustainability. Led by AIT, the initiative will review existing data on GHG emissions, water use, soil biodiversity, and farmer incomes to identify effective nature positive practices, demonstrate those to farmers, and explore scaling-up opportunities. The project seeks to improve soil health, protect water resources, increase farmer profitability, empower communities, and share knowledge across Asia. The project aims to transform rice production, reduce food import dependency, and enhance regional food security resilience in ASEAN countries.

Innovative Solutions for Plastic Free European Rivers (INSPIRE Europe)

Project budget- 5.8 million THB

Project duration- March 2023- August 2027

Donor- the European Union's Horizon program: European Climate, Infrastructure and Environment Executive Agency

INSPIRE's main objective is to contribute to the drastic reduction of litter, macro and microplastics in European rivers in a holistic approach, by bringing together 20 technologies and actions for: DETECTION of the pollution present in the river and at the riverbank, COLLECTION of litter and macroplastics at the river bank and litter, macro and microplasticsin the river, PREVENTION of litter, macro and microplastics to enter the river by collecting it from its waste stream before it can enter the river and by developing biodegradable alternatives for currently non-degradable polluting products, to avoid they will further be used and arrive in the river as litter INSPIRE's consortium is composed of 26 partners with complementary expertise and a good balance of academia, industry, communication specialists and soft skills organisations is obtained, who all together will work towards the target of having a number of successful solutions that can find their way to the market and put INSPIRE on the radar.

Technical Training for 100 Women Energy Professionals in Southeast Asia (SAR100)

Project budget- 16.4 million THB

Project duration- June 2023- March 2024

Donor - Department of Foreign Affairs & Trade (DFAT), Australia

WePOWER-SAR100, a professional training series for mid-career women engineering professionals from the South Asian Region (SAR) designed to equip them for leadership, ensuring gender diversity in the energy sector. Highly selective pilot program granted scholarships to 101 mid-career women. Academically rigorous innovative training program with real-world knowledge from a pool of internationally recognized experts. SAR100 provided specialized technical training and networking opportunities to women engineers and empowered them for senior management roles. WePOWER-SAR100, 8-months program consisted of 10 hybrid modules, delivered in 3-week cycles, and a capstone program at the AIT campus in Thailand. This hybrid model bridged geographical distances, empowering students and teachers to learn and teach. It is a collaborative regional effort that will upgrade skillsets and build gender diversity in a key development sector.

PROJECTS INTIATED UNDER WATER-ENERGY-FOOD

Below is the list of research, consultancy and capacity development projects initiated under *"Water-Energy-Food"* by various Institute wide outreach centers and departments during 2023.

1. **Agrotechnology Innovations Toward Sustaininability in Agriuculture and Food Systems**
   - *Duration*: 9 January 2023 - 5 December 2025
   - *Project Investigator(s):* Avishek Datta, Sushil Kumar Himanshu; Farhad Zulfiqur
   - *Sponsor*: Indian Council of Agricultural Research (ICAR)
   - *Total contracted amount*: 1,254,600
2. **13th International Symposium on Southeast Asian Water Environment**
   - *Duration*: 1 December 2022 - 30 April 2023
   - *Project Investigator(s):* Thammarat Koottatep
   - *Sponsor*: University of Tokyo, Japan
   - *Total contracted amount*: 1,254,600
3. **Fusion of remote sensing, modelling and ground measurement techniques for improved estimation of regional terrestrial water storage**
   - *Duration*: 1 February 2023 - 31 January 2025
   - *Project Investigator(s):* Natthachet Tangdamrongsub
   - *Sponsor*: Asian Institute of Technology
   - *Total contracted amount*: 150,000
4. **Project Management & Implementation of Agricultural and Rural Development Project (in Thailand & Vietnam)**
   - *Duration*: 18 February 2023 - 30 June 2023
   - *Project Investigator(s):* Md. Zakir Hossain
   - *Sponsor*: Palli Karma-Sahayak Foundation (PKSF)
   - *Total contracted amount*: 1,462,500
5. **Reduce, Reuse, Recycle to Protect the Marine Environment and Coral Reefs (3Rpromar)**
   - *Duration*: 1 November 2022 - 30 June 2025
   - *Project Investigator(s):* Guilberto Borongan Solomon Kofi Mensah Huno; Bayasgalan Sanduijav; Naharuethai Supakarn
   - *Sponsor*: The German Agency for International Cooperation of (GIZ), Germany
   - *Total contracted amount*: 3,994,845
6. **Capacity Building on Food Innovations and Sustainability**
   - *Duration*: 14 January 2023 - 31 May 2024
   - *Project Investigator(s):* Anil Kumar Anal
   - *Sponsor*: World Bank through ICAR-NAHEP
   - *Total contracted amount*: 684,682
7. **Geospatial Training Workship & Study Visit for Agriculture and Farming**
   - *Duration*: 2 March 2023 - 31 March 2025
   - *Project Investigator(s):* Nitin Kumar Tripathi
   - *Sponsor*: NAHEP-CAAST, VNMKV, Parbhani, India
   - *Total contracted amount*: 1,700,000
8. **Compendium of Lessons Learned**
   - *Duration*: 18 November 2022 - 31 August 2023
   - *Project Investigator(s):* Thammarat Koottatep
   - *Sponsor*: DUKE University, USA
   - *Total contracted amount*: 816,243
9. **Creating High-quality Sustainability Education Programmes for Teachers**
   - *Duration*: 21 May 2023 - 31 August 2023
   - *Project Investigator(s):* Ho Huu Loc
   - *Sponsor*: The Head Foundation (THF), Singapore
   - *Total contracted amount*: 235,000
10. **Nutrient and Irrigation Water Management through Smart Agri-Tech Approaches**
    - *Duration*: 14 January 2023 - 31 May 2024
    - *Project Investigator(s):* Anil Kumar Anal
    - *Sponsor*: World Bank through ICAR-NAHEP
    - *Total contracted amount*: 1,534,977
11. **Marine debris field surveys and data analysis in Thailand**
    - *Duration*: 1 May 2023 - 31 December 2023
    - *Project Investigator(s):* Thammarat Koottatep
    - *Sponsor*: Commonwealth Scientific and Industrial Research Organisation (CSIRO)
    - *Total contracted amount*: 594,000

12. **Assessment of Material Recycling Related to Used Beverage Cartons: A Focus on Formal & Informal Waste Sectors in Bangkok & Surrounding Cities of Thailand**
    - *Duration*: 4 April 2023 - 4 April 2024
    - *Project Investigator(s):* Thammarat Koottatep; Sarawut Ninsawat
    - *Sponsor*: National Research Council of Thailand (NRCT)
    - *Total contracted amount*: 8,741,000
13. **13th Southeast Asia Subregional Committee Meeting, Proposal Development Training Workshop**
    - *Duration*: 1 May 2023 - 31 December 2023
    - *Project Investigator(s):* Sangam Shrestha
    - *Sponsor*: Asia-Pacific Network for Global Change Research (APN)
    - *Total contracted amount*: 1,813,270
14. **Capacity building on Probiotic-based Food Product Development**
    - *Duration*: 14 January 2023 - 31 May 2024
    - *Project Investigator(s):* Anil Kumar Anal
    - *Sponsor*: Commission of Higher Education Development (CHED), Philippines
    - *Total contracted amount*: 969,071.74
15. **Technical Training for 100 Women Energy Professionals in South Asia Region (SAR100)**
    - *Duration*: 5 July 2023 - 31 December 2024
    - *Project Investigator(s):* Jai Govind Singh; P. Abdul Salam
    - *Sponsor*: The World Bank
    - *Total contracted amount*: 2,200,000
16. **The livelihood impact assessment through surveys with leaders, members, and non-members of organic paddy producer groups in northeast Thailand**
    - *Duration*: 1 January 2023 - 31 December 2025
    - *Project Investigator(s):* Takuji W Tsusaka; Nophea Sasaki
    - *Sponsor*: Institute of Developing Economies (IDE) of Japan External Trade Organization (JETRO)
    - *Total contracted amount*: 645,000
17. **Innovative Solutions for Plastic Free European Rivers**
    - *Duration*: 30 May 2023 - 31 August 2027
    - *Project Investigator(s):* Manzul K. Hazarika; Kittiphon Boonma
    - *Sponsor*: European Climate, Infrastructure and Environment Executive Agency
    - *Total contracted amount*: 5,841,560
18. **Strengthening Groundwater Governance in Rapidly Urbanizing Areas of the Lower Mekong Region**
    - *Duration*: 1 August 2023 - 31 December 2026
    - *Project Investigator(s):* Anil Kumar Anal
    - *Sponsor*: World Bank through ICAR-NAHEP
    - *Total contracted amount*: 1,534,977
19. **Regenerative Agriculture in ASEAN: Promoting Nature-Positive Solutions for Rice Production (REGA-ASEAN)**
    - *Duration*: 1 August 2023 - 31 July 2027
    - *Project Investigator(s):* Avishek Datta; Farhad Zulfiqar; Sushil Kumar Himanshu
    - *Sponsor*: The Rockefeller Foundation, USA
    - *Total contracted amount*: 9,900,000
20. **Cassava Production and Processing (Benchmarking on Mechanization and Other Technologies)**
    - *Duration*: 21 August 2023 -31 December 2023
    - *Project Investigator(s):* Faiz Hassan Shah
    - *Sponsor*: Fatima Multi-Purpose Cooperative (FMPC)
    - *Total contracted amount*: 9,900,000
21. **Technical Training for 100 Women Energy Professionals in Southeast Asia (SAR100)**
    - *Duration*: 10 June 2023 - 31 December 2024
    - *Project Investigator(s):* Faiz Hassan Shah
    - *Sponsor*: Department of Foreign Affairs & Trade (DFAT), Australia
    - *Total contracted amount*: 14,239,463
22. **International Fisheries Symposium 2023 (IFS 2023)**
    - *Duration*: 25 September 2023 - 31 December 2024
    - *Project Investigator(s):* Krishna R. Salin; Ha Thanh Dong
    - *Sponsor*: International Delegates
    - *Total contracted amount*: 2,700,000
23. **Giant Prawn Conference 2023**
    - *Duration*: 25 September 2023 - 31 December 2024
    - *Project Investigator(s):* Krishna R. Salin
    - *Sponsor*: International Delegates
    - *Total contracted amount*: 1,236,000
24. **Integrated Approaches to Urban River Corridor Management Experiences from Southeast Asia,10-17 October 2023**
    - *Duration*: 10 October 2023 - 30 March 2024
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: ADB, Nepal
    - *Total contracted amount*: 1,327,700

25. **Promotion of Action Against Marine Plastic Litter in Asia**
    - *Duration*: 1 June 2023 - 30 September 2024
    - *Project Investigator(s):* Takuji W Tsusaka; Anil Kumar Anal
    - *Sponsor*: United Nations Environmet Programme
    - *Total contracted amount*: 5,100,000
26. **Pumping Technology for Water Supply dated 15 to 22 November 2023**
    - *Duration*: 15 November 2023 - 20 May 2024
    - *Project Investigator(s):* Narumon Wangnai
    - *Sponsor*: EBARA Hatakeyama Memorial Fund (EHMF)
    - *Total contracted amount*: 738,000
27. **Blended (Virtual & In-person) Capacity Development Training Programs for CDD India Staff, 21 November 2023- 03 March 2024**
    - *Duration*: 21 November 2023 - 30 March 2024
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: CDD India
    - *Total contracted amount*: 2,187,150
28. **Milk Processing, Street Food and Entrepreneurship in Thailand and in Malaysia, 05 December 2023 - 25 February 2024**
    - *Duration*: 5 December 2023 - 25 June 2024
    - *Project Investigator(s):* Md. Zakir Hossain
    - *Sponsor*: Palli Karma-Sahayak Foundation (PKSF)
    - *Total contracted amount*: 1,871,100
29. **Hiring a Consultant for Review the Master Plan of Bangkok Sewerage System**
    - *Duration*: 26 September 2023 - 31 May 2024
    - *Project Investigator(s):* Thammarat Koottatep; Sarawut Ninsawat
    - *Total contracted amount*: 9,191,000

CHAPTER 3: RESEARCH PUBLICATIONS ASSOCIATED WITH AIT RESEARCH THEMES

The report presents the publications available from SCOPUS database for 2023. Grouped under five thematic research areas, this section lists the publications in 2023, reaching a total of more than 400. As the five research themes are interconnected, crossing their traditional boundaries, the publications are grouped based on their most relevant (single) research themes.

PUBLICATIONS

The following lists the total 409 publications available from SCOPUS database for 2023 that fall under five thematic research areas. Out of all publications in 2023, below is the list of publications that fall under *"Climate Change"*.

CLIMATE CHANGE

1. *Mohammed S.; Tyagi R.; Vishwakarma S.; Bhatia N.* **Use of ai for climate change: Modelling the barriers in energy sector by ism approach (2023). Water and Energy International,** *Volume 66r, Issue 9, pp 32-38*
2. *Penny J.; Khadka D.; Babel M.; Alves P.; Djordjević S.; Chen A.S.;* **Loc H.H.Integrated assessment of flood and drought hazards for current and future climate in a tributary of the Mekong River basin (2023). Journal of Water and Climate Change,** *Volume 14, Issue 12, pp 4424- 4443, DoI: 10.2166/wcc.2023.252*
3. *Tiwari A.D.; Pokhrel Y.; Kramer D.; Akhter T.; Tang Q.; Liu J.; Qi J.; Loc H.H.; Lakshmi V.* **A synthesis of hydroclimatic, ecological, and socioeconomic data for transdisciplinary research in the Mekong (2023). Scientific Data,** *Volume 10, Issue 1, Article No 283. DoI: 10.1038/s41597-023-02193-0*
4. *Pal I.; Baskota A.; Dhungana G.; Udmale P.; Gadhawe M.A.; Doydee P.; Nguyen T.T.N.; Sophat S.; Banerjee S.* **Index-based tools for livelihood security and resilience assessment (LiSeRA) in lower Mekong Basin (2023). MethodsX,** *Volume 11, Article No:102301. DoI: 10.1016/j.mex.2023.102301*
5. *Gunawardhana L.; Karunanayake N.; Amarasiri C.* **Environmental Impact Assessment of LED Lamp Types for Industrial Lighting Purpose (2023). Science and Technology Asia,** *Volume 28, Issue 4, pp 203- 212*
6. *Alves P.B.R.; Loc H.H.; De Silva Y.; Penny J.; Babel M.; Djordjévic S.* **The dual-risks context: A systematic literature review for the integrated management of flood and drought risks (2023). International Journal of Disaster Risk Reduction,** *Volume 96, Article No 103905,DoI:10.1016/j.ijdrr.2023.103905*
7. *Hashmi S.I.; Hewage H.T.S.A.; Visvanathan C.* **Cleaner production auditing for plastic recycling industry in Pakistan: A baseline study (2023). Chemosphere,** *Volume 337, Article No 139338, DoI: 10.1016/j.chemosphere.2023.139338*
8. *Limsiriwong K.; Winijkul E.* **Exploring Personal Exposure to Airborne Microplastics across Various Work Environments in Pathum Thani Province, Thailand (2023). International Journal of Environmental Research and Public Health,** *Volume 20, Issue 24, Article No 7162, DOI: 10.3390/ijerph20247162*
9. *De Silva Y.K.; Babel M.S.; Abatan A.A.; Khadka D.; Shanmugasundaram J.* **Evaluation of ENSO in CMIP5 and CMIP6 models and its significance in the rainfall in Northeast Thailand (202). Theoretical and Applied Climatology,** *volume 154, Issue 4-Mar, pp 881-906, DOI: 10.1007/s00704-023-04585-z*
10. *Kyaw Y.; Nguyen T.P.L.; Winijkul E.; Xue W.; Virdis S.G.P.* **The Effect of Climate Variability on Cultivated Crops' Yield and Farm Income in Chiang Mai Province, Thailand (2023). Climate,** *Volume 11, Issue 10, Article No 204. DOI: 10.3390/cli11100204*

11. *Wang L.; Cui S.; Tang J.; Fang L.; Fang X.; Shrestha S.; Manandhar B.; Huang J.; Nitivattananon V.* **Riverine flood risk assessment with a combined model chain in southeastern China (2023). Ecological Indicators,** *Volume 154, Article No 110686. DOI: 10.1016/j.ecolind.2023.110686*

12. *Dayal D.; Pandey A.; Gupta P.K.; Himanshu S.K.* **Multi-criteria evaluation of satellite-based precipitation estimates over agro-climatic zones of India (2023). Atmospheric Research,** *Volume 292, Article No 106879. DOI: 10.1016/j.atmosres.2023.106879*

13. *Alam A.; Ullah H.; Attia A.; Tisarum R.; Cha-um S.; Datta A.* **Integrated Application of Silicon and Potassium Nitrate Alleviates the Deleterious Effects of Drought Stress on Cantaloupe Plant Growth by Improving Biochemical and Physiological Traits (2023). Silicon,** *Volume 15, Issue 14, pp 6283-6298. DOI: 10.1007/s12633-023-02512-5*

14. *Ha Chi N.N.; Kim Oanh N.T.; Winijkul E.; Xue W.; Nguyen L.T.* **Bi-decadal trend of atmospheric emissions from thermal power plants in Mainlan d Southeast Asia: Implications on acid deposition and climate change Mitigation (2023). Journal of Environmental Management,** *Volume 348, Article No 119252, DOI: 10.1016/j.jenvman.2023.119252*

15. *Varnakovida P.; Ko H.Y.K.* **Urban expansion and urban heat island effects on Bangkok metropolitan area in the context of eastern economic corridor (2023). Urban Climate,** *Volume 52, Article No 101712. DOI: 10.1016/j.uclim.2023.101712*

16. *Chandrasiri C.K.; Tsusaka T.W.; Zulfiqar F.; Datta A.* **Impact of climate change on paddy crop failure under different water regimes in Sri Lanka (2023). Singapore Journal of Tropical Geography,** *Volume 44, Issue 3, pp 386-413. DOI: 10.1111/sjtg.12495*

17. *Jotaworn S.; Nitivattananon V.; Teparakul O.; Wongboontham T.; Sugiyama M.; Numata M.; Alvarez D.D.B.* **Households' Willingness to Pay for Renewable Energy Alternatives in Thailand (2023). Social Sciences,** *Volume 12, Issue 11, Article No 634. DOI:10.3390/socsci12110634*

18. *Wongboontham T.; Nitivattananon V.; Pal I.; Nguyen T.P.L* **Enhancing Urban Flood Resilience: The Role and Influence of Socioeconomics in the Chao Phraya River Basin, Thailand (202). International Journal of Sustainable Development and Planning,** *Volume 18, Issue 10, pp 3061-3076. DOI:10.18280/ijsdp.181009*

19. *Nakburee A.; Shrestha S.; Mohanasundaram S.; Loc H.H.; Maharjan M.* **Influences of teleconnections on climate variables in northern and northeastern Thailand (2023). Journal of Water and Climate Change,** *Volume 14, Issue 10, pp 3460-3483. DOI:10.2166/wcc.2023.120*

20. *Trang N.T.T.; Trang N.T.Q.; Loc H.H.; Parke E.* **Mainstreaming ecotourism as an ecosystem-based adaptation in Vietnam: insights from three different value chain models (2023). Environment, Development and Sustainability,** *Volume 25, Issue 9, pp 10465-10483. DOI: 10.1007/s10668-022-02481-6*

21. *Shrestha F.; Steiner J.F.; Shrestha R.; Dhungel Y.; Joshi S.P.; Inglis S.; Ashraf A.; Wali S.; Walizada K.M.; Zhang T.* **A comprehensive and version-controlled database of glacial lake outburst floods in High Mountain Asia (2023). Earth System Science Data,** *Volume 15, Issue 9, pp 3941-3961. DOI: 10.5194/essd-15-3941-2023*

22. *Khadka D.; Babel M.S.; Kamalamma A.G.* **Assessing the Impact of Climate and Land-Use Changes on the Hydrologic Cycle Using the SWAT Model in the Mun River Basin in Northeast Thailand (2023). Water (Switzerland),** *Volume 15, Issue 20, Article No 3672. DOI:10.3390/w15203672*

23. *Alam A.U.; Ullah H.; Himanshu S.K.; Praseartkul P.; Tisarum R.; Cha-um S.; Datta A.* **Seed Priming and Foliar Application of Salicylic Acid is Equally Beneficial in Mitigating Drought Stress in Cucumber (2023). Journal of Soil Science and Plant Nutrition,** *Volume 23, Issue 4, pp 6299-6316. DOI: 10.1007/s42729-023-01485-z*

24. *Gamonwet P.; Dhakal S.* **The assessment of the value of electricity saving and economic benefit to residential solar rooftop PV customer: The case of Thailand (2023) Energy Strategy Reviews,** *Volume 50, Article No 101203. DOI: 10.1016/j.esr.2023.101203*

25. *Pachauri R.K.; Singh J.G.* **A novel shadow dispersion approach for solar PV modules in array using chess board game methodology: An experimental study (2023). Solar Energy,** *Volume 265,Article No 112098. DOI: 10.1016/j.solener.2023.112098*

26. *Pal I.; Ghosh S.; Dash I.; Mukhopadhyay* **A. Review of Tsunami early warning system and coastal resilience with a focus on Indian Ocean (2023) International Journal of Disaster Resilience in the Built Environment,** *Volume14, Issue 5, pp 593-610. DOI:10.1108/IJDRBE-12-2020-0124*

27. *Sedtha S.; Pramanik M.; Szabo S.; Wilson K.; Park K.S.* **Climate change perception and adaptation strategies to multiple climatic hazards: Evidence from the northeast of Thailand (2023). Environmental Development,** *Volume 48, Article No100906. DOI:10.1016/j.envdev.2023.100906*

28. *Kamandika F.A.; Dhakal S.* **Impact of carbon price on Indonesia's power sector up to 2050 (2023). Carbon Neutrality,** *Volume 2, Issue 1, Article No 27. DOI: 10.1007/s43979-023-00066-4*

29. *29. Verma R.L.; Gunawardhana L.; Singh Kamyotra J.; Ambade B.; Kurwadkar S.* **Air quality trends in coastal industrial clusters of Tamil Nadu, India: A comparison with major Indian cities (2023). Environmental Advances,** *Volume 13, Article No 100412. DOI: 10.1016/j.envadv.2023.100412*

30. *Penny J.; Khadka D.; Alves P.B.R.; Chen A.S.; Djordjević S.* **Using multi criteria decision analysis in a geographical information system framework to assess drought risk (2023). Water Research X,** *Volume 20, Article No 100190. DOI: 10.1016/j.wroa.2023.100190*

31. *Champeecharoensuk A.; Dhakal S.; Chollacoop N.* **Climate Change Mitigation in Thailand's Domestic Aviation: Mitigation Options Analysis towards 2050 (2023). Energies,** *Volume 16, Issue 20, Article No 7199. DOI: 10.3390/en16207199*

32. *Ono S.; Tsusaka T.W.* **Comparative Analysis of Environmental, Economic, and Social Criteria for Plastic Recycling Technology Selection in India, Sri Lanka, Pakistan, and Thailand (2023). International Journal of Sustainable Development and Planning,** *Volume 18, Issue 8, pp 2461-2471. DOI: 10.18280/ijsdp.180817*

33. *Miah M.G.; Islam M.R.; Roy J.; Rahman M.M.; Abdullah H.M.* **A changing coastal ecosystem: Cox's Bazar in southeastern coastal region of Bangladesh (2023). Environment, Development and Sustainability,** *Volume 25, Issue 7, pp 6141- 6165. DOI: 10.1007/s10668-022-02297-4*

34. *Nguyen Q.; Shrestha S.; Ghimire S.; Mohana Sundaram S.; Xue W.; Virdis S.G.P.; Maharjan M.* **Application of machine learning models in assessing the hydrological changes under climate change in the transboundary 3S River Basin (2023) Journal of Water and Climate Change,** *Volume 14, Issue 8, pp 2902-2918. DOI: 10.2166/wcc.2023.313*

35. *Tariq A.; Ehsan S.; Badir Y.F.; Memon M.A.; Khan Sumbal M.S.U.* **Does green process innovation affect a firm's financial risk? The moderating role of slack resources and competitive intensity (2023). European Journal of Innovation Management,** *Volume 26, Issue 4, pp 1168- 1185. DOI: 10.1108/EJIM-05-2021-0265*

36. *Pal I.; Dhungana G.; Baskota A.; Udmale P.; Gadhawe M.A.; Doydee P.; Nguyen T.T.N.; Sophat S.* **Multi-Hazard Livelihood Security and Resilience of Lower Mekong Basin Communities (2023). Sustainability (Switzerland),** *Volume 15, Issue 11, Article No 8469. DOI: 10.3390/su15118469*

37. *Vithayaporn S.; Nitivattananon V.; Sasaki N.; Santoso D.S.* **Assessment of the Factors Influencing the Performance of the Adoption of Green Logistics in Urban Tourism in Thailand's Eastern Economic Corridor (2023). Social Sciences,** *Volume 12, Issue 5, Article No 300. DOI: 10.3390/socsci12050300*

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SMART COMMUNITIES

From the publications available from SCOPUS database in 2023, below is the list of publications that fall under *"Smart Communities"*.

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WATER-ENERGY-FOOD

From the publications available from SCOPUS database in 2023, below is the list of publications that fall under *"Water-Energy-Food"*.

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