
International Conference

**CLIMATE CHANGE CHALLENGES
FOR THE LOWER MEKONG BASIN
REGION: FINDINGS, CRUCIAL
PROBLEMS AND LESSONS
LEARNED FROM ACTION PLANS
TO DATE**

**Ho Chi Minh University of Social Sciences and
Humanities**

Ho Chi Minh City, Vietnam

September 19th – 21st, 2019



Co-funded by the
Erasmus+ Programme
of the European Union

Contractual Data	
Project	strengthening climate change REsearch And innovation CapaciTies in Cambodia, Laos and Vietnam
Acronym	REACT
Funding Programme	Erasmus + Key Action 2: Capacity Building in Higher Education
Grant Number	#573964-EPP-1-2016-1-ES-EPPKA2-CBHE-JP

REACT consortium:

European Union:

- University of Alicante (Spain), Project Coordinator
- Albert Ludwig University of Freiburg (Germany)
- Institut Euro-Méditerranéen en Science du Risque (France)
- Università degli Studi di Genova (Italy)

Cambodia:

- Royal University of Agriculture
- University of Heng Samrin Thbongkhmum

Laos:

- National University of Laos
- Souphanouvong University
- National Institute for Economic Research

Vietnam:

- Hue University of Agriculture and Forestry
- University of Social Sciences and Humanities Ho Chi Minh/ Vietnam National University

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International Conference

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1. PREFACE AND ACKNOWLEDGEMENTS

The International Conference

The international conference “*Climate change challenges for the lower Mekong basin region; findings, crucial problems and lesson learned from actions plans to date*” wants to be a transnational platform to survey research and action plans regarding the impact of climate change in the Lower Mekong Basin. The agenda of the conference comprehends interdisciplinary and specialized papers by scholars that deal with either local, regional or transnational problems caused by the impact of climate change in areas as diverse as economics, livelihood, tourism, land use, aquaculture, water management, education and related outreach initiatives.

The goal of the Conference is to bring together scholars and researchers of higher education and research institutions from the region in order to create a stronger network and foster intraregional collaboration in climate change research and innovation. A series of panels will bring together stakeholders from industry, NGOs, government and academic institutions from the region to discuss the most pressing problems to be addressed and steps to be taken.

Following the inauguration of the first day of Conference, the keynote speech “*An Overview On Climate Change Challenges And Adaptation In The Mekong River Delta of Vietnam*” by the local expert, Dr Le Anh Tuan, Vice director of Research Centre for Climate Change in Mekong Delta, will open the stage for a series of presentations in parallel sessions that will showcase state of the art research on the impact of climate change on Agriculture, Water Management, Energy , Industrial Production and Society in the lower Mekong basin region throughout the 2 days of conference. As a conclusion of the

first day of the conference, there will be the signature of the Memorandum of Agreement and the launching of the *REACT Network for Climate Change Research and Education in Southeast Asia*, meant to be a leading platform to support Climate Change research and education in Southeast Asia.

The second day will be opened by the key-note speech of Prof. Christian De Perthuis, Head of the Climate Economics Chair at Paris-Dauphine University that will broaden the picture and talk about the impact of climate change on a global scale. A panel on supporting research and education in Southeast Asia will follow with the participation of related national agencies and international network representatives.

After the panel, three studies addressing the adaptation of societies in the region in the scenario of climate change will be presented in a plenary session to the whole audience. As final event a panel with four local experts from mixed backgrounds representing NGOs, research institutions and government positions will take place with the aim to summarise, discuss and comment on the main outcomes of the conference and identify the next steps for enhancing scientific research on climate change in the lower Mekong basin region.

The international conference has been organised by the REACT Network for Climate Change Research and Education in Southeast Asia, supported by the project REACT – “strengthening Climate change Research And Innovation Capacities in Cambodia, Laos and Vietnam”, co-funded by the Erasmus+ Programme of the European Union. Special thanks go to the Erasmus+ programme, unique sponsor of the conference, and to our project officer Ms. Patricia Moreau, who supported our cause and made possible for researchers from the region to get granted and attend the conference. The organisation committee would also like to thank the host institution, the University of Social Science of Ho Chi Minh City for hosting the conference and taking care of all the logistic and organisational issues

that an international conference of such level brings with it. Last but not least we would like to thank all the researchers attending and all the people that took part in the organisation for making this event as rich of interesting formats and up to date high-level scientific contents.

The REACT Project

REACT – “Strengthening climate change REsearch And innovation CapactiTies in Cambodia, Laos and Vietnam” – is a three year Erasmus+ Capacity Building project co-financed by the European Commission (#573964-EPP-1-2016-1-ES-EPPKA2-CBHE-JP), aimed at supporting Higher Education Institutions (HEIs) in Cambodia, Laos and Vietnam in strengthening their capacities and regional cooperation by promoting effective Research & Innovation in Climate Change.

In particular, REACT has aimed to:

1. **Build up the human capacities** of partner institutions to initiate, develop, manage, assess and exploit R&I in Climate Change, as well as to modernize relevant curricula with the integration of R&I in Climate Change towards more competence-based study programs.
2. **Strengthen institutional capacities** by setting up a solid, regional and competitive multi-disciplinary REACT Network of Research & Academic Units in Climate Change.

Successful implementation of REACT activities by a consortium and Southeast Asian and European HEIs and Research Institutions have resulted in improved management and capacities of research and innovation in Climate Change in partner HEIs, as well as modernized relevant curricula and increased networking and cooperation opportunities.

Specifically REACT has:

- Provided a **comprehensive analysis of R&I and Academic offering focused on Climate Change** and related topics in Cambodia, Laos and Vietnam.
- Set up a **Climate Change Network**, through the creation of Climate Change Research and Education Support Units in partner HEIs to support them in developing a multi-disciplinary and innovative approach to Climate Change research & teaching.
- **Built human capacities** in strategy, management, implementation and evaluation of R&I results in Climate Change.
- **Fostered Networking & Sustainability** through National & Regional events, bringing together relevant stakeholders to raise awareness on Climate Change matters, and stimulated research cooperation and access to funding opportunities.

Through its activities and sustainable outputs, REACT hasn't just benefited the partners directly involved, but also other HEIs and stakeholders throughout Cambodia, Laos and Vietnam, including other academics, researchers and students from partner institutions and others (through training and services provided by the REACT Units).

REACT partners:

- University of Alicante, Spain
- Albert Ludwig University of Freiburg, Germany
- Institut Euro-Méditerranéen en Science du Risque, France
- Università degli Studi di Genova, Italy
- Royal University of Agriculture, Cambodia
- University of Heng Samrin Thbongkhmum, Cambodia
- National University of Laos, Laos
- Souphanouvong University, Laos
- National Institute for Economic Research, Laos
- University of Social Sciences and Humanities Ho Chi Minh/Vietnam National University, Vietnam
- Hue University of Agriculture and Forestry, Vietnam

2. SCIENTIFIC COMMITTEE

Dr. Thavrak Huon, Royal University of Agriculture, Cambodia

Dr. Sokuntheavy Hong, Royal University of Agriculture, Cambodia

Dr. Bounmy Keohavong, Souphanouvong University, Laos

Dr. Vongpasith Chanthakhoun, Souphanouvong University, Laos

Dr. Oulavanh Sinsamphanh, National University of Laos

Dr. Somkhit Boulidam, National University of Laos

Dr. Le Van An, Hue University of Agriculture and Forestry, Vietnam

Dr. Ngo Tung Duc, Hue University of Agriculture and Forestry,
Vietnam

Dr. Marc Hanewinkel, Albert Ludwig University of Freiburg,
Germany

Dr. Benno Pokorny, Albert Ludwig University of Freiburg, Germany

Dr. Chung Hoang Chuong, City College of San Francisco, USA

Dr. Le Ahn Tuan, College of Environment and Natural Resources,
Vietnam

Dr. Catherine Vesperini, Institut Euro-Méditerranéen en Science du
Risque, France

Dr. Oana Driha, University of Alicante, Spain

Dr. Pietro Zunino, University of Genoa, Italy

3. ORGANIZING COMMITTEE

Prof. Dr. Ngo Thi Phuong Lan, President Ho Chi Minh University of Social Sciences and Humanities, Vietnam

Prof. Dr. Tran Dinh Lam, Ho Chi Minh University of Social Sciences and Humanities, Vietnam

Ms. Bui Thi Minh Ha, Ho Chi Minh University of Social Sciences and Humanities, Vietnam

Dr. Ngo Tung Duc, Hue University of Agriculture and Forestry, Vietnam

Dr. Oulavanh Sinsamphanh, National University of Laos

Mr. Palitha Douangchack, Souphanouvong University, Laos

Mr. Tim Sophea, Royal University of Agriculture, Cambodia

Prof. Roderich von Detten, Albert Ludwig University of Freiburg, Germany

Ms. Lodovica Di Deodato, Albert Ludwig University of Freiburg, Germany

Ms. Fiorella Valenti, Albert Ludwig University of Freiburg, Germany

Prof. Catherine Vesperini, Institut Euro-Méditerranéen en Science du Risque, France

Ms. Olga Bloschinska, University of Alicante, Spain

Ms. Cristina Beans, University of Alicante, Spain

4. CONFERENCE AGENDA

GENERAL AGENDA

Thurs. Sept. 19 th Venue: Hall D, Building D, USSH	
08.00	<i>Arrival and registration</i>
08.30	Opening Ceremony Prof Phan Thanh Dinh, Vice-President of Ho Chi Minh University of Social Sciences and Humanities Dr Roberto Escarré, Director International Project Management Office, University of Alicante Dr Roderich von Detten, Assistant Professor, Institute of Environmental and Social Science, University of Freiburg
09.00	The REACT Project: Strengthening Research and Innovation Capacities in Higher Education Institutions in Cambodia, Laos and Vietnam Cristina Beans, REACT Project Manager, University of Alicante
09.30	Keynote: “An Overview On Climate Change Challenges And Adaptation In The Mekong River Delta of Vietnam” Dr Le Anh Tuan, Vice director of Research Centre for Climate Change in Mekong Delta (Vietnam) Following Q&A session with audience Prof. Chung Hoang Chuong - Professor, Asian American Studies, City College of San Francisco - Specialist on Southeast Asian American Issues, multicultural studies, vietnamese in the US - as translator
10.15	<i>Coffee Break & Networking</i>
10.45	Climate Change Research – parallel sessions #1 (details below) • Agriculture I • Water I • Transformation of production and consumption system
12.30	<i>Lunch</i>

13.45	Climate Change Research – parallel sessions #2 <i>(details below)</i> • Agriculture II • Climate Change Impacts on Society and Livelihood I
15.30	<i>Coffee Break</i>
15.50	Climate Change Research – parallel sessions #3 <i>(details below)</i> • Water II • Climate Change Impacts on Society and Livelihood II
17.45	The REACT Network for Climate Change Research & Education in Southeast Asia • Introducing the REACT Climate Change Network – Dr. Sengdeuane Wayakone, National University of Laos • Signing Ceremony
18.00	<i>Conference Cocktail</i>

Fri. Sept. 20th Venue: Room D201, Building D, USSH	
08.15	<i>Arrival and registration</i>
08.30	Keynote : “Global Warming and Economic Development” Prof. Christian De Perthuis, Professor of Economics at Paris-Dauphine University and Head of the Climate Economics Chair (France)
09.15	Supporting Climate Change Research & Education in Southeast Asia • Session introduction – Prof. Oana Driha, University of Alicante (Spain) • Supporting Climate Change Research & Education in REACT Universities – Royal University of Agriculture (Cambodia) – Prof. Kim Soben • A European example: Facing Climate Change with highly-specialised training: engineering for natural risk management – Prof. Giorgio Boni, University of Genoa (Italy)

	• Panel: “Supporting Climate Change Research & Education in Southeast Asia” • Prof. Ho Long Phi - Specialist researcher, Centre for Water Management and Climate Change, Viet Nam National University in Ho Chi Minh City • Dr. Christian Hartmann – Institut de Recherche pour le Développement & Institut Euro Méditerranéen en Science du Risque (France) • Mr. Saysongkham Sayavong – DALaM, Ministry of Agriculture and Forestry (Laos) Moderator: Prof Oana Driha, Lecturer and researcher at University of Alicante (Spain)
10.30	Coffee Break & Networking with REACT Units
11.00	Climate Change Research – Plenary session: “Adapting societies in the Lower Mekong River Basin Region to Climate Change” • <i>Principes Legibus Solutus Est Sovereignty, Eco-Politics, and Climate Change in the Lower Mekong Basin Region</i> - Fabio Calzolari, Mae Fah Luang University (Thailand) • <i>Making the Mekong: Adaptation and Mitigation in light of climate change</i> – Rebecca Anne Verzola, University of the Philippines Diliman (Philippines) • <i>Climate change adaptations to cities in Mekong Delta Vietnam</i> - Hanh Vu, University of Architecture in Ho Chi Minh City (Vietnam)
12.30	Lunch
13.45	Climate Change Research – parallel sessions #4 • Economic Development, Politics and Legislation in Climate Change • Agriculture III • Climate Change and its Challenges for Urban Planning, and Tourism in the Mekong Delta
15.45	Coffee & networking

16.15

Closing Panel Discussion- “*Climate Change in the Lower Mekong River Basin region: What do we know and what needs to be done?*”

Panellists:

- Prof. Ho Long Phi - Specialist researcher, Centre for Water Management and Climate Change, Viet Nam National University in Ho Chi Minh City.
- Prof Nguyen Hong Quan - Director of Research Centre for Climate change (Ho Chi Minh City, Vietnam)
- Dr Le Anh Tuan - Vice director of Research Centre for Climate change in Mekong Delta (Can Tho, Vietnam)
- Prof Pham Xuan Da - Chief of Department - National Agency of Southern Region, Ministry of Science and Technology (Vietnam)

Moderator: Dr.Ngo Tung Duc - Lecturer and researcher at Hue University of Agriculture and Forestry (Vietnam)

Prof. Chung Hoang Chuong - Professor, Asian American Studies, City College of San Francisco - Specialist on Southeast Asian American Issues, multicultural studies, vietnamese in the US - as translator

17.30

Closing remarks

Sat. Sept. 21st
OPTIONAL CLIMATE CHANGE EXCURSION

08.30

CAN GIO BIOSPHERE RESERVE AND RESEARCH CENTRE

Meeting point: TBD

Departure: 07.30

Return: 13.00

Cost: 810,000 VND/person (including lunch), to be paid at Conference during Registration (previous inscription via email required)

PARALLEL SESSIONS

Climate Change Research – Parallel Sessions #1

Agriculture I Venue: Room A001, Building A, USSH	
Thur. 19/09 10.45- 12.30	• <i>Efficient and Sustain Leafy Vegetables Cultivation Technologies; Case study of Pok Choi Cultivation</i> - Bou Bunthi, Royal University of Agriculture (Cambodia) • <i>Effects of plant growth-promoting rhizobacteria (Rhizobium sp. NBT625) and (Burkholderia sp. NPD721) on green onion</i> - Tran Thi Giang, BiRDI (Vietnam) • <i>The Efficiency of Plant Extracts for Antifungal Activity Caused by Aternaria solani on Tomato (Solanum lycopersicum)</i> - Eam Sreynich, Royal University of Agriculture (Cambodia) • <i>Observed and projected climate change in Cambodia: a synergy of satellite-derived dataset analysis with local farmers' perception</i> - Sophea Tim, Royal University of Agriculture (Cambodia)

Water I Venue: D102, Building D, USSH	
Thur. 19/09 10.45- 12.30	• <i>A Comparison of Hydrological Model for Assessing Impact of Climate Change in a Tropical Catchment</i> - I Putu Santikayasa, Bogor Agricultural University (Indonesia) • <i>Assessment of Land-use/ Land-cover LULC and Climate change Impacts on future precipitation trends in the Srepok River Basin</i> - Muhammad Touseef, Guangxi University (China) • <i>The impacts of sea level rise on estuarine and river water salinity</i> - Johana Ataupah, University of New South Wales (Australia) • <i>Analysis of impacts of climate change and land-use change on water resources in the 3S (Sesan, Sekong, and Srepok) River Basin</i> - Dao Nguyen Khoi, VNUHCM University of Science (Vietnam)

Transformation of Production and Consumption systems Venue: B006, Building B, USSH

Thur.
19/09

10.45-
12.30

- *Energy Efficiency and Climate Change Mitigation in Cambodia* - Tim Samnang (University of Heng Samren Thnongkhmom, Cambodia)
- *Sustainable consumption and production* - Amal Haddouche, Institut Euro-Méditerranée en Science du Risque (France)
- *Potentials of producing solar energy on buildings' roof in district 1, fHoChiMinh City connect to the grid* - Nguyen Thi Van Ha (University of Natural Resources and Environment, Vietnam)

Climate Change Research – Parallel Sessions #2

Agriculture II Venue: D102, Building D, USSH

Thur.
19/09

13.45-
15.30

- *Adoption behaviour of climate smart agriculture (CSA) among farmers in the Mekong Delta, Vietnam* - Luu Tien Dung, Lac Hong University (Vietnam)
- *Cropping the future. Climate Change Adaptation at multiple temporal and spatial scales in Lao PDR* - Saysongkham Sayavong, DALaM, Ministry of Agriculture and Forestry (Lao PDR)
- *Some solutions to use agricultural land adapting to climate change in the Mekong Delta* - Pham Phuong Nam, Vietnam Academy of Agriculture (Vietnam)
- *Impact of climate change on sustainable agricultural land use in Vietnam's Mekong Delta.* - Ngo Thi Phuong Thao, National Economics University (Vietnam)

Climate Change Impacts on Society and Livelihood I Venue: D201, Building D, USSH

Thur.
19/09

13.45-
15.30

- *“River” (novel) and Some Works of Nguyen Ngoc Tu about Mekong River Delta in the Vision of Ecocriticism* - Tran Le Hoa Tranh, HCM-VNU-University of Social Sciences and Humanities (Vietnam)
- *Adaptive behaviours to saline intrusion of rice farmers in Ben Tre province, Vietnam* - Ngo Thi Thanh Truc, Can Tho University (Vietnam)
- *Impacts of climate change on artisanal fishing and social implications in coastal communities in Central Vietnam* - Huynh T.A. Phuonga, Hue University of Agriculture and Forestry (Vietnam)

Climate Change Research – Parallel Sessions #3

Water II Venue: D102, Building D, USSH

Thur.
19/09

16.00-
17.45

- *The probability of disease occurrence in aquaculture sector under climatic events effects: Evidence from shrimp farms in Mekong* - Ngan Thi Thanh Le (Nha Trang University, Vietnam)
- *Impact of climate change on aquaculture land use in coastal communes of Thua Thien Hue province* - Le Ngoc Phuong Quy (Hue University of Agriculture and Forestry, Vietnam)
- *Integration of micro-watershed management to tackle climate change in rural Cambodia* - Siveun Nhak (FAO, Cambodia)
- *Challenges in sustainable use and management of Phuoc Hoa irrigation water sources: Looking from communities in Tan Bien and Duc* - Lê Thị Mỹ (Southern Institute of Social science, Vietnam)

Climate Change Impacts on Society and Livelihood II Venue: D201, Building D, USSH

Thur.
19/09

16.00 -
17.45

- *Assessment of climate change adaptability of livelihood models implemented in Tra Vinh province, Vietnam* - Nguyen Thanh Tuu (Tra Vinh University, Vietnam)
- *Women and Urban Climate: The Initial Surveys about the Impacts and the Coping Strategies of Flooding in Can Tho City, Vietnam* - Ly Quoc Dang, Chiang Mai University (Thailand)
- *Societal adoption of infrastructure projects: Tracking the implementation of fresh-water policy in the Mekong delta* - Nguyen Hong Quan (Center of Water Management and Climate Change, Vietnam)
- *Livelihood Adaption and Migration under Impact of Climate Change in the Southwest Region of Việt Nam* - LE Thanh Sang, SISS Southern Institute of Social sciences (Vietnam)

Climate Change Research – Parallel Sessions #4

Economic Development, Politics And Legislation In Climate Change Venue: D102, Building D, USSH

Fri.
20/09

13.45 –
15.45

- *Developing climate change legislation and related instruments: challenges Thailand is facing* - Chacrit Sitdhiwej, Thammasat University Faculty of Law (Thailand)
- *Climate Change Mitigation in Mekong Delta and International Cooperation between Japan and Vietnam* - Megumi Sakamoto/Nguyen Xuan Quynh Nhu, University of Fukushima/Hoa Sen University (Japan/Vietnam)
- *Challenges of global warming to Vietnam's development in the next decades* - Nguyễn Mậu Hùng, University of Sciences, Hue (Vietnam)
- *Climate change impacts on developing sustainable livelihood of rural households in Mekong Delta* - Lam Tran Dinh, Ho Chi Minh City University of Social Sciences and Humanities (Vietnam)

Agriculture III Venue: D201, Building D, USSH

- | | |
|---|---|
| <p>Fri.
20/09
13.45 –
15.45</p> | <ul style="list-style-type: none"> • <i>Drought impact on paddy land use change in urban agricultural area: A case study in Hoa Vang district, Danang city, Central Viet</i> - Tran Thi Phuong, HUAF (Vietnam) • <i>Detection and Management of Tomato Leaf Curl Virus (TLCV) by Using Plant Extract Species to Control Disease Severity and Disease Incidence</i> - Bunseng Lam, RUA (Cambodia) • <i>Simulation of Climate Change Impact on Lowland Paddy Rice Production Potential in Savannakhet Province, Laos</i> - Boulidam Somkhit, NUOL (Laos) |
|---|---|

Climate Change and its challenges for urban planning, and tourism in the Mekong delta Venue: D202, Building D, USSH

- | | |
|---|--|
| <p>Fri.
20/09
13.45 –
15.45</p> | <ul style="list-style-type: none"> • <i>The level of sustainable tourism development of the intensive ecological area in climate change context. A case study</i> - Le Thi To Quyen, Can Tho University (Vietnam) • <i>Climate Change and Adaptive Strategies in Sustainable Cultural Tourism in Luangprabang Lao</i> - Souksamone Sengchanh, Souphanouvong University (Laos) • <i>Social vulnerability assessment in the Saigon Dong Nai Sustainable Flood risk Management Project</i> - Ha Bui Thi Minh, Ho Chi Minh City University of Social Sciences and Humanities (Vietnam) • <i>Risk Assessment of The Vam Thuat River Water Quality for Safety Water</i> - Luong Quang Tuong, NTT-NTT Hi-Tech Institute (Vietnam) |
|---|--|

5. KEYNOTE SPEAKERS

LE ANH TUAN, PhD.



Dr. Le Anh Tuan has been working at Can Tho University since 1982 and currently holds the position of Senior Lecturer at the College of Environment and Natural Resources. He also is the Vice Director of the Research Institute for Climate Change – Can Tho University, Vietnam. **Dr. Tuan** has many years in teaching and research in the fields of Water Resources Planning and Management, Environmental Engineering, Natural Disaster Prevention and Preparation,

Hydrology and Meteorology. **Dr. Tuan** is currently a coordinator of the Mekong River Delta Network for Environmental Protection and Climate Change Adaptation (MekongNet). He is also a member of the Executive Board of Vietnam Rivers Network (VRN). **Dr. Le** will present a keynote speech titled *“An Overview on Climate Change Challenges and Adaptation in the Mekong River Delta of Vietnamese”*.

CHRISTIAN DE PERTHUIS, PhD.



Christian De Perthuis is Professor of Economics at Paris-Dauphine University and Head of the Climate Economics Chair. He started his career in the agricultural sector, went on to work in leading French research and forecasting institutes and headed the “Mission Climat” of Caisse des Dépôts between 2004 and 2008. He created the Climate Economics Chair of Paris Dauphine University in 2010. His research focuses on the economics of climate change and ecological transition. Author of several articles and books (including *Economic Choices in a Warming World*, Cambridge University Press, 2009), he is co-author of *Carbon Pricing* (Cambridge University Press, 2010) and *Green Capital* (Columbia University Press, 2015). He chaired the «Green Tax Commission », which helped the French Government to introduce a domestic carbon tax in 2014. He is also the author of a novel (*Le complot climatique*, L'Harmattan, 2015) **Dr. De Perthuis** will present a keynote speech titled “*Global warming and economic development*”.

6. PANELS

Panel 1: Supporting Climate Change Research & Education in Southeast Asia

This first panel will be an opportunity for researchers to interact with representatives from different agencies who support climate change research and education in the region. The aim is to raise awareness on the channels available for institutions in Southeast Asia to get this support and to find out more about what kind of actions are of interest to donors and the mechanisms to reach out and participate in these types of initiatives.

Moderator: Prof. Oana Driha, Lecturer and Researcher at University of Alicante (Spain)

Panelists:



Prof. Ho Long Phi

Ho Long Phi, PhD, is former director of the Center for Water Management and Climate Change - Viet Nam National University in Ho Chi Minh City (HCMC). He has been the Vice Chairman of the Steering Committee of Flood Control of HCMC (2006-2009) and then become the Senior advisor of the Steering Center of Flood Control Program HCMC (2009-2017), Director of the Project

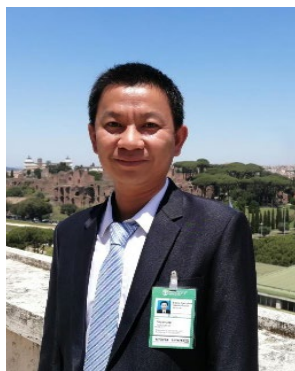
granted by Dutch government on Integrated Strategy of Flood-Inundation Management for Ho Chi Minh City (2011-2013). He has been a member of the Viet Nam Government Advisory Panel for Climate Change (VPCC) since 2015. He has been also leader of many

research programs for eco-hydrology (Sai Gon Dong Nai basin) and Socio-hydrology (Mekong delta) and urban flood management projects of Viet Nam. He has been retired since 2017.



Dr. Christian Hartmann

Christian Hartmann is a soil scientist interested in the sustainable management of cultivated tropical soils. After a PhD at the ‘Université Pierre et Marie Curie’ (1991), he entered as a researcher at the ‘Institut de Recherche pour le Développement’ (IRD) which is under the double umbrella of the French ministries of Research and of Foreign affairs. He started his career in West & Central Africa and in the French West Indies; in 1999 he moved to South East Asia. He has lived a total of 12 years in Laos and Thailand and developed institutional collaborations with universities and research institutes of both these countries. He is highly involved in the Global Soil Partnership from FAO, participating to several working groups of the Global Soil Laboratory Network. Currently he is also collaborating with the NUOL Faculty of Agriculture to launch a new master degree and PhD.



Mr. Saysongkham Sayavong – DALaM, Ministry of Agriculture and Forestry (Laos)

Saysongkham Sayavong is the head of GIS Unit and head of the component 2 of the Strengthening Agro-Climatic Monitoring and Information Systems (SAMIS) to improve adaptation to climate change and food security in Lao PDR at the Department of Agricultural Land Management (DALaM), Ministry of Agriculture and Forestry (MAF).

Since 2002 -2010, he started his career in management of sloping land, farming system, soil survey and soil sampling, mapping of soil and land use/land cover, soil improvement, land suitability evaluation, and land use planning for agriculture and forestry under National Agriculture and Forestry Research Institute (NAFRI), MAF. In 2012 he moved to the DALaM, his work focuses on participatory land use planning at different levels, GIS tools, mapping, data analysis, and land suitability evaluation for crop and tree plantations. Land use and land cover change by using remote sensing and GIS technologies. Soil survey, soil sampling, soil classification, and improving of soil map of Lao PDR using World Soil Classification System. He is highly involved in the SAMIS project in charge of Land Resource Information Management (LRMIS) and Agro-Ecological Zoning (AEZ). He is strongly provide the agricultural information, and land use information for the system Lao Climate Services for Agriculture (LaCSA).

Panel 2: Climate Change in the Lower Mekong River Basin region: What do we know and what needs to be done?

The closing panel of the conference will be an interdisciplinary-multi-prospective discussion with the aim of summarise the main findings of the conference and create an overarching discussion that can reflect the status quo of R&D in climate change in the region, its main obstacles and the future prospective: what can be expected? What is the position of the government? What are the future actions needed to improve the situation? what have been learned and can be done better?

Moderator: Dr. Ngo Tung Duc, Lecturer and Researcher of International Project at Hue University of Agriculture and Forestry (Vietnam)

Panelists:



Prof. Ho Long Phi

Ho Long Phi, PhD, is former director of the Center for Water Management and Climate Change - Viet Nam National University in Ho Chi Minh City (HCMC). He has been the Vice Chairman of the Steering Committee of Flood Control of HCMC (2006-2009) and then become the Senior advisor of the Steering Center of Flood Control Program HCMC (2009-2017), Director of the Project granted by Dutch government on Integrated Strategy of Flood-Inundation Management for Ho Chi Minh City (2011-2013). He has been a member of the Viet Nam Government Advisory Panel for Climate Change (VPCC) since 2015. He has been also leader of many research programs for eco-hydrology (Sai Gon Dong Nai basin) and Socio-hydrology (Mekong delta) and urban flood management projects of Viet Nam. He has been retired since 2017.



Prof. Nguyen Hong Quan – Director of Research Center for Climate Change (Ho Chi Minh city, Vietnam)

Dr. NGUYEN Hong Quan is currently associate professor at the Vietnam National University – Ho Chi Minh city (VNU-HCM), leading a research group on socio-hydrology at center of Water management and Climate Change (WACC), Institute for Environment and resources (IER), VNU-HCM.

Dr. Quan studied in the Netherlands (M.Sc, post-doc) and Germany (PhD) and obtained expertise in environmental hydrology studies using hydraulic/hydrologic/GIS/RS/

Geo-sciences modeling techniques. He has been working in water related issues (e.g. saline intrusion, flood, water pollution) in Southern Vietnam over the past 15 years. During his career, he has been involved in numerous projects in which representatives from both academic and government officers were presented. This provided him with skills and networks regarding bridging the gap between the scientific development and practical implementation. He has a special interest in trans-disciplinary study and thus he has a strong academic collaboration research network in Vietnam and abroad, especially from Australia, Cambodia, Germany, Japan, Korea, Philippine, Thailand, the Netherlands and the US as well as with different stakeholders in Vietnam. **Dr. Quan** has published numerous papers at (inter-)national journals, conferences/workshops including 25 ISI/Scopus indexed articles.



Dr. Le Anh Tuan – Vice director of Research Center for Climate Change in Mekong Delta (Can Tho, Vietnam)

Dr. Le Anh Tuan has been working at Can Tho University since 1982 and currently holds the position of Senior Lecturer at the College of Environment and Natural Resources. He also is the Vice Director of the Research Institute for Climate Change – Can Tho University, Vietnam.

Tuan completed his Bachelor of Engineering in Water Management and Land Improvement at Can tho University, Vietnam in 1982 and Master of Engineering in Water Resources Engineering at Asian Institute of Technology, Bangkok, Thailand in 1990. He finished PhD. in Applied BioSciences and Engineering, specialized in Environmental Hydrology at Catholic University of Leuven, Belgium. In 2012, Dr. Tuan was official recognized as an Associate Professor in Earth Sciences of Can Tho University.

Dr. Tuan has many years in teaching and research in the fields of Water Resources Planning and Management, Environmental Engineering, Natural Disaster Prevention and Preparation, Hydrology and Meteorology. Recently, he has participated in research projects involved Climate Change and Adaptation in the Mekong River Delta.

Dr. Tuan is currently a coordinator of the Mekong River Delta Network for Environmental Protection and Climate Change Adaptation (MekongNet). He is also a member of the Executive Board of Vietnam Rivers Network (VRN).



Mr. Nguyen Manh CUONG, Deputy General Director – Agency for Southern Affairs of Ministry of Science and Technology (ASA-MOST), Vietnam

Mr. Nguyen Manh Cuong has more than 20 years of experience in research, starting as a computer software developer in Institute of Microelectronics Technology (IMET) and promoted to IMET's board of director in 2004. He moved to the National Center for Technological Progress (Nacentech) in 2008 to take the position as the Director of Head Office and served as a Vice President from 2011 to 2018. From August 2018 until now, he has worked for ASA-MOST as Deputy General Director.

7. ABSTRACTS

The abstracts are hereby presented following the order of presentation as in International Conference, therefore please refer to the programme in the previous pages in order to find the abstract of your interest.

KEYNOTE I: An Overview on Climate Change Challenges and Adaptation in the Mekong River Delta of Vietnamese

Le Anh Tuan¹

¹ Research Institute for Climate Change – Can Tho University, Vietnam;
E-mail: latuan@ctu.edu.vn

Keywords: Climate change; Challenges and Adaptation; Mekong River Delta; Suitable farming systems

The Mekong River is the longest river in the South-East Asia Region. It is an important transnational river flowing from the Northern Tibet Plateau to the East Sea after passing Yunnan Province of China and Myanmar, then Laos, Thailand, Cambodia and Viet Nam. The Lower Mekong River Region, has rich abundant with in water, biological and mineral resources natural resources of a population of 60 million people living in the Lower Mekong Basin.

The Mekong River Delta in Vietnam (also referred to as “MD”) is the most downstream part of the Mekong River Basin connecting the river streams and the East Sea via many river mouths and estuaries. Thanks the diversity of hydrological conditions and the rich ecosystems, MD becomes the biggest agriculture and aquaculture production region of the country. However, the Mekong River Delta is facing many challenges due to the risks of climate change and sea

level rise that could lead the change of seasonal water resources regimes and cause negative impacts livelihoods, argo-aquaculture production and ecosystems for the whole Delta and people. Future climate projection from regional climate model indicates that the Mekong River Delta region tends to be warmer in the future with longer and drier summertime. Seasonal pattern could be altered under influence of global warming. The phenomena of increasing temperature, abnormal rainfalls, floods, droughts, tropical storms and sea level rise will cause the vulnerabilities to all sectors, that its typical delta ecosystems values will be destroyed quickly more than temporal area degradation. Climate change will create a crisis of water resources to the Delta that negative leading the food security and affecting the livelihoods of many rural vulnerable farmers groups.

The local people in the Mekong River Delta have developed many suitable farming systems based on their indigenous knowledge systems with the technical and financial supports of scientists, government agencies and other Non-Government Organizations to mitigate and to adapt to the change of local climate. This presentation summarize the fieldwork surveys and discussions with different rural livelihood groups, to recognize and to evaluate the adaptability of the agriculture sector in different agro-ecological zones for finding reasonable coping models with climate change impacts. The study also suggested policy improvements for creating incentives in the long-term sustainable development for the region.

AGRICULTURE I

Efficient and Sustain Leafy Vegetables Cultivation Technologies; Case study of Pok Choi Cultivation

Bunthi B¹, Borarin B², Karen L², CHINMENG Sophannara², Kong T², Trexler C², Miller D², Young G², Hill J², Sarong G²

¹ Faculty of Agronomy, Royal University of Agriculture, Phnom Penh, Cambodia; E-mail: boubunthi@gmail.com

² Division of Research and Extension, Royal University of Agriculture, Phnom Penh, Cambodia

Keywords: Net Low-tunnel

This study is aimed to build up a model of combination of efficient and sustain vegetable cultivation technologies for safe and efficient vegetable production. Notable smart agricultural technologies such as Dripping Irrigation System, Solar Pumping System; which are really useful for modern agriculture with less labor and utilization of renewable energy, Vermicomposting; which is a significant technology in provide nutrient input to the soil, and last but not least, Low-Tunnel in combination with Net (Net Low-tunnel) help to prevent water loss, pest, and disease incidence. Above combined technologies (CTM) is implementing in experiment field with comparison with Common Cultivation Method (CCM), and Net house Cultivation Method (NHM) as in Randomized Completely Block Design (RCBD) for one factor, in which we expect to seek for safe and efficient production model for vegetable, in a case study on Pok Choi cultivation. As the result, there has shown less significant different on quality parameters. However, CTM has shown its commercialized characteristic in economic analysis in which we could conclude that implement CTM method provide chance to farmer; mostly women, to be able to generate income, and spend less time.

Effects of plant growth-promoting rhizobacteria (*Rhizobium* sp. NBT625) and (*Burkholderia* sp. NPD721) on green onion

Tran Thi Giang¹, Le Thi Kim Ngan, and Cao Ngoc Diep

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Keywords: biofertilizer, green onion, plant growth-promoting rhizobacteria

Chemical fertilizers cause many health problems as well as directly affect the surrounding environment (soil and water). In particular, overuse of chemical fertilizers has emitted gases (N₂O) causing climate change. Therefore, biofertilizer is becoming a trend for agricultural development; it not only ensures health for consumers but also contributes to the protection of the living environment. In this study, the effect of plant growth-promoting rhizobacteria (*Rhizobium* sp. NBT625 and *Burkholderia* sp. NPD721) was evaluated on green onion (*Allium fistulosum*) under greenhouse conditions. Four different treatments, i.e. no fertilizers, chemical fertilizers only, biofertilizer only, and half dose of chemical fertilizers combined with biofertilizer, were conducted with triplicates. The results showed that the use of a combination between biofertilizer and a half dose of chemical fertilizers gave no significant difference in crop productivity compared to the full recommended dose of chemical fertilizers. Besides that, the increase of the total nitrogen, soluble phosphate, as well as organic content in the soil was shown when using the treatment of combination between biofertilizer and a half dose of chemical fertilizers. More important, nitrate in green onion significantly decreased around four times in that treatment compared to the treatment using full chemical fertilizers. Therefore, the combination of biofertilizer and chemical fertilizer could be a good practical technique for reducing the risk of environmental pollution, ensuring human health and economically.

The Efficiency of Plant Extracts for Antifungal Activity Caused by *Aternaria solani* on Tomato (*Solanum lycopersicum*)

Eam Sreynich¹, Ong Socheath¹, Tho Kim Eang², Chea Leangsrn³

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² Division of Research and Extension, Royal University of Agriculture, Phnom Penh, Cambodia

³ Faculty of Agronomy, Royal University of Agriculture, Phnom Penh, Cambodia

Keywords: *Aternaria solani*, Neem, Garlic, Papaya, Plant extract

Using plant extract is a method to minimize disease development and it is also an eco-friendly product which safes to environment and human health. The present study examined a new control with a low toxicity to environment and human under the experiment “The Efficiency of Plant Extracts for Antifungal Activity Caused by *Aternaria solani* On Tomato (*Solanum Lycopersicum*)”. The objective of this experiment is to study the efficiency of different plants extract to control on early blight disease under field condition. The experiment was conducted in Royal University of Agriculture arranged in Randomized Completely Block Design (RCBD) with four replications. There are four treatments such as T0: Control, T1: Garlic (*Allium sativum* L.), T2: Pawpaw (*Carica papaya*), T3: Neem (*Azadrachta indica*). Data were collected on disease severity, disease incidence, day of flower 50% and 100%, plant height, fruit weight, marketable yield, yield loss and total yield. The data was analyzed through ANOVA and LSD in statistic8 program. For data collection on disease severity and disease incidence, control treatment was the highest during week3 and week 4 with 70.75%, 57.5%, 87.5% and 100%, respectively at (P-value <0,01), while *Allium sativum* L., *Carica papaya* and *Azadrachta indica* were no significantly different. *Carica papaya* was found the most effective to increase 100% flowering and plant height than T1, T3 and T0 at (p≤0.01). For marketable yield and total yield were signif-

icantly different at ($P\text{-value} < 0.01$) which T2 illustrated the highest number of marketable yield and total yield with 1052.8g and 1071.3 g, respectively. There was no significantly different in yield lose among four treatments. Based on the demonstration of result, using plant extract is able to reduce the application of chemical fungicide. Plus, it minimizes the risk to environment.

Observed and projected climate change in Cambodia: a synergy of satellites-derived dataset analysis with local farmers' perceptions

Tim Sophea¹, Sok Pheak¹, Navin Chea^{1,2}, Be Gechkim¹, Lay Nary¹ and Kim Soben^{1,2}

¹ Centre for Agricultural and Environmental Study, the Royal University of Agriculture, Cambodia; E-mail: stim3993@gmail.com

² Graduate School, the Royal University of Agriculture, Cambodia

Keywords: Climate change, observed climate change, climate change projection, local perception, Cambodia

Although climate change has been of critical concerns affecting several development sectors of Cambodia, research on historical and future climate change remains limited. This study aimed to investigate the observed and projected climate trends in Cambodia by synergising an analysis of satellites-derived climate datasets with local people's perceptions. The investigated climate parameters are monthly temperature and daily precipitation (mainly rainfall), derived from Climatic Research Unit of the University of East Anglia (CRU TS4.02 covering 1901-2017; 0.25 degree) and APHRODITE (1901-2015; 0.25 degree) respectively. The climate change projections were based on the Representative Concentration Pathways (RCPs) of greenhouse gases concentration scenarios adopted by the IPCC's Fifth Assessment Report – RCP4.5 and RCP8.5, generated in two different periods of short-term (2026-2050) and long-term (2085-2099), compared to the baseline period of 1975-2005. Local people's perceptions on climate change were collected through interviews of over 200 individual farmers and 11 focus group discussions (FGD), conducted in five different provinces of Cambodia. Results from the satellite data reveal that many parts of Cambodia saw an upward trend in the average annual temperature since the last three decades, with a magnitude between 0.1 and 0.2°C. Rainfall patterns varied spatially throughout the country. The projection

of RCP4.5 indicates that the average temperature over Cambodia is likely to increase by some 1.94°C in the short-term and 2.85°C in the long-term against the baseline level. The figures are higher with RCP8.5, at 2.25°C and 4.05°C respectively. In both scenarios, the future rainfall is projected to be drier in dry season and wetter in rainy season. These observed and projected trends align substantially with the perceptions of local farmers, with consensus views both from the individual interviews and FGD: it has been hotter and seasonal rainfall patterns have varied significantly over the last decade. To conclude, information from people on the ground provides robust insights, powering satellite data analysis.

WATER I

A Comparison of Hydrological Model for Assessing Impact of Climate Change in a Tropical Catchment

I Putu Santikayasa¹, Muh Taufik¹, Retno W. Widowati¹

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Keywords: Hydrological model; climate change; impact assessment; tropical watershed

Tropical regions are among the most vulnerable to possible hydrological climatic changes impact and therefore the hydrological modeling development and climate change scenarios over the regions can provide the important information for developing the suitable mitigation and adaptation options. Impacts on hydrology and also water resources are normally investigated using modeling approaches, in which climate projections from multiple climate models are used as the inputs to multiple hydrological model, under different greenhouse gas emission scenarios. While the goal is generally to investigate the relevance changes in climate for the water availability water cycle and also hydrological extremes, it is often the case that variations in other components of the hydrological model obscure the effect of climate scenario variation. Therefore, evaluation of hydrological model uses on impact assessment are very important. In this study, we compared different hydrological models to assess the impact of changing climate on hydrological extreme especially flood vulnerability in Cimanuk Watershed, one of the tropical watershed in Indonesia. Two models were used namely topographic wetness index (TWI) and Indonesian national standard flood mapping (BSN). We assessed the flood extent and flood vulnerability using the both models. The models were calibrated and validated using the observation data on the period of 1990-2010.

The flood extent during the period of simulation were simulated. Our results showed that TWI approach is better prediction flood extent because TWI includes the topographic and land parameters to assess the flood. In addition, the TWI is able to capture the most important surface parameters which are impact on the flood in the area. Overall, this study indicates that the major weakness of all hydrological model is their poor representation of land and flow parameters on simulating the flood extent for assessing the flood vulnerability.

Assessment of Land-use/ Land-cover LULC and Climate change impacts on future precipitation trends in the Srepok River Basin

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Keywords: Climate change, Land-use/Land-cover, CMIP5, Precipitation, Water stress

Water resources in Asian countries are currently under severe stress. The stress is due to anthropogenic changes. Land-use Land-cover LULC changes is the key factor inter-linked with climate change impacts on water resources. It is of great importance to understand the impacts of these changes on hydrological processes for sustainable water resources management. Population growth and urbanization increases the LULC changes which in turn influences hydrological processes. This study focused on Srepok River Basin and analysed the high resolution LULC data (1995,2005,2015) developed by European Space Agency (ESA). Considering this LULC, statistically downscaled Global Circulation Models (GCMs) participated in coupled Model inter-comparison Project phase 5 CMIP5 data for RCP-4.5 and RCP-8.5 scenarios historical period (1970-2000) and future (2020-2050) to assess the precipitation trends and surface run-off. The results reveal that surface run-off will likely to be increase with inclined trends in future rainfall. LULC change is found to have slightly impacts on hydrological processes. The frequency of extreme precipitation events will increase and subsequently level of water stress will rise in dry season.

The impact of sea level rise on estuarine and river water salinity

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Keywords: Estuaries, climate change, sea level rise, salinity, salt intrusion

Located at the interface between coastal rivers and the sea, estuaries are where the freshwater from the upland catchments mix with the marine saltwater, and hence are extremely important in determining the extent of salt intrusion to the course of freshwater. With sea levels around the world are expected to continue increase at an accelerating rate in the face of climate change, the balance between the two sources of waters mix in estuaries are likely to undergo significant changes and so the salt distribution, possibly causing water scarcity to the upstream water usage (e.g. agriculture, industry, domestic). The impact on the freshwater streams will vary considerably between estuary systems, with no two systems are alike, due to the highly dynamic and diverse features, and the local pressures across estuaries. This paper presents a modeling study conducted to simulate the saltwater intrusion consequent to changes in sea level in the Hunter River estuary in New South Wales, Australia. The salinity mixing processes between seawater and river water in the tidal pool are simulated under several scenarios of different sea levels using a two-dimensional hydrodynamic model and the extent of saltwater intrusion to the inland river is analyzed. The potential impacts on, and the capacity of the model to aid decision-making relating to dealing with climate change threats to, water supplies are discussed.

Analysis of impacts of climate change and land-use change on water resources in the 3S (Sesan, Sekong, and Srepok) River Basin

Dao Nguyen Khoi¹, Pham Thi Loi, Nguyen Thi Thuy Trang

¹ Lecturer, Faculty of Environment, VNUHCM University of Science; E-mail: dnkhoi@hcmus.edu.vn

Keywords: Land use change, climate change, SWAT model, streamflow, water quality

Assessing water resources under the influence of environmental change have gained attentions of scientists. The objective of this study was to analyse the impacts of land use change and climate change on water resources in terms quantity and quality in the 3S basin in the period 1981-2008 by using hydrological modelling (SWAT model). The results show that streamflow and water quality (TSS, T-N, and T-P) tend to increase under individual and combined effects of climate change and land use change. In addition, the impact of land use change on the flow is smaller than climate change impact. However, water balance components and water quality are equally affected by two factors of climate change and land use change. In general, the results of this study could serve as a reference for water resource management and planning in the river basin.

TRANSFORMATION OF PRODUCTION AND CONSUMPTION SYSTEMS

Climate Change Mitigation through Energy Efficiency (EE) in Cambodia

Tim Samnang¹, Jutidamrongphan Warangkana²

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² Faculty of Environmental Management, Prince of Songla University, Thailand

Keywords: Climate Change, Energy Efficiency, GHGs mitigation

Particularly, it was characteristically recognized that energy production contributes to majority of CO₂ emissions, there are other important contributing activities, including transportation and agriculture in 2014. Although Cambodia's CO₂ emissions (at 1.96 Mt-C in 2013) are currently very low compared to other countries like Thailand (60.2 Mt-C in 2013). However this is expected to increase follow by raising GDP and energy consumption. Consequently Cambodia's total energy consumption is forecast to increase from 6.00 Mtoe in 2013 to 14.29 Mtoe in 2040, at an average annual rate of 3.3% (Kimura & Phoumin, 2016). (EMC, 2017). At the end of 2017, the EAC reported that the total domestic installed capacity was 1,878 MW, of which 980 MW (52%) was hydropower, 564 MW (30%) was coal-fired, 295 MW (16%) was diesel, 29 MW (less than 2%) was biomass, and 10 MW (less than 1%) was solar. Over 92% of this capacity is owned by IPPs, 6% is owned by EDC, and the rest is owned by other licensees. (ADB, 2018). The campaign of energy efficiency (EE) measures can consider as green growth approach for entire country that will consequently contribute to GHGs mitigation. National energy efficiency policy 2018-2035 was drafted and under review by Ministry of Industries, Mines, and energy. This aligned with EE objectives. The Nationally Determined Contribution (NDC) provide

saving energy strategies by means of 1) promotion EE for building, 2) improving operation and maintenance technologies for transportation vehicles, 3) Adopting EE for garment and significant industries, and 4) promoting EE by end users. The benefit of EE beyond climate change mitigation could be estimated through cost savings for consumers (households and businesses), support energy security for the country, including contributes to government priorities for innovative technologies with higher quality. Therefore, EE is the significant strategy for Cambodia’s sustainable development.

Potentials of Producing Solar Energy on Building's Roof in District 1, Ho Chi Minh City Connected to Power Grid

Nguyen Thi Van Ha¹, Vu Phuong Thu, Nguyen Tam Thanh

HCMC University of Natural Resources and Environment, Vietnam; E-mail: ntvha@hcmunre.edu.vn

In Vietnam, Ho Chi Minh City (HCMC) is considered one of the provinces with great potential to develop the solar industry. However, due to limited land fund, the development of solar power in Ho Chi Minh City is not feasible for large-capacity power plants, but mainly consider focusing on development and applying solar panel system for buildings (households, apartment buildings, city administrative centers), this is one of the strengths of HCMC.

In order to develop the advantages of solar power production on the roof of buildings in HCMC, the topic “Survey and evaluate the potential of producing solar energy on building's roof in District 1, HCMC by using grid connected solar power system” is conducted to target buildings with economic potential as well as meeting the criteria to roof selection. Study identified 27 potential buildings over 63,000m², equivalent to the potential solar energy output is more than 40 MWh/day

Promoting the production of roof solar power to contribute to supplying electricity to the national electricity network, solving future electricity needs, using clean and renewable energy and reducing the effects of climate change is an important approach for smart and sustainable city development.

Sustainable Consumption and Production

Amal Haddouche¹

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Eco-Design or Design for Environment (DfE) is both a principle and an approach. It consists of integrating environmental aspects over a service or a product lifecycle. “The main goal is to anticipate and minimize negative environmental impacts while keeping the product’s/service quality level according to its ideal use”.

Eco-Design emerges increasingly as an important pathway to sustainable development in the business sector.

This work presents the Eco-Design approach and attempts to contribute to a better understanding of:

- Internal and external drivers for Eco-Design in companies regarding environmental, economic and social aspects (Corporate Social Responsibility: CSR);
- The main steps required to introduce Eco-Design activities in business;
- The Eco-Design Methodology (ex. Overview of the lifecycle Assessment and the Product Carbon Foot Print).

The presentation introduces the practical relationship between Eco-Design and the Circular Economy. Concrete examples from Cambodia, Lao and Vietnam in connection with Eco-Design and Circular Economy can illustrate the concern of these countries regarding the Consumption and Production sustainability.

For Cambodia, it refers to a recent study on the topic of “sustainable construction”. It provides the current state of drivers and barriers; attempts to identify the key steps towards an Eco-Design in this sector.

Regarding Lao, the presentation focuses on the challenges facing the mining sector: impacts on the natural resources, waste discharge, chemicals and hazardous substances in rural areas...while needing to continue its leading role in economic and social development of the country.

And Finally on the basis of the last report jointly prepared by Hanns Seidel Foundation and ASEM SMEs Eco-Innovation Center (Asia-Europe Meeting Small and Medium Enterprises), the presentation gives an overview of the current status regarding the Consumption and Production activities seen from sustainability angle and how far this sustainability needs to be extended to the market organization and product logistics/distribution channels.

Agriculture II

Adoption behaviour of climate smart agriculture (CSA) among farmers in the Mekong Delta, Vietnam

Luu Tien Dung¹

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Keywords: Sustainable agriculture development; behavior science

Adoption of climate smart agriculture (CSA) of farmers will guarantee for increasing income, providing quality agricultural products for the society, preserving the tolerance limits of agriculture ecological environment. This study analyses the factors affecting the adoption behavior of CSA of farmers based on multinomial logit model. A primary data sample was obtained basic of structured interviews with 420 rice farmers in the Mekong Delta, Vietnam. The findings of the study indicate that farmers are more likely to have an adoption of CSA when they have better favorable resources, including (i) human capital; (ii) farm size; (iii) social capital; (iv) extension access; and (v) financial capital. The study provides theoretical foundation for policymakers in promoting the adoption of CSA among farmers in Vietnam.

Cropping the future. Climate Change Adaptation at multiple temporal and spatial scales in Lao PDR

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Keywords: Sustainable agriculture development; behavior science

The project “Strengthening Agro-climatic Monitoring and Information Systems (SAMIS) to improve adaptation to climate change and food security in LAO PDR” is increasing decision-making and planning capacity for the agricultural sector at national level and at the decentralized and farmers’ scale in Lao PDR. Its objective is to enhance capacities to gather, process, analyse, and share climatic and geospatial information so that these can be applied to planning and decision-making.

As the farmer and decentralized scale, the project has already reach its target of building the infrastructure and a comprehensive agro-climatic monitoring and information capacity focused on boosting sustainable production by optimizing farmers and small-holders resilience against climate change. The system Lao Climate Services for Agriculture (LaCSA) is functional and provides daily collected data and forecast information, automatically connected data from the automatic and manual stations, and connectivity of all existing historical data used to interpolate seasonal forecast. In addition, the system provides two innovative products which are a provincial seasonal bulletin covering the entire country updated on a

monthly basis (end of every month) and a weekly bulletin (beginning of every week) with recommendations on rice productivity and pest and disease for six pilot locations. The field level testing is happening through diffusion of weekly information by radio, village speakers, and by organizing multiple types of farmers groups and Farmer Field Schools.

At the national and policy level, detailed future prevision of crop distribution and productivity as well as socio-economical acceptability of farming and cropping systems that will results due to the impact of climate change is analyzed. The project will enable policy and decision makers to access detailed future prevision of crop distribution and productivity as well as socio-economical acceptability of farming and cropping systems that will results due to the impact of climate change (for example, in 100 years' time). By the end of the project, the results will enable the integration of climate change scenarios into national agriculture policies, plans and programmes data.

Some solutions to use agricultural land adapting to climate change in the Mekong Delta

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The research presents a number of theoretical issues about climate change, agricultural land, agricultural land use in the context of climate change and international experience in agricultural land use when global warming and typhoons, sea level rise, salinity, erosion, agricultural land area decrease. In particular, the research in depth studies the impact of climate change on agricultural land use in some localities in the Mekong Delta region. Some solutions to using agricultural land to adapt to climate change include the use of agricultural land associated with smart agriculture in the context of the Fourth Industrial Revolution; reduce intensive farming, increase quality, increase value through processing and value chains, reaching high value markets; see saltwater and brackish water as resources to make the best use of these resources; change plant structure to reduce fertilizer, increase product value; change the purpose of land use; technical investment in production, industrial development for agriculture in the green, clean and sustainable direction; developing domestic and international agricultural markets; strengthening cooperation between farmers, traders and the state.

Impact of climate change on sustainable agricultural land use in the Vietnam's Mekong Delta

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Keywords: Climate change, agricultural land use

The paper aims at analyzing and assessing the impact of natural phenomena caused by climate change on the quantity and quality of land use for agricultural production, in order to proposed solutions to manage the sustainable agricultural land use for livelihood, planning and agricultural production development. The analysis impact method with the data collected in the field of land use, climate change, socio- economics indicators at province level for the period of 2015-2019 will be used to deal with land loss by inundation, salinization, planning for better land management and land use agricultural development in Vietnam's Mekong Delta area.

With a convenient geographic location, favorable natural resources, the Mekong Delta owns various advantages for sustainable development, especially in the context of international economic integration. However, since the Mekong Delta, as a region, locates in the downstream of the Mekong River, borders with the East Sea (on the east) and the Gulf of Thailand (and on the west), it faces with many disadvantages and constraints in natural conditions. The region is clearly affected by the impact of unpredictable climate change with the sea level rise and salinity intrusion, as well as from the activities happened in the Mekong River upstream.

Therefore, to ensure sustainable socio-economic development in the Mekong Delta, effective land use measures are needed to adapt to climate change.

CLIMATE CHANGE IMPACTS ON SOCIETY AND LIVELIHOOD I

“River” (novel) and Some Works of Nguyen Ngoc Tu about Mekong River Delta in the Vision of Ecocriticism

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Keywords: Nguyen Ngoc Tu. Literature. Mekong River Delta. Ecocriticism

Mekong river delta is a biggest delta of Vietnam, and in fact, this is a rich and potential developing region of South East Asia in general and Vietnam in particularly.

However, Mekong river delta now has effected strongly by the climate change and the neglect of government in protect the environment here.

Many writers in the South depict in their works about the harmfulness of climate changes to people and environment here.

Nguyen Ngoc Tu is a well known female writer of Vietnam, especially in the South. Most of her works are concentrated in life and situation of people at Mekong river delta, in both negative and positive sides when the economic changes comes to villages and the people here face with the challenges that they can not earn their living by farming.

This article will focus on “River”, the famous novel of Nguyen Ngoc Tu and several other works of her bases on ecocriticism theory. This is the important method to discover the risks, the challenges and the necessary to save the environment of Mekong river delta.

Adaptive behaviors to saline intrusion of rice farmers in Ben Tre province, Vietnam

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Keywords: adaptive behavior, contingent valuation method, saline intrusion, Ben Tre, Mekong Delta

Saline intrusion has significantly affected rice production in the Mekong Delta, Vietnam. A survey of 360 rice farmer respondents in six communes in Giong Trom and Ba Tri districts, Ben Tre province, Vietnam with different levels affected by saline intrusion was conducted to investigate how the farmers made choices for their livelihood strategies in 2019-2025 and 2026-2030. Using the Contingent Survey-Based Approach, three sea level rise scenarios developed by Ministry of Environment and Natural Resource of Vietnam in 2016 were introduced to respondents before asking their choices. The results show that with the low increase in sea level rise scenario, more rice farmers intended to change their livelihood strategies in 2026-2030 than in the period of 2019-2025 of three scenarios. Shifting to more tolerant rice varieties and adaption of rice farming techniques are the most preferable strategies chosen by farmers to adapt to saline intrusion in both 2019-2025 and 2026-2030 periods. Shift to coconut plantation and combination of rice and other farm activities was their second choices and engaging in agricultural and non-agricultural hired labor and renting or selling their land are third choices. Male respondents, percentage of rice income over total household income, influence and supports from the community in both knowledge transfer and finance are significant factors that can speed up the process of adapting livelihood strategies to saline intrusion in Ben Tre province, Vietnam.

Impacts of climate change on artisanal fishing and social implications in coastal communities in Central Vietnam

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Keywords: fishery, climate change impacts, social consequences, sustainability

Climate change as a real global threat has been increasingly affects the lives and livelihoods of population throughout the world, in which coastal communities are among the most vulnerable. This paper attempts to explore social dimensions of climate change impacts on traditional fishing in two coastal communities in Central of Vietnam.

Using a mixed qualitative and quantitative research approach, it found that climate variables have been both observed and perceived to be increasingly changing toward severity and variation. In such changing climate context, local household well perceived a growing decrease in or disappearance of fish species and shell-fish resources within their local fishing area as well as increasing damage of their fishing boats and equipment. In other side, big fishing boats from nearby regions are evidently reaching local offshore zone for fishing with no resistance from local households. As a result, fishing production and revenue were increasingly decreased at local household level.

In responding to adverse impacts of climate change, local households developed a wider range of measures to sustain their traditional livelihood and income. Within fishing, electric fishing equipment and new fishing nets capturing all sizes of fish species were most used. Besides, local households diversified their livelihoods toward local self-employment, local hired labor work and mostly internal

migration for waged jobs. Those measures were perceived to less or more bring economic benefit for households but implied negative consequences on natural resource base and family structure as well as community development.

The findings of the study stressed the need for more appropriate measures to adapt to adverse impacts of climate change at both local and policy levels for the sustainability of natural resource base and of family and community development.

WATER II

The probability of disease occurrence in aquaculture sector under climatic events effects: Evidence from shrimp farms in Mekong region, Vietnam

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Keywords: disease occurrence, logistic regression, white leg shrimp, machine learning methods, extensive, intensive production system

This study developed logistic regression and multiple analyses of machine learning approach to predict of the probability of disease occurrence in white leg shrimp (*Penaeus monodon*) aquaculture under the impact of self-reported drought, saline water intrusion and water cross pollution. Analysis was performed separately for two different production systems: extensive and intensive shrimp farms from a survey of 437 Vietnamese farmers at Mekong region. The input explanatory factors include farming site characteristics, farming practices, farming infrastructure, climatic events and taken adaptive measures will be examined in explaining the predictions. The result emphasizes that Bayesian logistic regression is selected as the best model in predicting the disease occurrence. The key findings revealed that the water cross pollution, the change to another kind of production systems (polyculture) aquaculture were identified as risk factors that significantly increased the higher chance of disease occurrence in extensive farms. While, the longer duration of farming crop in drought weather may help to reduce the disease outbreak in extensive farms. In terms of intensive production system, the results highlight that the major contributors such as the seed supplied by well-known input suppliers; farms located in upper stream of water source or belonged to planned shrimp area, as well

as intensive farmers who applying the aquaculture good practice for farming activities management and having a change in adjusting stocking density that are less likely to have shrimp disease's occurrence.

Impact of climate change on aquaculture land use in coastal communes of Thua Thien Hue province

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Keywords: Aquaculture land, climate change, impact, land use

This study was conducted in Phong Dien district, Thua Thien Hue province, to assess the effects of climate change on the land use of an aquaculture. The three coastal communes of Dien Huong, Dien Loc and Phong Hai have the largest area of aquaculture land in Phong Dien district, which was selected as the study site. The research has used a combination of secondary data collection methods, direct interviews with 60 households and in-depth interviews with 5 relevant staffs. The results show that climate change greatly affects the use of aquaculture land, such as the area of aquaculture land decreased by 2.97 ha / year on average, increasing desertification; 57.8% of households believe that unseasonal rainfall seriously affects the use of aquaculture land. The paper has suggested some solutions to use aquaculture land in an economical and effective way to cope with the climate change situation in the study area.

Integration of micro-watershed management to tackle climate change in rural Cambodia

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Keywords: Adaptation; mitigation; food security; micro-watershed; livelihood; in-stream; in-slope

Climate change represents a serious threat to Cambodia's development as it continues to adversely affect agriculture, fisheries, water resources, ecosystem services, social and economic development. Micro-watershed management is increasingly seen as a critical approach in developing a suitable land use and livelihood strategic to adapt and mitigate the impacts of climate change and ensure ongoing food security of small-holder farmers. Micro-watershed management includes various activities to improve the understanding of local community so that they can sustainable manage their use of natural resources. To achieve long term commitment, we developed a multi-stakeholder bottom up platform to ensure local community engagement in dialogues that built a shared understanding about the micro-watershed management approach. This addressed common issues of most significantly on social/cultural, economic and ecosystem values in order to reduce the climate vulnerability in of the community. Two activities were demonstrated as mechanisms to reduce vulnerability and enhance. They included: 1) In-slope intervention associated with forest restoration, which enforcing community forest legalization and management, improved soil management through sustainable agriculture, enhanced land cover and vegetation, and livelihood development; and 2) In-stream intervention, which focused on in-stream structures for purpose of water conservation (i.e. check dams, drop structures), water storage (i.e. small to medium ponds, mini-dams) and water off-take or harvesting

structures (i.e. small weirs, offtake canals) to slow water and flood peak movement through stream with the aim of increasing water infiltration to recharge the groundwater aquifers. It is evident that the piloted measure and practices and optimization of small-scale instream structures had multiple benefits for the people and environment. They have strengthened adaptive capacity and built the resilience of ecosystems and people to prepare for and reducing the water stress with the potential impacts and risks of climate change.

Challenges in sustainable use and management of Phuoc Hoa irrigation water sources: Looking from communities in Tan Bien and Duc Hoa irrigation area, in Tay Ninh and Long An provinces

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Keywords: Sustainable management of water resources, Phuoc Hoa irrigation

Using and managing sustainable water resources in the context of global climate change becomes urgent at both national and local. This article argues that the challenges in the process of use and aims at sustainable resource management today by analysing data household survey conducted in 2017-2018 of 4 communities in Tan Bien and Duc Hoa irrigation areas, in Tây Ninh and Long An provinces.

Phuoc Hoa Irrigation has brought a new and different appearance to the picture of agricultural economy in communities. Thus, in Duc Hoa irrigation area, people have gradually changed their habits in irrigation and irrigation water use instead of drilled wells; Crop structure changes, crops and crop yields increase. The method of taking water from people in both irrigation areas is also very diverse (using pumps, self-flowing, installing water pipes, cutting holes, ...), so it is necessary to aim at a way to get water suitable for the context local to ensure sustainability in water use.

There is still a relatively high proportion of agricultural households using water from drilled wells and not yet having access to irrigation water. Therefore, the implementation of construction of intra-field canal system here becomes urgent but also faces barriers in policy, community participation, consensus among people - people, people - authorities local,...

CLIMATE CHANGE IMPACTS ON SOCIETY AND LIVELIHOOD II

Assessment of climate change adaptability of livelihood models implemented in Tra Vinh province, Vietnam

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Keywords: climate change; adaptation; livelihoods; Vietnam; Mekong Delta; agriculture; farming

Tra Vinh is an important agricultural production area of the Vietnamese Mekong Delta, but its economic development is being heavily affected by climate change. This study used a set of 14 indexes to assess the climate change adaptability of 24 livelihood models (that is, cultivation, livestock, and aquaculture) in Tra Vinh province in order to find livelihood models with the greatest adaptability. The adaptability was calculated using relevant parameters including weighted scores, raw data points, and mean points of each model. Calculations show that two models have great adaptability, twenty models have relatively pretty good adaptability, two models have normal adaptability, and no models have low adaptability. These successful models can be applied to farmers in Tra Vinh province and attention needs to be paid to economic issues such as capital or market when implemented.

Women and Urban Climate: The Initial Surveys about the Impacts and the Coping Strategies of Flooding in Can Tho City, Vietnam

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Keywords: vulnerable women; women’s experiences; women’s knowledge; women’s participation; urbanisation; flooding; Can Tho

This paper is to understand the impacts and coping strategies differently from flooding by urbanization and climate change to women in three different community of Can Tho City. The economy Integration, industrialization and modernization, and climate change have been transforming many impacts to Can Tho City. Urbanization and climate change- flooding have been creating urban population worse. Women are one of the vulnerable groups from those issues, especially urban poor women and women who are more intersections in family and society. This research discusses that among women have different experiences in flooding management in their families and communities which base on their social, economic and environmental characteristics. Owing to their different experiences, women create the knowledge and achievements differently which use their participation and relationships to other groups in the society. This research presents that women have impacted from flooding which based on their differences of social, economic and environmental backgrounds. However, this research shows that different impacts do not make different coping strategies from women. The author uses ethnography studies including survey, observation, in-depth interviews, field notes in seven research sites to 75 different respondents and 12 relevant stakeholders.

Societal adoption of infrastructure projects: Tracking the implementation of fresh-water policy in the Mekong delta

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Keywords: Sustainable Livelihood; Mekong Delta; MOTA; plan implementation; Social – ecological resilience

Mekong delta is one of the most focused deltas in the world given its dynamics and complexity. In the past decades, the Mekong delta has changed rapidly together with the socio – economic development of Vietnam. The Mekong delta is facing with multiple threats which are not only inside the delta but also from external factors (e.g. up-stream hydrological development, national/international market changes). To proper govern the Mekong delta, especially under the (uncertain) climate change, requires a thorough understanding these complexity and a holistic perspective in decision making processes. In order to solve these problems, a Motivation and Ability framework (MOTA) is proposed to assess the implementation feasibility of various cases considering both social and institutional perspectives. The framework was applied to three cases in the Vietnamese Mekong Delta: (1) the adoptability of livelihoods transformation in Ben Tre province, (2) the institutional enabling and constraining conditions to make it happen, and (3) the evaluation of an on-going policy to convert to fresh water livelihoods based on a historical case of Ba Lai

sluice gate. These case studies cover different stages of the policy cycle and different relevant groups of actors on a plan development. They were developed through surveys, group interviews and focus group discussions. The three cases show how the MOTA framework can serve as a decision-making tool that helps to determine the gaps planning and implementation given wide ranges of motivations and abilities among stakeholders.

Livelihood Adaption and Migration under Impact of Climate Change in the Southwest Region of Việt Nam

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Keywords: Climate change, livelihood, adaptation, resilience, migration

Impacts of climate change are becoming more apparent in the Southwest region of Vietnam, where the ecosystem is closely linked to agricultural production of most people. Livelihood adaptation is the basic strategy of households to respond to climate change based on mobilization and integration of diverse resources, and migration is part of this strategy. Based on perspective of human ecology and method of casual loop diagram for survey results of 2,100 households in 7 Southwestern provinces, the article explores and discusses the mechanism of impacts of climate change and other socio-economic factors on livelihoods, livelihood adaptation, and migration, and livelihood resilience of households. Our findings show that climate change increases risks of disease, productivity, and product quality; increases production costs; and thus, reduces income. Levels of vulnerability and adaptability of livelihoods depend greatly on resources of households, but livelihood resilience is limited. Climate change is not a direct factor that has a strong impact on migration but has an indirect impact and is increasing in interaction with other factors. This article also outlines some policy implications regarding livelihood adaptation, migration and livelihood resilience in the Southwest region.

KEYNOTE II: Global Warming and Economic Development

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Over the four years 2015-2018, the planet's surface temperature was 1.1°C higher than the pre-industrial average. A new all-time record, which reduces the window of time available to keep within the 1.5°C / 2°C target. Global CO₂ emissions again increased in 2018. COP-24, held in Katowice in the very heart of coal-mining country, did not provide any impetus to speed up action to reach the targets of the Paris agreement on climate.

While some still question the reality of climate change, successive events, as the rainforest fires in Brazil, show that its impacts are already being felt. In Asia, many delta areas like the Mekong Delta, are highly vulnerable to the sea level rise and the monsoon system stems from complex mechanisms being studied by climatologists. Their models point to increasing intensity of rains resulting from global warming. Given the Greenhouse Gases (GHG) stock already in the atmosphere, these impacts will hit harder in the coming decades, even if the GHG emissions decrease rapidly.

To tackle climate change issues, policies should combine adaptation and mitigation policies. The adaptation policies aim at increasing the resilience against global warming impacts. In tropical countries, it seems strategic to move towards agricultural practices which reduce GHG emissions and develop food production in harmony with the forest protection. This is a main target which contributes both to adaptation and mitigation. The latest IPCC report on agriculture and forestry reminds us that developing agroforestry is an important way to move toward carbon neutrality and to improve food safety in the future.

Energy transition is the cornerstone of mitigation policies, because two third of the GHG emissions in the world come from fossil fuels. Today, more than 80 % of primary energy use in the word comes from coal, oil and natural or shale gazes. This proportion has to be reduced very rapidly, especially in Asia where fossil fuel use continues to increase. The drop of the production costs of renewable energies and of electricity storage makes it possible to find substitutes for fossil sources at large scale. This substitution will be much easier with the help of efficiency policies aimed at reducing energy consumption. The key of the energy transition in the world is now in fast growing economies, especially in Asia, which could show to the rest of the world how to combine improvements in energy access with the reduction of fossil fuel use. In other word, to disconnect economic development of fossil fuel addiction.

Facing Climate Change Impacts with highly specialized training: the approach at the University of Genova.

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In the last years the sensitivity towards the problems related to climate change has certainly grown. Therefore, the demand for applied research on the subject has grown, especially about the impact on people, societies and economic activities. It is well known that the main problem connected with climate change, as said recently also by a leading Italian climatologist, dr. Provenzale, is not so much the survival of our planet, but the survival of the current socio-economic system, which can be heavily undermined through an increase in climate-change related social, economic and natural risks.

It is therefore necessary to significantly shift the focus of research on climate change towards potential impacts on human activities of all kinds.

This, however, immediately generates a series of difficulties for the researcher as building future scenarios sufficiently reliable to support high-impact socio-economic decisions by governments still presents a series of uncertainties that limit their practical use. Uncertainties especially related to the need of greater knowledge on all the physical, economic and social processes involved.

To cite some examples: the construction of future scenarios requires a reliable knowledge of the past, on which the validation of climate models must be based, knowledge that is often incomplete. The reconstruction of the climate and meteorology of the past therefore requires specialized skills on past and modern observation systems, on the treatment of large databases, on the statistical interpretation of information; on the other hand the interpretation of the future cli-

matic scenarios provided by the global models requires knowledge of climatic weather modelling; and, last but not least, the translation of climate forecasts into social and economic impacts requires the ability to build reliable risk scenarios.

It therefore appears clear that, to adequately address these uncertainties, a demand for knowledge is generated which involves many different disciplines, that are supposed to start a fruitful dialogue.

To date, in Universities and higher education institutions, training courses for professionals capable of managing climate-change related risks with the necessary interdisciplinary knowledge are not yet sufficiently widespread. These courses should provide essentially engineering skills, based on the knowledge of physical processes, on technologies for processing and transmitting information. Finally, these professionals should be also adequately sensitive to the social aspects of managing climate-change related risks.

However, universities or university consortia generally possess the necessary skills for the formation of the specific professional figure. The ability to model complex systems, knowledge of physical processes, social dynamics and communication, and technologies for city management can be contained in different departments of different universities. Steps are therefore needed towards interdisciplinary collaboration between them in order to build the training paths necessary for the research needs on climate change.

The talk aims to show, through practical examples, first of all why the need for an innovative and interdisciplinary training course arises, if one wants to adequately address the study of climate change impacts at national and regional level. And then how the University of Genoa tried to provide an answer to these needs, setting up a training course for engineers experienced in managing natural hazards.

PLENARY SESSION: “Adapting societies in the Lower Mekong River Basin Region to Climate Change”

Princeps Legibus Solutus Est: Sovereignty, Eco-Politics, and Climate Change in the Lower Mekong Basin Region

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Keywords: Sovereignty, Climate Change, Democracy, Lower Mekong Basin Region

The research addresses the relationship between climate change, and state sovereignty in the lower Mekong Basin Region. On the one hand, it investigates how the loss of viable eco-systems is rendering classic notions of statehood, inadequate. On the other hand, it analyzes how South East Asian countries try to defend their normative self-organization, and territorial integrity despite the loss of natural resources. Because conditions continue to decline at an impressive rate (e.g. degradation of freshwater supplies in Laos, and fishing reservoirs in Thailand), identifying existing processes, and next steps in improving human “connectedness with nature” (CWN) should be a political priority. To shed some light, the author reviewed up-to-date literature from international relation theories, and environmental-ity. In addition, he linked place-based socio-ecological phenomena with influences that are transboundary in scale, to trace impacts on the micro- (local) and macro- level (global). Finding suggest that global warming threatens Westphalian sovereignty. And that policy makers are either unprepared or unwilful to cope with a potential paradigm-shift. The above-cited can be seen on the lack of an effective International Environmental Law (IEL), and the absence of true settlement mechanisms on liability claims. In that regard, the Xaya-bouri Dam disaster emerged as one of the most relevant examples of how societies can jeopardize the future (e.g. destruction of carbon

sinks in wetlands, and displacement of poor communities). Some recommendations are as follow: (1) Technology must be directed towards sustainable solutions; (2) Viewed broadly, there is a need to exercise massive public pressure to move beyond crystallized ideology, which implies that democratic functioning has to be kept alive in regions where the opposite seems to be true. Further study should focus on grass-root movements for green economy, political barriers to environmental adaptation, and the impact of dams on microclimates of the surrounding areas.

Making the Mekong: Adaptation and Mitigation in light of climate change

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The environment in Mekong Delta is severely being affected by harsher disasters, water pollution and natural resources depletion according to scholars. These permeating issues can be attributed to global climate change, hydropower development in the Mekong delta river course, and low environment awareness of the public. The annual flooding season in the region created impact on the natural resources as seen in the reduction of natural minerals of the soil particularly alluvium causing landslides; droughts and intrusion of saltwater as sea level rises; low economic projects that poses high risk of pollution; and rapid urbanisation, have created more problems in waste treatment and have made the Mekong Delta Basin vulnerable. As the “rice bowl” of Cambodia and Vietnam, the delta is essential for their food security and income. Managing these shared resources are vital in sustaining the Mekong Delta region particularly its water as a shared resource, through developing bilateral project supported by Mekong River Commission (MRC). This paper defines different adaptation and mitigations for climate change initiated by various sectors in the Mekong Delta region with reference to the agricultural geography of the area. It aims to explore the bilateral project on developing cross-border coordination mechanisms specifically in the joint management of shared water resources between Cambodia and Vietnam. This paper will contribute to the development of the Mekong Delta Basin as it provides assessment on the environmental, social and economic impacts of development and climate change.

Climate change and Cities in Mekong Delta - Viet Nam

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Climate change is no longer an environmental problem but rather attached to the development of all places in the world, especially those which are strongly affected.

Mekong delta region in Vietnam, like many other deltas in the world, has strong water-based characteristics, where living environment and ways of living strongly influenced by water, eventually receives worst impacts of climate change and sea level rise. Having important roles in economic development, food security and natural ecology of Vietnam, this delta has been received lots of international, national, and local attentions to research and propose ways to enable it to sustain from the impacts of climate change, to strengthen the roles and to maximize its potentials. The research ‘Development of climate change adaptabilities for cities in Mê Kông Delta’ is among those efforts.

Approaching from the urban morphology, this research is to understand different morphological layers of the delta at regional and cities levels how different urban morphological classifications affected by climate change, focusing on the flood and salinity impacts resulted by average projected future energy-related CO₂ emissions scenario.

From those above two analytical bases, the research proposes groups of adaptabilities from regional planning, urban planning and detailed planning solutions. Besides, structural and non-structural mitigations and adaptations, which focus on integrated water management and urban resilience to disasters and hazards, are also recommended in various scale and types.

AGRICULTURE III

Drought impact on paddy land use change in urban agricultural area: A case study in Hoa Vang district, Danang city, Central Viet

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Keywords: Drought, impact, paddy land use, urban agricultural area

Assessment of drought impact on changing of paddy land area are very important because this data can support policy-makers in paddy land use and water resources management. This paper has applied remote sensing and GIS technology to analyse the change of paddy land area in the period of 1997-2016 for Hoa Vang district, Danang city. The results show that paddy land area in all 11 communes of the district was fluctuating in decreasing pattern, with total area of 835.6 ha lost. Beside the factors of urbanization, income and policy, drought has been identified as one of the factor that have a strong impact on reducing paddy land area through stakeholder consultation methods and multivariate regression equation. The impact of drought on paddy land use change in temporal scale was calculated by Standardized Precipitation Index (SPI) from daily rainfall data collected of 4 actual observation stations and 4 simulation stations from remote sensing images during 20 years. The SPI calculated shows that drought occurred mainly in the Summer-Autumn crop season from May to August, of which drought occurred in almost communes of the district in June and July. The impact of drought on paddy land use change in spatial scale through spatial interpolation method. The drought was distributed in all 11 communes in Summer-Autumn season. The Summer-Autumn of the year 2002, 2006, 2010, 2011, 2015 and 2016 almost all drought occurs during 20 years. The most severe drought occurred in 2006 that effected

to 3736.2 ha of paddy rice land. The severe drought was occurred in 2010 with affect to nearly 500 ha of paddy rice land. The effect of drought on rice land in the district does not follow a certain rule, sometimes it occurs in the mountainous and midland areas but at other times concentrated in the flat areas.

Detection and Management of Tomato Leaf Curl Virus (TLCV) by Using Plant Extract Species to Control Disease Severity and Disease Incidence

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Keywords: Survey, TYLCV, Immuno-strip, Elisa

Currently, *tomato yellow leaf curl virus* has become the limiting factor for tomato production in many tropical and subtropical region of the world. This disease is induced by a number of begomoviruses, the type member begin *Tomato yellow leaf curl virus* (TLCV), transmitted by the Whitefly *Bemisia tabaci* who severe population outbreaks are usually associated with high incidence of the disease. In annual production losses in world tomato production yields as a result of disease average about 80%. On another hand, the farmer could not find a method without using chemical pesticide to control this pathogen in Kandal province. Due to this disease easily damaged in tomato growth and yield so it is the reason that I choose a topic of “ Detection and Management of Tomato Leaf Curl Virus (TLCV) by Using Plant Extract Species to Control Disease Severity and Disease Incidence”. Specifically, this study is to identify TLCV in both disease severity and disease incidence and comparative of efficacy of plant extract such as Neem, (*Azadirachta indica*, 4 O'clock flower (*Mirabillis jalapa*), Carnation Flower (*Dianthus Caryophyllus*) .This experiment was conducting in Koh Prak Village Phum Thom commune Kean Svay district Kandal province which has been damaged by TLCV symptoms in Tomato Farmer Field for sample collection . The sample will be collected on tomato plant have symptoms such as exhibited upward and inward rolling of the leaf margin and leaves are induced in size and stunned plants and the present of whitely

on the plants. Testing the pathogen by using the Immuno-strip and Elisa to confirm that the plant caused by the *tomato leaf curl virus*. Moreover, in this experiment also was conducted in Crop station at Royal University of Agriculture. The experimenting has 4 replications and 4 treatment and 4 pots and totally 64 tomato plants, T₁: Used for control, T₂: Neem, T₃: 4 O'clock flower, T₄: Carnation flower. First of all experimental was transplanting tomato seedling from tray to pot for planted from 3 weeks I had been put whiteflies for transmitted virus against. So that, the first data collection is recording to chlorophyll measurement for two times as well as before foliar plant extract and after foliar plant extract as one month. As the time TLCV showing symptom I was recorded for each 1 week to observing the disease symptom such disease incidence, disease severity, disease progressive curl. For crop component assessment I was recorded on plant height, marketable yield, and unmarketable yield. The data was prepared in Microsoft Excel and analyzed in Statistix 8, Chi-square for finding the significant differentiation in meaning value 95% and 99%. This is the first time that TYLCV has been detected in Cambodia and want to know their strain and cause agents.

Simulation of Climate Change Impact on Lowland Paddy Rice Production Potential in Savannakhet Province, Laos

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Keywords: Crop Simulation, climate change scenarios, rice yields, low land paddy rice, Savannakhet Laos

This study focus on two objectives which are 1) to estimate the impacts of climate change on rice production in a rice growing region of Savannakhet province and 2) to explore adaption options of local farmers to climate change.

To assess the rice yield potential under climate change conditions, the DSSAT CERES-Rice model was applied under three General Circulation Models (GCMs) such as CSMK3, HadCM3 and HadGEM with high and low climate sensitivity, respectively. The resulting six climate change scenarios were the base for the generated daily weather data input for the rice yield simulation of the 21st century (2001 to 2100). Three periods out of these 100 years were finally selected for comparison of the results (2001 to 2030, 2030 to 2065, and 2070 to 2100).

The results show that rice yield (of the same selected cultivar) under all six climate change scenarios will increase between +6.8% and +12.8% compared with observation years (1995 to 2009), mainly determined by increasing temperatures from currently sub-optimum level for the simulated cultivar TDK 1. However, if comparison between the three simulated periods, the second period (2035 to 2065) will reach the highest yields and in the third period (2070 to 2100) yields will not further increase. According to the results the rice growing period of the same cultivar will be shortened by approximately 5 to 14 days to between 134 and 143 days in average by the

end of the 21st century. Adaptation in rice farming practices may include cultivar change, soil preparing, sowing and transplanting date, weeding, timing and amount of fertilization. Farm technologies and cultivar breeding supporting local rice farming will be further challenges beyond the farm level to ensure or further increase rice production for future climate change conditions.

ECONOMIC DEVELOPMENT, POLITICS AND LEGISLATION IN CLIMATE CHANGE

Developing climate change legislation and related instruments: challenges Thailand is facing

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Keywords: climate change, Thailand, challenges, legislation

Climate change due to the man-made global warming has become more and more evidenced and recognised worldwide lately. Thailand is no exception. As a result, the Thai authorities, from the House of Parliament to the Council of Ministers, Ministries and other agencies, local governments, as well as the private sector and members of the public, have been alarmed of the seriousness of its adverse consequences. Various bodies even have put their efforts to help tackle the issue.

One of the major actions being undertaken in Thailand over the past few years includes attempts to develop certain legislation, e.g. climate change bills, emissions trading scheme bills and their subordinate instruments. However, in doing so, many stakeholders seem to face numerous challenges, from the basic issues, such as the appropriate knowledge and understanding of climate change and how to effectively tackle it, to the more complex difficulties, such as what legal measures should be introduced and how to effectively develop and implement them, from the national to the provincial and local levels.

This paper is aimed to highlight the aforementioned challenges Thailand is facing, certain actions that have been undertaken, and to discuss possible solutions, while seeking feedback from the readers.

Climate Change Mitigation in Mekong Delta and International Cooperation between Japan and Vietnam

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Eight years has already passed from the historically devastated atomic plant accidents in Fukushima. Three nuclear reactors had exploded and emitted huge amount of radiation world widely. The decommissioning of the melted down reactors is still on the verge of the procedures.

Vietnam decided to stop the import of atomic plants in October 2016. This resolution should be highly estimated. Vietnam Power Development Plan 7-A also shows that Vietnam can encourage to promote the Renewable Energy. COP 24 also urges to deal with the reduction of CO₂ emission to mitigate the climate change.

This presentation has two impacts. First is to convey the details of actual situations of Fukushima accidents now into Vietnam. This leads to the question, “How can we get the sustainable development and electricity without atomic plants in Vietnam?” Japan has improved the Renewable Energy technologies. This paper will show, for the first time, the way for Vietnam and Japan to help each other sharing these sophisticated RE technologies for the mutual development.

Second point is the renewable energy development in Vietnam. At present, wind and small hydropower are the largest share amongst all renewable energy sources. The first wind farms are located in Bac Lieu and Ninh Thuan provinces. After new policy that the Feed in Tariffs (FIT) of electricity from solar power plants is 9.35 US cents/

kWh for a period of 20 years. Solar energy projects attract more foreign investors. The government has approved more than 70 new projects, with a total capacity of over 3,000 MW. Some solar plants will operate in 2019. However, development of renewable energy in Vietnam face to many challenges include lack of financing, technical expertise of the local developers, and grid infrastructure quality.

Challenges of global warming to Vietnam's development in the next decades

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Vietnam has recently demonstrated the improving capacity of integration into regional orders and international systems, but simultaneously faced an increasing number of both internal and external issues which might result in serious outcomes for her emergence in the near future. One of such objective factors is global warming as part of climate change that Vietnam is predicted to be one of the most affected countries. This question has been a big issue of international public spheres and public concern of national forums, but it is still a neglected matter at lower levels and in practice of daily life. Improving awareness of the populace, enhancing ability of decision-makers, and renovating capacity of practice of the administration system are therefore one of the key answers to the urgent matters of global scale, especially in coastal countries. This effort is however in most cases not a question of Vietnam only. For this reason, international cooperation is expected to play an enormous part in finding solutions to the transnational problem. In combination with the quantitative and qualitative methods, the paper utilizes the statistical data of state offices, recordings of research institutions, and collected information from interviews to explore the alarming reality of understanding of popular strata on climate change, the problematic procedures of decision-making process on global warming, and the undoubted consequences that Vietnam suffers from this external element in the coming time if actions are not ready to be taken into practice. On this basis, the article aims to propose a system of solutions to the question in order to reduce the negative effects of global warming on Vietnam's development in the next decades, particularly the coastal regions such as Mekong Delta,

raise public awareness on the issue, renew the mechanism of decision-making process of functionaries, and upgrade implementation capacity of the system.

Climate change impacts on developing sustainable livelihood of rural households in the Mekong Delta

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Keywords: Climate change, Mekong Delta, Farmer household

Agriculture is the source of livelihood for 75% of the population in the Mekong Delta which is regarded as Vietnam's important rice granary. However, this is also the geographical area that is under intense pressure by Climate Change (CC). This research will focus on evaluating the impact of CC on the livelihood of farmer households in the Mekong Delta based on the Sustainable Livelihood Approach. This will help answer the research question of which resources, strategies, and external factors are considered as key factors for farmer household to maintain their livelihood in the long term process.

This paper also uses secondary data to sketch a general picture of the impact of CC on the livelihood sustainability of farmers in the Mekong Region. In addition, Probit model is also applied to analyze the data collected from 450 surveys of farmer households on their living strategy, selective behavior in order to measure and evaluate possible results.

Research's results indicate that human resources, natural resources, sustainable farming methods, microcredit, cooperation in agricultural production, diversity in means of livelihood and infrastructure are the principal factors that have direct positive influences on Delta community's livelihood. It also emphasizes on the policies that could be the key favorable conditions for farmers to adapt to more sustainable living methods given the current impact of climate change on the whole region.

CLIMATE CHANGE AND ITS CHALLENGES FOR URBAN PLANNING, AND TOURISM IN THE MEKONG DELTA

The Level of Sustainable Tourism Development of the Sensitive Ecological Area in Climate context – A case study at Mo O Beach, Tran Dai District, Soc Trang Province

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Keywords: Sustainable tourism development, climate change at coastal area, Mo O

The aim of this research is to analyse the level of sustainable tourism development of sensitive ecological area in the climate change context at Mo O beach, Soc Trang province. The study was conducted by quantitative methods by surveyed 121 respondents who are local people living in Trung Binh commune, Tran De district, Soc Trang province. It is revealed that there are 5 criteria groups which are assessed at good level, including: “socio-economic indicators”, “indicators of population, culture, management”, “indicators” on biodiversity”, “environmental indicators” and “satisfaction indicators”. Through Exploratory Factor Analysis, and Linear Regression Analysis results, there are four factors affecting the level of sustainable tourism development in sensitive ecological areas in climate context at Mo O beach namely “biodiversity (33.7%)”, “facilities – infrastructure (24.2%)”, “administration of government (23.6%)”, “people with environment (18.5%)”. Also, thereby proposing some solutions to develop tourism sustainable in climate change context of coastal area.

Climate Change and Adaptive Strategies in Sustainable Cultural Tourism in Luangprabang Lao PDR

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Keywords: Climate change, Cultural tourism, Cultural activity, Sustainable cultural tourism, Luangprabang

Adaptive strategy in Cultural tourism has been practiced by stakeholders such as the government, business owners, tourists, and also the local people in terms of cultural tourism activities. Drawing from the concepts of maintaining, conserving and preserving of resources and assets in cultural tourism faced by climate change which were effects in cultural tourism landscapes. Luang Prabang has been re-shaped and changed “authenticity” and “uniqueness” which is connected to the natural, historical culture. Local people become the main actor to make cultural tourism be more sustained as adaptation strategy in tourism in Luangprabang.

Social Vulnerability assessment in the Saigon Dong Nai Sustainable Flood risk Management Project

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Keywords: flood risk, vulnerability, vulnerability map

This paper presents a method for flood vulnerability mapping in large river basin, within the context of climate change. The Dong Nai river basin is Vietnam second largest watershed. Its population has always been affected to flooding. Nowadays, due to increase in population, land use and climate change flooding risk (seen here as the combination of exposure and vulnerability) has grown dramatically.

In order to reduce flood risks as well as their impacts on socio-economic developments and human life conditions in the Dong Nai Basin, a Sustainable Flood Risk Management (SFRM) project has been implemented. A central component of this project consisted of building a vulnerability map. The method that we used in order to conduct this mapping exercise is described and analyzed in terms of knowledge quality assessment.

One of the central challenge was to minimize data collection costs without compromising robustness and resolution. In order to raise to this challenge census data were combined with technique akin to rapid rural appraisal and scoring. Data were collected through surveys in both rural and urban areas in the Sai Gon – Dong Nai basin and in three typical provinces in Tay Ninh, Dong Nai and HCMC. A principal-component analysis of the data was conducted. We retained four factors that allowed for the construction of 4 synthetic indicators: demographic, physical, social and economic. Four vulnerability maps were built and applied for reducing flood risk and encouraging sustainable development. Lessons learned in the pro-

cess are shared in order to envision the application of this method to other large watersheds.

Risk Assessment of the Vam Thuat River Water Quality for Safety Water Supply to District 12, Ho Chi Minh City

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Keywords: Water Pollution, Organic Pollutants, Vam Thuat River

Vam Thuat River is the important water source for water supply in District 12, Ho Chi Minh City. This study inherits the primary research content and then we assess its pollution status and risks of those pollutants for water supply because its water quality may be degrading gradually. There were 10 water samples collected from upstream to downstream of Vam Thuat River from October 19th, October 26th, November 2nd and November 9th, 2017, basing on national technical regulation on surface water quality. Monitoring parameters include Temperature, pH, Total suspended solids (TSS), Chemical Oxygen Demand (COD), Ammonium-Nitrogen (NH₄-N), Nitrate-Nitrogen (NO₃-N), Phosphates (PO₄-P), Sulfate (SO₄) and Total Iron (Fe). Results of 10 samples repeating every week in this above period was calculated by an average to compare with a limit allowed for water quality in (QCVN 08: 2008). These results are higher the surface water quality in (QCVN 08: 2018). It was therefore concluded that the Vam Thuat River system heavily polluted by TSS, COD, NH₄-N, PO₄-P and urgent action to control urban pollution was required to protect this river system.

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