THA 2015 International Conference on
"Climate Change and Water & Environment Management in Monsoon Asia"

THA 2015

28-30 January 2015 | Swissôtel Le Concorde,

www.tha2015.org | Bangkok, Thailand

Executive Summary Report

Organized by

Preface

The THA 2015 international conference on "Climate Change and Water & Environment Management in Monsoon Area" was organised from January 28th to 30th, 2015 at Swissôtel Le Concorde, Bangkok. The organisers are the Thai Hydrologist Association (THA), the Faculty of Engineering Chulalongkorn University, Kasetsart University, Kampaengsaen Campus, Asian Institute of Technology, Royal Irrigation Department, Department of Water Resources, and the Thailand Research Fund. The main objective was to provide a platform for researchers, scientists, practitioners, and policy makers to share and present new advances, research findings, perspectives, and experiences in disaster, irrigation and water management. Special attentions were given to developing certain skills or competence, or general upgrading of performance ability for climate change adaptation, participatory water management, disaster and environmental management, and sustainable development in irrigation and drainage in the monsoon Asia. The conference brought together leading researchers, engineers, scientists, and officials in the domain of interest from around the world.

The THA 2015 international conference was successful according to the main objective of serving as the public assembly. Report on the background of the THA 2015 international conference was given by Dr. Subin Pinkayan, the President of Thai Hydrologist Association and followed by the opening speech given by His Excellency Mr. Ampol Senanarong, Privy Councillor. At this conference we had three keynote speakers, 268 Thai participants, 83 foreign participants from 15 countries including Cambodia, China, Denmark, India, Indonesia, Japan, Korea, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Taiwan, USA, and Vietnam. The three keynote presentations given by distinguished speakers who were invited to participate in the conference emphasized the connection between water security and food, academic collaboration to support planning and water and disaster management, and measures to deal with climate change after catastrophic flood in Thailand in 2011. There were 66 papers submitted and 48 papers were selected for presentation including 12 invited papers. The presentations were categorized into four themes as listed below:

A. Climate Change and Uncertainty in Hydrology and Meteorology
(4 invited papers and 16 presented papers)

The climate change issue with uncertainty was highlighted to see the impact to water resources and irrigation systems and to raise understanding and awareness about its impact to variation of hydrology and meteorology. The comparison of GCM data, the stochastic storm rainfall simulation were presented. The impact of climate change on basin water management, multipurpose dam operation and water resources policy framework were also discussed. Lastly the GHG from paddy field was investigated by DNDC simulation model to find the effect to climate change.

B. Participatory Management for Water and Irrigation Project
(3 invited papers and 7 presented papers)

The participation of farmers in the irrigation management system is vital in the present day. The relationship of irrigation water and farmer group in the levy system, the vulnerability of irrigation system according to water supply and demand were investigated. The studies on integrated water management and adaptation to climate change were also investigated such as changing of cropping pattern with consideration of ecosystem and economic. Besides the assessment of farmer participation in irrigation management in many countries such as Myanmar and Philippines were also presented.

C. Emerging Technologies in Water and Environment Management
(3 invited papers and 17 presented papers)

New emerging technologies such as satellite data, GA technique, ENSO index, I/O Table were introduced in the water and irrigation management. The change of water use resulting from climate change was also estimated and simulated. Besides, the introduction of automated irrigation system was also presented to find the optimum operation in the system.

D. Water Related Disaster Management
(2 invited papers and 8 presented papers)

Flood and drought are major threat to water resource management. Flood rule curve, flood plain management and flood monitoring using mathematical model and satellite data to reduce flood risk and flood damage were investigated. The drought monitoring using satellite data was also presented. In addition risk reduction of disaster was elaborated using monitoring system, institution and participation by stakeholder.

Apart from the presentations based on the above-mentioned themes, the ASEAN Academic Networking in Water & Disaster Management and Climate Change was organised in parallel to the THA 2015 international conference. The aim of the ASEAN Academic networking was to encourage further collaboration in research, to exchange knowledge and technology pertaining to disaster warning, management and recovery and to suggest appropriate policies that correspond to the increased severity of the climate change and natural disasters. The ASEAN Academic networking was divided into four sessions including planning and technical presentations, preparation for setting up a formal network and a technical training on "Satellite-based Rainfall (PERSIANN) for Planning and Management for Natural Disasters in Monsoon Asia. There were 7 and 9 invited presentations from ASEAN countries in the planning and technical sessions accordingly. Suggestion, recommendations, opportunities for further collaboration were discussed among ASEAN representatives and also shared from the views of 8 invited speakers from countries including China, Denmark, Japan, Korea, Taiwan, Thailand and international organizations which are ASEAN Secretariat and UNESCO-IHP. There were 6 ASEAN universities/institutions joining the poster exhibition including the Institute of Technology of Cambodia (ITC), the Institut Teknologi Bandung from Indonesia, the Laguna Lake Development Authority, the National University of Laos (NUOL), Yangon University and Chulalongkorn University.

At the end of the THA 2015 international conference, a summary plenary session presentation was given by Assoc. Prof. Dr. Bancha Kwanyuen, Dean of Faculty of Engineering, Kasetsart University, Kampaengsaen Campus followed by the formal announcement of the establishment of the ASEAN Academic Network made by Assoc. Prof. Dr. Sucharit Koontanakulvong, Department of Water Resource Engineering, Chulalongkorn University. The closing remarks were given by Dr. Subin Pinkayan, the President of Thai Hydrologist Association.

Major outputs obtained from the THA 2015 can be summarised below:

- Knowledge dissemination and exchange from the presentations. At this conference and workshop we had 3 guest speakers, 268 Thai participants, 83 foreign participants from 15 countries: Cambodia, China, Denmark, India, Indonesia, Japan, Korea, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Taiwan, USA, and Vietnam, 26 invited papers, 57 technical papers participated.
- Formal establishment of the ASEAN Academic Networking in Water & Disaster Management and Climate Change under the adopted Bangkok statement (see Appendix) after fruitful discussion among ASEAN academics and management.
- A technical training on "Satellite-based Rainfall (PERSIANN) for Planning and Management for Natural Disasters in Monsoon Asia
- Poster exhibition displaying water-related technologies, products and services from governmental agencies, universities, research institutions and private companies

Major outcomes are listed below:

- Creating an opportunity for being a coordinator in research and education regarding Water & Disaster Management and Climate Change which has already started.
- Presenting technologies and water management in Thailand to ASEAN and other countries outside ASEAN.
- Presenting water management plan applied to Thailand to international level to gain more confidence in investing in our country.

This document presents main conclusions from the THA 2015 international conference on “Climate Change and Water & Environment Management in Monsoon Asia”. Related materials that will be issued separately are the THA 2015 proceeding, a book titled “Current and Future on Water and Disaster Management and Climate Change in Monsoon Asia”, the Special Collection of THA2015 in Hydrological Research Letters (http://www.hrljournal.org/; ISSN/E-ISSN: 1882-3416, The Japan Society of Hydrology and Water Resources, and a PERSIANN training manual for Asia.

Lastly, we would like to take this opportunity to express our sincere gratitude to all participants for their contributions and support that driving the THA 2015 international conference toward the desired objectives and achievement.

The organisers of the The THA 2015 international conference on “Climate Change and Water & Environment Management in Monsoon Asia
February 2015

ASEAN Academic Networking in Water, Disaster Management and Climate Change – Bangkok Statement

We, Faculty Members / Researchers / Planners from the ASEAN working for water / environment / disaster management from the Kingdom of Cambodia, the Republic of Indonesia, the Lao People's Democratic Republic, Malaysia, the Republic of the Union of Myanmar, the Republic of the Philippines, the Republic of Singapore, the Kingdom of Thailand and the Socialist Republic of Vietnam, Member States of ASEAN, on this occasion of the THA 2015 **"Climate Change and Water & Environment Management in Monsoon Asia"** and **ASEAN Academic Networking in Water, Disaster Management and Climate Change;**

Resulting from an intensive and interactive process, the participants:

1. **Emphasized** developing joint research initiatives in areas identified as common concerns for members of ASEAN;
2. **Declared** their firm intention to work together to enhance the visibility and outreach of academic networking on water, disaster management and climate change issues in ASEAN Member States through a dedicated web site to contribute dissemination of national/regional news and reports;
3. **Committed** themselves as members of the academic network to convince their governments and policy makers to prioritize water resources related disaster management in the vent of climate change This may include contacting their planners and policy makers to secure possible funding from governments and other bilateral funding sources for pilot research with in their countries;
4. **Emphasized** an urgent need for an improved communication and exchange of research findings between and amongst the member states within ASEAN Countries, **Chulalongkorn University** has been requested to establish a communication mechanism that is efficient, frequent and dynamic. This may include an e-newsletter, and an e-discussion group;
5. **Underlined** the urgent need for ASEAN Secretariat and UNESCO Bangkok and other Offices in the regions to draw-up mechanisms for effective coordination as per the MoU Signed during Dec 2013;
6. **Called upon** UNESCO to allocate sufficient seed resources, and to assist this academic network to generate additional resources for their activities;

7. **Extended** special thanks and appreciation to our host " **Chulalongkorn University**", for the opportunity provided to attend and benefit from the International Conference on Climate Change and Water & Environment Management in Monsoon Asia and organising ASEAN Academic Networking in Water, Disaster Management and Climate Change along with this conference;
8. **Appreciated** the efforts of **Chulalongkorn University** initiating this academic network for linking national level research findings to regional level inferences;
9. **Requested Chulalongkorn University** to support this ASEAN Academic Network and may convert the same into UNITWIN Network under UNESCO Chair proposed by them
10. **Welcomed** all the member countries from ASEAN to work together to bring regional integration of research results in to policy to handle water related disasters created by climate change. Suggested upon formalising this network could induct members from other developing countries outside ASEAN in future.

Coordinators from ASEAN Institutions:

Country	Contact	Position and Institution	email
Cambodia	Dr. LY Sarann	Head of Department of Rural Engineering Institute of Technology of Cambodia (ITC)	ly.sarann@itc.edu.kh
Indonesia	Prof. Dr. Muhammad Syahril Badri Kusuma	Head of Research Division on Water Resources Engineering, Institut Teknologi Bandung	msbadrik@yahoo.com
Laos	Dr. Keoduangchai Keokhamphui	Lecturer, Water Engineering Department, Faculty of Engineering, National University of Laos	keoduangchai@gmail.com
Malaysia	Ir Mohd Zaki Mat Amin	Director, Water Resources and Climate Change Research Centre, National Hydraulic Research Institute of Malaysia	zaki@nahrim.gov.my
Myanmar	Dr. Hrin Nei Thiam	Director-General, Department of Meteorology and Hydrology	hnthiam@gmail.com
Philippines	Ms. Adelina C. Santos-Borja	Division Chief III, Laguna Lake Development Authority, National Ecology Center, PHILIPPINES	lennieborja@yahoo.com
Singapore	Prof. Shie-Yui Liong	Deputy Director, Tropical Marine Science Institute (TMSI), National University of Singapore (NUS)	tmslsy@nus.edu.sg
Thailand	Assoc. Prof Sucharit Koontanakulvong	Head of department of Water Resource Engineering, Chulalongkorn University	sucharit.k@chula.ac.th
Vietnam	Assoc. Prof. Duong Hong Son	Deputy Director General, Vietnam Institute of Meteorology, Hydrology and Environment	dhson@imh.ac.vn

Conference Organizing Institutes:

Thai Hydrologist Association

**Faculty of Engineering,
Chulalongkorn University**

**Faculty of Engineering at Kamphaengsaen,
Kasetsart University**

Royal Irrigation Department

Department of Water Resources

Thailand Research Fund

Asian Institute of Technology

Organizing Committee

Advisory Committees:

1.	Prof. Dr. Pirom Kamol-ratanakul, M.D.	Chulalongkorn University
2.	Assoc. Vudtechai Kapilakanchana	Kasetsart University
3.	Prof. Dr. Worsak Kanok-Nukulchai	Asian Institute of Technology
4.	Mr. Lertviroj Kowattana	Director General of Royal Irrigation Department
5.	Mr. Jatutorn Buruspat	Director General of Department of Water Resources
6.	Dr. Suthipun Jitpimolmard, M.D.	Director General of Thailand Research Fund
7.	Prof. Kuniyoshi Takeuhi	ICHARM, Japan
8.	Prof. Makoto KIMURA	Kyoto University, Japan
9.	Prof. Wei-Fuu Yang	President of PAWEES, Japan
10.	Dr. Ramasamy Jayakumar	UNESCO-IHE

Organizing Chair:

1.	Dr. Subin Pinkayan	President of Thai Hydrologist Association

Organizing Co-Chair:

1.	Prof. Dr. Bundhit Eua-arporn	Chulalongkorn University
2.	Assoc.Prof. Dr. Bancha Kwanyuen	Kasetsart University
3.	Dr. Thongplew Kongjun	Royal Irrigation Department
4.	Mr. Chaiporn Siripornpibul	Ministry of Natural Resources and Environment
5.	Asst. Prof. Dr. Chanatip Pharino	Thailand Research Fund

International Scientific Committees:

1.	Assoc.Prof. Dr. Bancha Kwanyuen	Kasetsart University
2.	Dr. Yutaka Matsuno	PAWEES, Kinki University, Japan
3.	Prof. Dr. SAYAMA Takahiro	ICHARM, Public Works Research Institute, Japan
4.	Prof. Dr. Yasuto TACHIKAWA	Kyoto University, Japan
5.	Prof. Kwansue Jung	Chungnam National University, Korea
6.	Dr.Fi John Chang	National Taiwan University, Taiwan
7.	Prof. Ke-Sheng Cheng	National Taiwan University, Taiwan
8.	Dr. Ailikun	Chinese Academy of Sciences, China
9.	Prof. LIONG Shie-Yui	National University of Singapore, Singapore
10.	Prof. Jiaguo Qi	Zhejinag University China, China
11.	Prof. Tissa Illangasekare	Colorado School of Mines, USA
12.	Dr. Ole Mark	DHI, Denmark
13.	Assoc.Prof.Dr.Sucharit Koontanakulvong	Chulalongkorn University
14.	Asst. Prof. Dr. Aksara Putthividhya	Chulalongkorn University
15.	Dr. Piyatida Hoisungwan	Chulalongkorn University
16.	Dr. Pongsak Suttinon	Chulalongkorn University
17.	Dr. Anurak Sriariyawat	Chulalongkorn University
18.	Dr. Yutthana Talaluxmana	Kasetsart University
19.	Dr. Sutat Weesakul	Asian Institute of Technology
20.	Dr. Sangam Shrestha	Asian Institute of Technology
21.	Dr. Somchai Chonwattana	Asian Institute of Technology
22.	Assoc. Prof. Amnat Chidthaisong	King Mongkut's University of Technology Thonburi, TRF
23.	Dr. Jeerasorn Santisirisomboon	Ramkhamhaeng University

Working Committees:

1.	Assoc.Prof.Dr.Sucharit Koontanakulvong	Chulalongkorn University
2.	Dr. Yutthana Talaluxmana	Kasetsart Uuniversity
3.	Dr. Sutat Weesakul	Asian Institute of Technology
4.	Mr. Thada ukhapunnaphan	Royal Irrigation Department
5.	Mr. Adisorn Champathong	Royal Irrigation Department
6.	Mrs. Wasna Proiamphaeng	Department of Water Resources
7.	Mrs. Orathai Ongrattana	Department of Water Resources
8.	Ms. Kanokwan Yoowong	Department of Water Resources
9.	Assoc. Prof. Amnat Chidthaisong	King Mongkut's University of Technology Thonburi, TRF

Website and Information System :

1.	Miss Mada Iaumsupanimit	Chulalongkorn University
2.	Miss Marayart Petcharat	Thai Hydrologist Association

CONTENTS

Preface I
Organizing Committee IX
Seminar programme 1
Report Speech 11
Dr. Subin Pinkayan
President of Thai Hydrologist Association
Opening Speech 14
His Excellency Mr. Ampol Senanarong
Privy Councillor

Abstract:

Session A. Climate Change and Uncertainty in Hydrology and Meteorology

INVITED PAPER A01
Introduction to Monsoon Asia Integrated Regional Study and Possible Involvement of Thailand in The Regional Initiative.. 17

INVITED PAPER A02
Improving Understanding of Atmospheric Loading of Greenhouse Gases Driving Climate Change: Filling Knowledge Gaps to Develop Strategies for Mitigation.. 18

INVITED PAPER A03
Adapting to Climate Change through Effective Risk Assessment and Management in East Asia - An Initiative for Collaboration.. 19

PAPER ID: TA01
Uncertainty in climate change projection and its impact on hydrology of the Nam Ou River Basin.. 20

PAPER ID: TA02
Climate Change Scenario on Surface Water Resource in Bangnampriao District, Chachernsao Province.. 21

PAPER ID: TA05
Impact of climate change on groundwater recharge in Ho Chi Minh City area.. 22

PAPER ID: TA06
Comparative evaluation of storm characteristics derived from observed rainfalls and GCM precipitation outputs.. 23

PAPER ID: TA07
Introduction to TCCIP: dynamic and statistical downscaling and its applications.. 24

PAPER ID: TA08
Urban-induced Rainfall in Chiang Mai, Thailand.. 25

PAPER ID: TA09
Bias correction test of simulated rainfall from PRECIS using adjustment factors based on distribution mapping.. 26

CONTENTS

PAPER ID: TA11
Uncertainty of stream flow under climate change scenarios using statistical downscaling data........ 27

PAPER ID: TA12
Application of a Land Surface Model for Bias Correction of Runoff Generation Data from MRI-AGCM3.2S Dataset........ 28

PAPER ID: TA13
River Discharge Assessment under a Changing Climate in Chao Phraya River, Thailand by using MRI-AGCM3.2S........ 29

PAPER ID: TA15
Designed Intensity-duration-frequency (IDF) curves under climate change condition in urban area........ 30

PAPER ID: TA16
Evaluation of Precipitation over Northern Thailand in CMIP5 MRI-CGCM3 Simulations........ 31

PAPER ID: TA17
Climate Change impact on Groundwater Recharge in Plaichumpol Irrigation Project, Thailand........ 32

PAPER ID: TA19
Rainfall-Runoff-Inundation Simulation with Bias-corrected Satellite Based Rainfall: Case Study Yom River Basin........ 33

Session B Participatory Management for Water and Irrigation Project

INVITED PAPER B01
Can Regional Climate Models Provide Proxies for Sustainable Water Resources Management Over Data Sparse Regions?........ 34

INVITED PAPER B02
Climate Change Mitigation: Water And Energy Nexus in Urban Environments........ 35

INVITED PAPER B03
Integrated Study of The Water-Ecosystem-Economy in The Heihe River Basin and Its Implication for Water Resource Management in World's Inland River Basins........ 36

PAPER ID: TB01
Participatory Approach on Management of Communal Irrigation Systems in Upland Areas: Case Studies of Water Governance in Three Provinces of Northern Luzon........ 37

PAPER ID: TB02
Assessment of Water Requirement of Chulsa Rice by using CROPWAT model........ 38

CONTENTS

PAPER ID: TB05
Analysis of Hydrologic Variables Changes related to Large Scale Reservoir Operation by Using Mann-Kendall Statistical Tests in Thailand.. 39

PAPER ID: TB06
Effect of AWDI Practices on GHG Emission in a Small Scale Lysimeter.. 40

PAPER ID: TB07
Irrigation Demand and the Flood Retention Potential by Changing of Cropping Calendar of the In-season Rice and Off-season Rice in Chao Phraya River Basin Area.. 41

PAPER ID: TB10
Benchmarking for Performance Assessment of Irrigation Schemes: Comparison of National Irrigation Systems(NIS) and Communal Irrigation System(CIS) in Cagayan River Basin, Philippines.. 42

Session C Emerging Technologies in Water and Environment Management

INVITED PAPER C01
Assessment of climate change impact on large scale flooding - a case study in the Chao Phraya River Basin via new modeling technology..... 43

INVITED PAPER C02
Artificial Intelligence Techniques for Urban Flood Control................... 44

INVITED PAPER C03
Iwrm for Climate Change Adaptation in The Mekong River Basin......... 45

PAPER ID: TC01
Aerobic Rice Technology (ART) in the Philippines and Southeast Asia: Improving Productivity and Enhancing Technology Adaption towards Rice Sufficiency and Climate Change Resiliency................................... 46

PAPER ID: TC02
Autonomous Surface Vehicle for Bathymetric and Environmental Survey: Implementation and Results.. 47

PAPER ID: TC03
Applying satellite communication for weather data to improve the efficiency of telemetry system in the upstream area... 48

PAPER ID: TC07
Development of a User-Friendly Web-based Rainfall Runoff Model..... 49

PAPER ID: TC08
Strategy to Automatically Calibrate Parameters of a Hydrological Model: A Multi-step Optimization Scheme and its Application to Xinanjinag Model.. 50

PAPER ID: TC09
Characteristics of Fluctuation in Air and Water temperatures at Kracak Dam, West Java – Indonesia.. 51

CONTENTS

PAPER ID: TC10
Detection of paddy fields in sub-state level by combined use of MODIS and Landsat imagery.. 52

PAPER ID: TC12
Estimation of Evapotranspiration in Lam Ta Kong Basin using Surface Energy Balance Algorithm for Land (SEBAL) Model.. 53

PAPER ID: TC13
Deep Groundwater and Possible Signals for Human and Climatic Effects.. 54

PAPER ID: TC14
Improvement of a Kinemative Wave-based Distributed Hydrologic Model to Predict Flow Regimes in Arid Areas.. 55

PAPER ID: TC15
Sensitivity of snow covered area of Brahmaputra River Basin to temperature.. 56

PAPER ID: TC16
Estimation of urban asset value for natural disaster risk assessment at the macro scale.. 57

PAPER ID: TC19
Water quality and hydraulic performances of the HMGDS Drainage Module.. 58

PAPER ID: TC20
Zn Removal from Synthetic Wastewater using Zeolite Modified with Oxidizing Agent.. 59

PAPER ID: TC21
Study on the Sustainable Sand Removal Capacity on Sand Mining Activities.. 60

PAPER ID: TC23
The Study of Relationship between Deciles and VCI.. 61

PAPER ID: TC24
Effect of Particle Size Distribution to Remove Colour and Escherichia coli in Groundwater.. 62

Session D Water Related Disaster Management

INVITED PAPER D01
Analyses and Strategies for Handling of Climate Change Impacts on Flooding.. 63

INVITED PAPER D02
Mitigating Water Insecurity through Disaster Preparedness in Korea.................. 64

INVITED PAPER D03
Impact assessment of climate change on water-related disasters for building up an adaptation strategy.. 65

CONTENTS

PAPER ID: TD01
Development of operational flood optimization in the flood forecasting system to determine the optimal release for Ubonrat reservoir for flood mitigation.. 66

PAPER ID: TD02
Hydrodynamics Simulation of An Overland Flow Over Low Lying Flat Land: A Case Study of The 2011 Severe Flood in Sam-Khok and Khlong Luang Districts.. 67

PAPER ID: TD03
Assessment of River Bank Erosion and Vulnerability of Embankment to Breaching: A RS and GIS Based Study in Subansiri River in Assam, India.. 68

PAPER ID: TD04
Development of Technology for Monitoring, Evaluation and Prediction of Global and Local Water Related Disaster using Various Observation System.. 69

PAPER ID: TD06
Quasi-real-time satellite monitoring for assessing agronomic flood damage.. 70

PAPER ID: TD07
Technology Assisted Flood Management.. 71

PAPER ID: TD08
Derivation Of Optimal Rule Curves For Flood Control Study of Ubolratana Reservoir, Thailand.. 72

PAPER ID: TD09
The basin-wide flooding loss assessments under extreme climate scenario.. 73

PAPER ID: TD10
Impact of Climate Change on Urban Flood Management: A Case Study in Mae Sot Municipality in Tak Province, Thailand.. 74

PAPER ID: TD11
Drought Monitoring using the Normalized Difference Infrared Index (NDII) for the Upper Ping River Basin.. 75

PAPER ID: TD12
Mainstreaming Disaster Risk Management in the Governance of Cagayan River Basin: Institutional Design and Stakeholder Participation towards Development of Integrated River Basin Masterplan.. 76

Appendix
Appendix I- Participants list
Appendix II- Photo of Seminar
*Presentations are in attached CD

Program of THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

TIME	WEDNESDAY- 28 JANUARY 2015			
08.00- 09.00	Registration at Le Concorde Ballroom, 2nd floor, Swissôtel Le Concorde			
Venue: Le Concorde Ballroom, Level 2				
09.00-09.10	**Opening Ceremony**			
09.10-09.20	**Conference Report**	**Dr. Subin Pinkayan** President of Thai Hydrologist Association		
09.20-09.30	**Opening Remarks** and Group Photo	**His Excellency Mr. Ampol Senanarong** Privy Councillor		
09.30-10.15	**Exhibition Tour/Press Conference**			
10.15-10.30	**Coffee Break**			
10.30-11.00	**Keynote Speaker I** **Water related disasters due to changing climate**	**Dr. Gwang-Jo Kim** Director, UNESCO Asia and Pacific Regional Bureau for Education (UNESCO Bangkok)		
11.00-11.30	**Keynote Speaker II**	**Mr. Miguel Musngi** Senior Officer of DMHA Division, ASEAN Secretariat		
11.30-12.00	**Keynote Speaker III** **Water related Project Planning under Climate Change Thailand** **NESDB representative**	**Mr. Arkhom Termpittayapaisith** Secretary-General, Office of the National Economic and Social Development Board (NESDB), Thailand		
12.00-13.00	**Lunch Break**			
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Jamjuree** **Plenary session presentation**	**Venue: Krisana** **Plenary session presentation**	**Venue: Salon B** **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"**
Chair	Dr. Dusadee Sukawat	Asst. Prof. Dr.Ekasit Kositsakulchai	Dr. Pongsak Suttinon	
Briefing	Dr. Saisunee Budhakooncharoen	Dr. Sarawut Jansuwan	Dr. Sompong Boonprasert	
13.00	**Invited paper A01** **Introduction to Monsoon Asia Integrated Regional Study and possible involvement of Thailand in the regional initiative** **Dr. Ailikun** Chinese Academy of Sciences, China	**Invited paper B01** **Can regional climate models provide proxies for sustainable water resources management over data sparse regions?** **Prof. LIONG, Shie- Yui** National University of Singapore,Singapore	**Invited paper D01** **Analyses and Strategies for handling climate change impacts on flooding** **Dr. Ole Mark** DHI, Denmark	**Session 1: Planning presentation** Opening speech and introduction to the session by **Dr. Ramasamy Jayakumar**, Programme Specialist and Chief Natural Sciences, UNESCO Office in Bangkok, Thailand

TIME	WEDNESDAY- 28 JANUARY 2015			
Room	Venue: Salon A **Plenary session presentation**	Venue: Jamjuree **Plenary session presentation**	Venue: Krisana **Plenary session presentation**	Venue: Salon B **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"** (ASEAN Workshop)
13.30	**Paper TA 01:** **Uncertainty in climate change projection and its impact on hydrology of the Nam Ou River Basin** (Manisha Maharjan[1, a*], Mukand S. Babel[1, b] and Shreedhar Maskey[3, c] ,Thailand)	Invited paper B02 **Climate Change Mitigation: Water and Energy Nexus in Urban Environments** **Dr. Tamim Younos** The Cabell Brand Center for Global Poverty and Resource Sustainability Studies, USA.	**Paper TD 01:** **Development of operational flood optimization within the flood forecasting system to determine the optimal release for Ubonrat reservoir for flood mitigation** (Sathit Chantip[1, a*], Piyamarn Sisomphon[2,b] Surajate Boonya-aroonnet[3,c] ,Thailand)	**Session 1: Planning presentation (Cont.)** - **Dr. Thongplew Kongjun** The Office of Water Management and Hydrology, Royal Irrigation Department, Thailand - **Flood Risk Management in the Delta Areas of Myanmar** **Dr. Hrin Nei Thiam**, Director-General of the Department of Meteorology and Hydrology, Ministry of Transportation, Myanmar - **Report on Water Disaster Management in Lao PDR** **Mr. Maykong Phonephommavong**, Director-General of the Department of Irrigation, Ministry of Agriculture and Forestry of Laos - **Prof. Duong Hong Son**, Deputy Director General of Vietnam Institute of Meteorology, Hydrology and Environment of Vietnam - **Ir Mohd Zaki Mat Amin**, Director of Research Centre for Water Resources, National Hydraulic Research Institute of Malaysia (NAHRIM)
13.50	**Paper TA 05:** **Impact of climate change on groundwater recharge in Ho Chi Minh City area** (Ha Quang Khai[1, a*], Sucharit Kooltanakulvong [2,b] ,Thailand)	**Paper TB 02:** **Assessment of Water Requirement of Chulsa Rice by using CROPWAT model** (Mrs. Men Nareth, Cambodia)	**Paper TD 03:** **Assessment of River Bank Erosion and Vulnerability of Embankment to Breaching: A RS and GIS Based Study in Subansiri River in Assam** (BIPUL TALUKDAR[1,a*], RANJIT DAS[2,b] , India)	
14.10	**Paper TA 07:** **Introduction to TCCIP: dynamic and statistical downscaling and its applications** (Lee-Yaw Lin [1,a*] , Yung- Ming Chen[1, b] , Jung-Lien Chu[1,c] , Chao-Tzuen Cheng [1,d] , Jun-Jih Liou [1,e] , Yun-Ju Chen [1,f] and, Yuan-Fong Su [1,g] , Taiwan)	**Paper TB 05:** **Analysis of Hydrologic Variables Changes related to Large Scale Reservoir Operation by Using Mann-Kendall Statistical Tests in Thailand** (MANEE Donpapob[1, a*], TACHIKAWA Yasuto[2, b] and YOROZU Kazuaki[3, c] , Japan)	**Paper TD 07:** **Technology Assisted Flood Management** (Surajate Boonya-aroonnet[1, a], Peraya Tantianuparp.[1,b] Sutat Weesakul[1,2,c*] and Royol Chitradon[1,d] , Thailand)	
14.30	**Paper TA 08:** **Urban-induced Rainfall in Chiang Mai, Thailand** (KLONGVESSA Pawee[1, a*] and LU Minjiao[1,b] , Japan)	**Paper TB 06:** **Effect of AWDI Practices on GHG Emission in a Small Scale Lysimeter** (Mr. Ishwar Pun, Japan)	**Paper TD 10:** **Impact of Climate Change on Urban Flood Management: A Case Study in Mae Sot Municipality in Tak Province** (Assoc.Prof. Sombat CHUENCHOOKLIN, Thailand)	

TIME	WEDNESDAY- 28 JANUARY 2015			
14.50	**Coffee Break**			
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Jamjuree** **Plenary session presentation**	**Venue: Krisana** **Plenary session presentation**	**Venue: Salon B** **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"** (ASEAN Workshop)
Chair	Dr. Shrestha Sangam	Assoc. Prof. Suwatana Chittaladakorn	Asst. Prof. Dr. Aksara Putthividhya	
Briefing	Dr. Saisunee Budhakooncharoen	Dr. Sarawut Jansuwan	Dr. Sompong Boonprasert	
15.10	**Paper TA 12:** **Application of a Land Surface Model for Bias Correction of Runoff Generation Data from MRI-AGCM3.2S Dataset** (DUONG Duc Toan[1, a *], TACHIKAWA Yasuto[1, b] and YOROZU Kazuaki[1, c], Japan)	**Invited paper B03** **Integrated study of the water-ecosystem-economy in the Heihe River Basin and its implication for water resource management in world's inland river basins** **Prof. Xin Li,** Academy of Sciences (CAS),China	**Invited paper D02** **Mitigating Water Insecurity through Disaster Preparedness in Korea** **Dr. CHOI Byungman** Executive Director of K-water Institute and Co-chair of the Regional Process Commission of the7th World Water Forum, Korea	**Session 1: Planning presentation (Cont.)** - **Enhancing Resiliency through Community Participatory Flood Observation System for the Laguna Lake Basin** **Mrs. Adelina C. Santos-Borja**, Division Chief III, International Linkages & Research Development Unit, Laguna Lake Authority, Philippines - **Flood and drought management under climate change** **Mr.Chanawat Arunrat on behalf of Mr. Nirut Koonphol,** Director, Bureau of Water Resources Policy and Planning, Department of Water Resources, Thailand
15.40	**Paper TA 16:** **Evaluation of Precipitation over Northern Thailand in CMIP5 MRI-CGCM3 Simulations** (Parichat Wetchayont [1, 3, a *] and Srilert Chotpantarat [1, 2, b], Thailand)	**Paper TB 01:** **Participatory Approach on Management of Communal Irrigation Systems in Upland Areas: *Case Studies of Water Governance in Three Provinces of Northern Luzon*** (Agnes M. Ramos[1,a], Orlando F. Balderama[2,b,*], Philippines)	**Paper TD 02:** **Hydrodynamics Simulation of An Overland Flow Over Low Lying Flat Land:** **A Case Study of The 2011 Severe Flood in Sam-Khok and Khlong Luang Districts** (SAIFHON Tomkratoke[a*] and SIROD sirisup[b], Thailand)	
16.00	**Invited paper C01** **Assessment of climate change impact on large scale flooding – a case study in the Chao Phraya River Basin via new modeling technology** **Dr. Takahiro Sayama** ICHARM, Public Works Research Institute, Japan	**Paper TB 07:** **Irrigation Demand and the Flood Retention Potential by Changing of Cropping Calendar of the In-season Rice and Off-season Rice in Chao Phraya River Basin Area.** (Songsak Puttrawutichai[1, a *], Buncha Kwanyeun[2, b] and Thongplew Kongjun[3, c], Thailand	**Paper TD 04:** **Development of Technology for Monitoring, Evaluation and Prediction of Global and Local Water Related Disaster using Various Observation System** (Dr. LEE Eulrae, Korea)	**16.15-17.15 PM** **Session 2: Discussion issues on Water & Disaster Management and Climate Change**

TIME	WEDNESDAY- 28 JANUARY 2015			
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Jamjuree** **Plenary session presentation**	**Venue: Krisana** **Plenary session presentation**	**Venue: Salon B** **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"** (ASEAN Workshop)
16.20	**Paper TC 03:** **Applying satellite communication for weather data to improve the efficiency of telemetry system in the upstream area.** (Wasukree Sae-tia[1, a *], Thakolpat Khampuengson[2,b], Piyamarn Sisomphon [3,c] and Surajate Boonya-aroonnet [4,d], Thailand)	**Paper TB 10:** **Benchmarking for Performance Assessment of Irrigation Schemes: Comparison of National Irrigation Systems(NIS) and Communal Irrigation System(CIS) in Cagayan River Basin** (Prof. Dr. Orlando Balderama , Philippines)	**Paper TD 06:** **Quasi-real-time satellite monitoring for assessing agronomic flood damage** (Akihiko KOTERA[1, a *], Youtaro UENO[1] and Takanori NAGANO[1] ,Japan)	**17.15-17.30 PM** **Session 3: Discussion on support to collaborative academic network**
16.40	**Paper TC 07:** **Development of a User-Friendly Web-based Rainfall Runoff Model** (Khin Htay Kyi[1,a *], Minjiao Lu[2,3,b] and Xiao Li[4,c], Japan)		**Paper TD 08:** **Derivation Of Optimal Rule Curves For Flood Control Study Of Ubolratana Reservoir, Thailand** (Pich Hirun[1, a *] and Areeya Rittima[1,b] , Thailand)	
17.00	**Paper TC 20:** **Zn removal from synthetic wastewater using zeolite modified with oxidizing agent** (SALWA Mohd Zaini Makhtar[1, a *], ISMAIL Abustan[1,b], MAHYUN Ab Wahab[1,c], NOR AMIRAH Abu Seman[1,d], NUR ATIQAH Ahmad Awalluddin[1])			
18.00	**Reception Dinner** (For registered participants) Venue: Le Lotus 1			

TIME	THURSDAY- 29 JANUARY 2015		
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Salon B** **Plenary session presentation**	**Venue: Krisana** **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"** (ASEAN Workshop)
Chair	Dr. Shrestha Sangam	Asst. Prof. Dr. Sanit Wongsa	
Briefing	Dr. Suppattana Wichakul	Dr. Siriluk Chumchean	**Session 4: Technical presentation** To present recent findings or on-going research related to Water & Disaster Management and Climate Change Speakers from ASEAN countries - **Research Issues on Water Disaster Management and Climate Change in Western Part of Java Island, Indonesia** **Prof. Dr. M. Syahril B. Kusuma** Faculty of Civil And Environmental Engineering of Institut Teknologi Bandung, Indonesia - **Assessment of water resources for improved water governance under climate change: case study in Stung Chrey Bak Catchment of Tonle Sap Great Lake Basin in Cambodia** **Dr. Ly Sarann**, Head of Department of Rural Engineering of Institute of Technology of Cambodia - **Vulnerability of Vietnamese coasts to coastal disasters and climate change** **Dr. Nguen Danh Thao** Director, External Relations Office, HCMC University of Technology , Vietnam - **Use of Multi-sensors Data Input for Improved Flood Forecasting** **Assoc.Prof. Dr. Wadah Tahir** Director of Flood Control Research Center, Universiti Teknologi MARA
09.00	**Invited paper C02** **Artificial intelligence technologies for urban flood control** **Prof. Fi-John Chang** National Taiwan University, Taiwan	**Invited paper A02** **"Improving Understanding of Atmospheric Loading of Greenhouse Gases Driving Climate Change: Filling Knowledge Gaps to Develop Strategies for Mitigation"** **Prof. Tissa Illangasekare** Colorado School of Mines, USA	
09.30	**Paper TC 09:** **Fluctuation and its change during rainfall events in water temperature at the upstream tropical forested watershed; study case: Kracak reservoir catchment - Indonesia** (Luki Subehi and Kwansue Jung, South Korea)	**Paper TA 06:** **Comparative evaluation of storm characteristics derived from observed rainfalls and GCM precipitation outputs** (Yuan-Fong Su[1,a*] , Jun-Jih Liou[1,b] and Ke-Sheng Cheng[2, c] , Taiwan)	
09.50	**Paper TC 12:** **Estimation of Evapotranspiration in Lam Ta Kong Basin using Surface Energy Balance Algorithm for Land (SEBAL) Model** (Miss. Haruetai maskong , Thailand)	**Paper TA 09:** **Bias correction test of simulted rainfall from PRECIS using adjustment factors based on distribution mapping** (Kowit Boonrawd[1, a]Chatchai Jothityangkoon[1, b] ,Thailand)	
10.10	**Paper TC 15:** **Sensitivity of Snow Covered Area of Brahmaputra River Basin to Temperature** (Swapnali Barman[1,a*], R.K. Bhattacharjya[2,b] , India)	**Paper TA 15:** **Designed Intensity-duration-frequency (IDF) curves under climate change condition in urban area** (Ashish Shrestha [1, a *], Sutat Weesakul[1,b], Mukand Singh Babel[1,c] and Zoran Vojinovic [2,d] ,Thailand)	
10.30	**Coffee Break**		

TIME	THURSDAY- 29 JANUARY 2015		
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Salon B** **Plenary session presentation**	**Venue: Krisana** **Workshop on "ASEAN Academic Networking in Water& Disaster Management and Climate Change"** (ASEAN Workshop)
Chair	Dr. Shreshta Sangam	Dr. Chaiwat Ekkawatpanit	
Briefing	Dr. Suppattana Wichakul	Dr. Siriluk Chumchean and Dr. Sompong Boonprasert	
10.50	**Paper TC 23:** **The Study of Relationship between Deciles and VCI in the Northern Part of Thailand** (Aphantree Yuttaphan [1, 2, a*], Sombat Chuenchooklin [2,b] and Somchai Baimoung [3,c] ,Thailand)	**Paper TA 19:** **Rainfall-Runoff-Inundation Simulation with Bias-corrected Satellite Based Rainfall: Case Study Yom River Basin** (Teerawat Ram-Indra [1, a], Anurak Sriariyawat [1,b *] and Piyatida Hosisungwan [1,c], Thailand)	**Session 4: Technical presentation (Cont.)** - **Climate Change in Myanmar and the Dry Zone** **Dr. Win Naing Tun** Myanmar Environment Institute, Myanmar - **Climate of Yangon city** **Dr. Khin Kay Khaing**, Lecturer, Department of Geography, University of Yangon, Myanmar - **Assessment of groundwater vulnerability in Yangon City, Myanmar** **Dr. Wint Wint Htun**, Department of Geology, Yangon University, Myanmar - **Application of community-based arsenic removal unit (SARSAC) for provision of safe water in affected provinces of Laos** **Dr. Keoduangchai Keokhamphui,** Lecturer, Faculty of Water Resources Engineering, National University of Laos (NUOL), Laos - **Status of climate change research in Thailand** **Assoc. Prof. Dr. Sucharit Koontanakulvong** Head of Dept.Water Resources Engineering, Faculty of Engineering Chulalongkorn University, Thailand
11.10	**Paper TC 24:** **Effect of Particle Size Distribution to Remove Colour and *Escherichia coli* in Groundwater** (Nur Aziemah Abd Rashid[1,a*], Ismail Abustan[2,b], Mohd Nordin Adlan[3,c] , Malaysia)	**Paper TA 02:** **Climate Change Scenario on Surface Water Resource in Bangnampriao District, Chachernsao Province** (Dr. Charuvan Kasemsap ,Thailand)	
11.30	**Paper TC 01:** **Aerobic Rice Technology(ART) in the Philippines and Southeast Asia: *Improving Productivity and Enhancing Technology Adaption towards Rice Sufficiency and Climate Change Resiliency*** (Orlando F. Balderama[1,a,*], Philippines)	**Paper TA 11:** **Uncertainty of stream flow under climate change scenarios using statistical downscaling data** (Yun-Ju Chen [1], Yuan-Fong Su[1], Jun-Jih Liou[1] and Yung-Ming Chen[1] , Taiwan)	
11.50	**Paper TC 02:** **Autonomous Surface Vehicle for Bathymetric and Environmental Survey: Implementation and Result** (Pasan Kulvanit [*], Thailand)		
12.10	**Lunch Break**		

TIME	THURSDAY- 29 JANUARY 2015			
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Salon B** **Plenary session presentation**	**Venue: Krisana** **ASEAN Workshop**	**Venue: Jamjuree** **Technical training**
Chair	Dr. Sutat Weesakul	Dr. Pariwate Varnakovida	**Session 5: Preparation for collaborative academic network setup for water, disaster management and climate change among ASEAN countries** **13.00-13.15 PM** Summary of presentations from Technical presentation session in the morning **13.15-13.30 PM** - Introduction to preparation for collaborative academic network setup by **Dr. Ramasamy Jayakumar** and **Assoc. Prof. Dr. Sucharit Koontanakulvong** **13.00- 14.30 PM** - **Dr. Ailikun** Director, International Program Office of Monsoon Asia Integrated Regional Study (MAIRS), Institute of Atmospheric Physics, Chinese Academy of Sciences, China - **Prof. Dr. Kaoru Takara** Chair, Japanese National Committee for UNESCO-IHP - **Prof. Dr. Takahiro Sayama** Senior researcher, International Centre for Water Hazard and Risk Management (ICHARM), Public Works Research Institute (PWRI), Japan	**Technical training by University of California - Irvine with UNESCO's International Hydrological Programme (IHP) "Satellite-based Rainfall (PERSIANN) for Planning and Management for Natural Disasters in Monsoon Asia"** **(For who reserved a seat)**
Briefing	Dr. Duangruedi Khosit kittiwong	Dr. Sompong Boonprasert		
13.00	**Invited paper C03** **IWRM for Climate Change Adaptation in the Mekong River Basin** **Dr. Kittiwet Kuntiyawichai,** Department of Civil Engineering, Faculty of Engineering, Khon Kaen University	**Invited paper A03** **Adapting to Climate Change through Effective Risk Assessment and Management in East Asia - An Initiative for International Collaboration** **Prof. Jiaguo Qi, Zhejinag** University China, China		
13.30	**Paper TC 08:** **Strategy to Automatically Calibrate Parameters of a Hydrological Model: A Multi-step Optimization Scheme and its Application to Xinanjinag Model** (Minjiao Lu[1, 2,a*] and Xiao Li[3,b], Japan)	**Paper TA 13:** **River Discharge Assessment under a Changing Climate in the Chao Phraya River, Thailand by using MRI-AGCM3.2S** (Supattana WICHAKUL[1, a *], Yasuto TACHIKAWA[1, b], Michiharu SHIIBA[1, c] and Kazuaki YOROZU [1,d], Japan)		
13.50	**Paper TC 10:** **Detection of paddy fields in sub-state level by combined use of MODIS and Landsat imagery** (Assoc. Prof. Dr. Takanori Nagano , Japan)	**Paper TA 17:** **Climate Change impact on Groundwater Recharge in Plaichumpol Irrigation Project** (Mr. Chokchai suthidhummajit, Thailand)		
14.10	**Paper TC 13:** **Deep Groundwater and Possible Signals for Human and Climatic Effects** (UMA Seeboonruang[*], Thailand)			
14.30	**Coffee Break**			

TIME	THURSDAY- 29 JANUARY 2015			
Room	**Venue: Salon A** **Plenary session presentation**	**Venue: Salon B** **Plenary session presentation**	**Venue: Krisana** **ASEAN Workshop**	**Venue: Jamjuree** **Technical training**
Chair	Dr. Sutat Weesakul	Assoc. Prof. Dr. Tuantan Kitpaisalsakul	**Session 5: Preparation for collaborative academic network setup for water, disaster management and climate change among ASEAN countries (Cont.)** - **Prof. Dr. Kwansue Jung** Director, International Water Resources Research Institute, Chungnam National University, Korea - **Dr. Ole Mark** Head of Research and Development, Danish Hydraulic Institute (DHI), Denmark - **Prof. Dr. Fi-John Chang** Department of Bioenvironmental Systems Engineering, National Taiwan University, Taiwan - **Asst. Prof. Dr. Chanathip Pharino** TRF, Thailand - **Mr. Miguel Musngi**, Senior Officer of DMHA Division, ASEAN Secretariat - 15.45-16.00 pm Discussion and confirmation of the statement of setting up an academic network on water, disaster management and climate change among ASEAN countries	Technical training by University of California - Irvine with UNESCO's International Hydrological Programme (IHP) "Satellite-based Rainfall (PERSIANN) for Planning and Management for Natural Disasters in Monsoon Asia" (For who reserved a seat)
Briefing	Dr. Sompong Boonprasert	Dr. Duangruedi Khositkittiwong		
14.50	**Paper TC 14:** **Improvement of a Kinemative Wave-based Distributed Hydrologic Model to Predict Flow Regimes in Arid Areas** (Tomohiro Tanaka, Japan)	**Invited paper D03** **Impact assessment of climate change on water-related disasters for building up an adaptation strategy** **Prof. Yasuto TACHIKAWA** Graduate School of Engineering, Kyoto University, Japan		
15.10	**Paper TC 16:** **Estimation of urban asset value for natural disaster risk assessment at the macro scale** (Tiratas Suwathep[1, a *], Wee Ho Lim[1,b *], Yoshihiko Iseri[1,c] and Shinjiro Kanae[1,d], Japan)	**Paper TD 09:** **The basin-wide flooding loss assessments under extreme climate scenario** (Hsin-Chi Li[1], Hsiao-Ping Wei[1], Tingyeh Wu[1], Hung-Ju Shih[1], Wei-Bo Chen[1], Yuan-Fong Su[1] and Yung-Ming Chen[1], Taiwan)		
15.30	**Paper TC 21:** **Study on the Sustainable Sand Removal Capacity on Sand Mining Activities.** (Syamsul Azlan Saleh[1, a]*, Ismail Abustan[2,b], and Mohd Remy Rozainy Mohd Arif Zainol[3,c], Malaysia)	**Paper TD 11:** **Drought Monitoring using the Normalized Difference Infrared Index (NDII) for the Upper Ping River Basin** (Assoc.Prof. Dr. Nutchanart Sriwongsitanon, Thailand)		
15.50	**Paper TC19:** **Water quality and hydraulic performances of the HMGDS Drainage Module.** (Nor Amirah A.S[1]., Abustan, I[2]., Remy Rozainy M. A. Z[3]., Salwa M. Z. M[4]., Mahyun A.W[4], Malaysia)	**Paper TD 12:** **Mainstreaming Disaster Risk Management in the Governance of Cagayan River Basin: Institutional Design and Stakeholder Participation towards Development of Integrated River Basin Masterplan** (Prof. Dr. Orlando Balderama, Philippines)		

TIME	THURSDAY- 29 JANUARY 2015	
Venue: Le Concorde Ballroom, Level 2		
16.10	**Summary Plenary session presentation**	**Assoc. Prof. Dr. Bancha Kwanyuen** Dean of Faculty of Engineering, Kasetsart Universit, Kampaengsaen Campus
16.15	**Meeting on collaborative academic network setup for water, disaster management and climate change among ASEAN countries**	**Assoc. Prof. Dr. Sucharit Koontanakulvong** Head of Dept.Water Resources Engineering, Faculty of Engineering Chulalongkorn University
16.30	**THA Summary Meeting** **- Closing Remarks**	**Dr. Subin Pinkayan** President of Thai Hydrologist Association
18.00	**Farewell Party Dinner** (For registered participants) Venue: Le Lotus 1	

(The programs are subject to change without notice.)

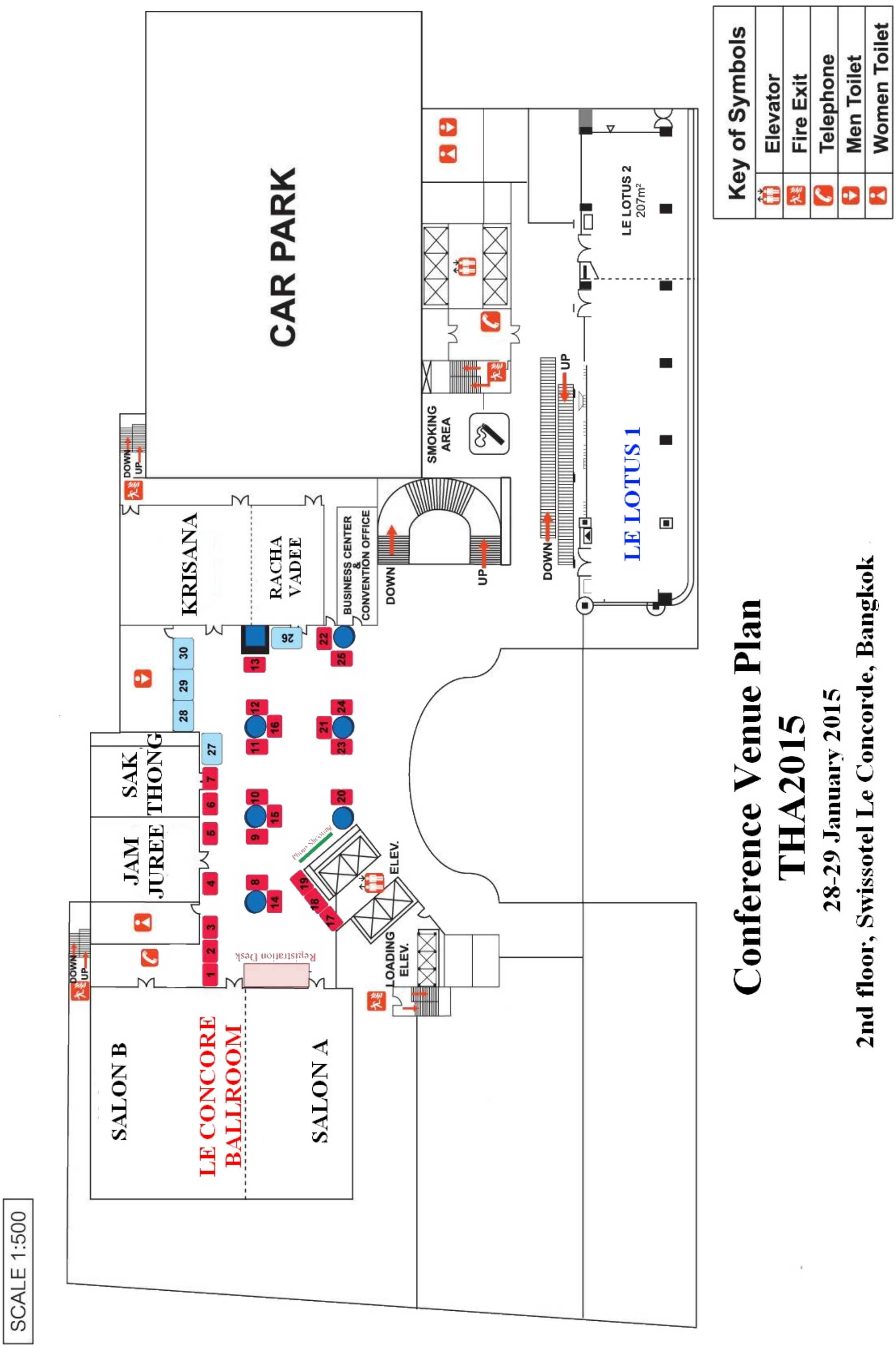
Remark:

TA: Topic A Climate Change and Uncertainty in Hydrology and Meteorology

TB: Topic B Participatory Management for Water and Irrigation Project

TC: Topic C Emerging Technologies in Water and Environment Management

TD: Topic D Water Related Disaster Management


Conference Venue Plan
THA2015
28-29 January 2015
2nd floor, Swissotel Le Concorde, Bangkok
Key of Symbols
Elevator
Fire Exit
Telephone
Men Toilet
Women Toilet
CAR PARK
SMOKING AREA
LE LOTUS 2
207m²
LE LOTUS 1
UP
DOWN
KRISANA
RACHA VADEE
BUSINESS CENTER & CONVENTION OFFICE
SAK THONG
JAM JUREE
ELEV.
LOADING ELEV.
Registration Desk
SALON B
LE CONCORE BALLROOM
SALON A
SCALE 1:500

Report Speech

Dr. Subin Pinkayan

President of Thai Hydrologist Association

- His Excellency Mr. Ampol Senanarong, Privy Councillor,

The Opening Chair of the THA 2015 International Conference on Climate Change and Water & Environment Management in Monsoon Asia,

- The Director of UNESCO Asia and Pacific Regional Bureau for Education,
- ASEAN Secretariat delegate,
- Secretary-General of the National Economic and Social Development Board (NESDB), Thailand,
- Executives from International Water Institutions,
- Faculties from universities in ASEAN and in neighbouring regions, and all honourable guests.

I, on behalf of Thai Hydrologist Association would like to report on the background of the THA2015 International Conference as follows:
There has been the higher frequency of water disasters and water shortage in Asia monsoon region including Thailand over recent years. Each country has attempted to deal with the problems using various means depending on their own physical characteristics, economic and social conditions in the area. To address water-related problems at an international level, the dimensions of economy, society and environment must be taken into account together at the same time. Moreover, the dimensions of water, food and energy must also be considered. Recently, the issue of climate change has become a crucial factor which needs to be integrated into planning. A forum for exchange knowledge, information and experience, in planning is therefore important.

As a result, the Thai Hydrologist Association in association with the Royal Irrigation Department, Department of Water Resources, Chulalongkorn University, Kasetsart University, Thailand Research Fund and Asian Institute of Technology decided to organize the THA 2015 International Conference on Climate Change and Water & Environment Management in Monsoon Asia from January 28th to 30th, 2015. This conference serves as a public forum for researchers, scientists, practitioners and policy makers to present their research findings, share knowledge, experiences and perspectives, update new progress of relevance to the issue of disaster, irrigation and water management. The conference pays particular attention to developing the skills and ability to address the problems of water and disaster management, participatory management, environmental management and sustainable development for irrigation and drainage in Monsoon Asia.

The conference consists mainly of four parts including oral presentation, poster exhibition, special training and study tour. The presentations are categorised into four main themes including 1) Climate Change and Uncertainty in Hydrology and Meteorology, 2) Participatory Management for Water and Irrigation Project, 3) Emerging Technologies in Water and Environment Management, 4) Water Related Disaster Management.

The THA 2015 International Conference is running in parallel to the workshop on ASEAN Academic Networking in Water & Disaster Management and Climate Change. This is to provide an opportunity for the executives, planners and senior scholars to exchange knowledge and experiences, and prepare for the establishment of the ASEAN Academic Network which aims to promote collaborative network in research and education in ASEAN that can be extended to other countries in the future.
The THA2015 International Conference is therefore:

1) gathering scholars and combining the knowledge of climate and water and disaster management together to be able to identify the problems in a holistic manner through the view of planners, practitioners and academic researchers
2) gathering the executives at DG level from ASEAN countries and Thailand to exchange perspectives on planning, addressing water problems and to propose key areas of future collaborative research to cope with global climate change especially in ASEAN region
3) providing an opportunity to meet distinguished senior scholars coming from ASEAN and international to exchange research concept and research findings as well as to seek for collaborative supports, for the establishment of the ASEAN Academic Network from countries outside ASEAN in the future.

The THA 2015 International Conference has received kind cooperation from a number of international organizations for example, UNESCO; Chinese Academy of Sciences, China; UNESCO-IHE, Netherlands; ICHARM, Public Works Research Institute, Japan; PAWEES, Japan; School of Engineering, Kyoto University, Japan; K-water Institute, Korea.

I hope that all participants of the THA 2015 International Conference will gain more knowledge and innovations regarding climate change, water and environmental resources management, water disaster management, new technology and operation of basin management from the presentations given by scholars and experts from several countries in different regions of the world. This is believed to lead to the creation of a network for academic and professional research as well as cordial collaboration in this region.

Now it is a time for me to invite His Excellency Mr. Ampol Senanarong, Privy Councillor to make an opening speech for the THA2015 International

Opening Speech

His Excellency Mr. Ampol Senanarong

Privy Councillor

---

(1) The President of Thai Hydrologist Association, distinguished delegates, ladies and gentlemen,

It is my great pleasure to welcome you all to the THA 2015 International Conference on Climate Change and Water & Environment Management in Monsoon Asia and the workshop on ASEAN Academic Networking in Water & Disaster Management and Climate Change which are organised by the Thai Hydrologist Association (THA) in association with the Royal Irrigation Department, Department of Water Resources, Chulalongkorn University, Kasetsart University, Asian Institute of Technology and Thailand Research Fund. This event provides a forum for water planners and water professionals in academia coming from a number of countries including Thailand, other ASEAN countries, countries in ASIA, Europe and USA to present academic findings, exchange knowledge and experience in water and disaster management to increase preparedness and capability to cope with climate change which is likely to be more intense. I have a great honour to attend the THA International Conference and the ASEAN Workshop today. I would like to take this opportunity to provide you information and philosophy of water management in Thailand that are applied to the royal projects. This could probably be of beneficial to encouraging collaboration on water, disaster management and climate change within the ASEAN region which could be extended to other regions in the foreseeing future.

(2) Thailand has adopted the Philosophy of Sufficiency Economy into developing the 8th-10th (1997-2011) Economic and Social Development Plans. The Philosophy of Sufficiency Economy has been adapted to be used at various scales ranging from household, community and national as a whole. It has been well proved to increase resilience to a rapid change in climate between 2012 to 2016. The Philosophy of Sufficiency Economy in combination with knowledge, science, technology innovation and creativity are critical components to attain sustainable development and stability.

(3) The philosophy of water resources management initiated by His Majesty the King Bhumibol Adulyadej focuses on the development for solving water problems in the country by considering infrastructure and management simultaneously. Also, His Majesty the King has attempted to address the problems of agriculture and soil. Examples of the royal projects are a project for improving soil acidity (Klang Din), new theory agriculture and organic farming. His Majesty the King has established a cooperative system, Sufficiency Economy and Suwannachart retail shop for the development of community. To improve education and literacy of Thai residents, His Majesty the King has established an education centre demonstrating how to deal with the problems of forest, soil and water. Distance learning is also used to disseminate knowledge to rural areas to increase the resistance and resilience of the local residents to various kinds of risks including land slide, flood and drought and to solve the problem of poverty directly at the community level.

(4) The royal projects are undertaken based on the philosophy of His Majesty the King covering three dimensions of conceptual principle, framework and technology.

<u>Conceptual principle</u> refers to self-reliance, comprehensive thinking and integrating, using natural means as solutions to natural problems. Everything has its own value and no waste. Solutions to the problems must be designed to comply with the surrounding context of the area and lead to sustainability. Also, there must not be unfavorable effects on other people. Solutions must be turned into actions for real demonstration.

<u>Framework</u> means the use of information, work diagram, mind map, integration of information and work diagram into actual site where the problem occurs, network of operation, experiment, monitoring, evaluation and extension of the results.

<u>Technology</u> includes handheld transceiver, computer, internet, GIS map, GPS, data from satellite, radar and tele-gauges. Appropriate technologies for specific site must be selected.

(5) Examples of the royal projects that have been implemented are: the Rainmaking Project to expedite rainfall in the desired areas; the monitoring of storm data for the use of reservoir management; the application of satellite data for flood

monitoring; using natural pond for waste water treatment such as the Laem Phak Bia Project

(6) Each royal project has adopted and applied the philosophy of Sufficiency Economy initiated by His Majesty the King into resources management leading to sustainable development and improved shelter from future climate change.

(7) I sincerely hope that water management under the philosophy of Sufficiency Economy initiated by His Majesty the King as mentioned above will be beneficial to you as it provides information for discussion session on preparedness for climate change. Also it encourages further academic collaboration within the region which can subsequently be extended to other regions.

(8) Now it is time to open our International Conference and ASEAN Workshop. I wish that the International conference and ASEAN Workshop proceed smoothly and achieve the desired objectives.

Session A

Climate Change and Uncertainty in Hydrology and Meteorology

INVITED PAPER A01

INTRODUCTION TO MONSOON ASIA INTEGRATED REGIONAL STUDY AND POSSIBLE INVOLVEMENT OF THAILAND IN THE REGIONAL INITIATIVE

Ailikun

Asia is a special region of the world, particularly when considering future pathways towards sustainability. The Asian monsoon and the Himalayas – Tibetan Plateau drive a unique climate with global impacts and which, through traditional cultures and practices, have supported a range of sustainable natural ecosystems and human societies for millennia. However, Asia is now in transition. As the development of global change research in monsoon Asian region, the traditional monsoon study is requested to meet the needs from various fields such as agriculture, hydrology and water management, land use and urban design, risk management., Monsoon Asia Integrated Regional Study (MAIRS) has been worked hard to deal with the question on “How to let the current monsoon study transform to support the sustainability research in monsoon Asia region”. In this talk, we will mainly introduce some thinking, experiences and case studies on integrated studies under the framework of MAIRS in last several years. In specific, we will focus on monsoon simulation, future projection of Asian monsoon and how to provide support to water and land management for policy making of urban-land design in this region.

Keywords: Asian Monsoon, Integrated Study, Sustainability Research

Ailikun
Institute of Atmospheric Physics, Chinese Academy of Sciences
Email: aili@mairs-essp.org

INVITED PAPER A02

IMPROVING UNDERSTANDING OF ATMOSPHERIC LOADING OF GREENHOUSE GASES DRIVING CLIMATE CHANGE: FILLING KNOWLEDGE GAPS TO DEVELOP STRATEGIES FOR MITIGATION

Tissa H. Illangasekare [1], Kathleen Smits[1] , Elif Agertan[1], Luca Trevisan[1], Michel Plampin[1], Andrew Trautz[1], Ariel Esposito[1], Ben Wallen[1] and Paul Shulte[1].

Potential long-term impacts of climate change on both local and global water resources and the environment have been recognized. The local and regional impacts will have major implications on the sustainability of water as a resource for a rapidly growing world population facing with the issues of reliable and clean supply of potable water, water for irrigation tied to food security, water for energy development tied to industrial and economic growth, and the quality of the environmental that affects both ecological and human health. Numerical models simulating systems ranging from basin to global scales are needed for these impact predictions and risk analysis. For prediction reliability, these models need to accurately capture water flow, energy and mass transfer processes occurring in the subsurface, on the land surface and in the atmosphere. Many scientific and technological challenges still remain to accurately capture and simulate these processes at all relevant scales. Addressing these challenges require filling scientific knowledge gaps in processes understanding and their parameterization, parameter up-scaling to move across hierarchy of scales, coupling of land and atmospheric systems, among others. This presentation will discuss some of these challenges and identify critical research needs. Examples from ongoing research on green house gas loading that contributes to global warming, and mitigation through carbon storage are presented.

Keywords: Climate change, Global Climate Models, Carbon Capture and Storage, Methane Loading, Soil Moisture and evaporation.

Tissa H. Illangasekare
Center for Experimental Study of Subsurface Environmental Processes (CESEP)
Colorado School of Mines, Golden, Colorado 80401, USA.
E-mail: tissa@mines.edu

INVITED PAPER A03

ADAPTING TO CLIMATE CHANGE THROUGH EFFECTIVE RISK ASSESSMENT AND MANAGEMENT IN EAST ASIA - AN INITIATIVE FOR COLLABORATION

Jiaguo Qi1[2], Xuchao Yang[1], Howard Ho[1], Guanqiong Ye[1], Yiji Tan[1], Ying Chen1and Leye Yao[3]

Increases in frequency, intensity, duration, and geographic scope of extreme climate events such as floods, droughts, storm surges, and typhoons in East Asia are imposing significant threats to the nations in the region including food security, infectious disease outbreaks, landslides, infrastructure damages and human capital losses. Therefore, there is an urgent need to develop effective risk assessment and management strategies in order to adapt to the regional climate change, which requires a multidisciplinary collaboration and an integration of science, technology and stakeholders. In this study, risks are categorized and subsequently assessed based on their potential long-, mid-, and short-term impacts and related causes. Strategies to mitigate these risks through better information management, dissemination, broad scale training, and improved forecasting capabilities are discussed for developing a general framework of risk assessment and management. Using case studies in China, challenges, information and knowledge gaps are identified and analysed, which lead to a comprehensive theoretical framework for disaster prevention, mitigation, and recovery.

Keywords: Climate Change, Adaptation, Risk Assessment

1. Zhejiang University, Hangzhou, China
2. Michigan State University, East Lansing, Michigan, USA
3. Sichuan University, Chengdu, China
Email: qi@msu.edu

PAPER ID: TA01

UNCERTAINTY IN CLIMATE CHANGE PROJECTION AND ITS IMPACT ON HYDROLOGY OF THE NAM OU RIVER BASIN

Manisha Maharjan[1, a *], Mukand S. Babel[2,b] and Shreedhar Maskey[3,c]

Climate change is likely to increase mean temperature affecting every aspect of hydrological cycle. More frequent and severe droughts and floods are already apparent, and their impact increases as a growing population becomes more dependent upon a set of atmospheric and hydrological circulations. The variation in temperature leads to change in evapotranspiration, rainfall pattern and flow quantity. Besides, there is always an uncertainty in projection of future climate and hydrological variables. This uncertainty is attributed to use of different General Circulation Models (GCMs), greenhouse gas emission scenarios, downscaling techniques and hydrological models. This research focuses on the uncertainty in future climate projection and its impact on hydrology of the Nam Ou River Basin under different GCMs and emission scenarios. Long Ashton Research Station -Weather Generator (LARS-WG) was used to downscale future climate for 2046-2065 and 2080-2099 periods under various GCMs and two scenarios A1B and A2. The impact of uncertainty in future climate on flow was studied using Soil and Water Assessment Tool (SWAT). Probability density functions (PDFs) were constructed to analyze uncertainty in future climate and flow of the basin. The result shows increase in maximum and minimum temperature in the future periods. Precipitation is observed to change in both positive and negative direction from the baseline, depending on the GCMs and emission scenarios used. Wide variation in temperature and precipitation is depicted during 2080-2099 compared to 2046-2065 under GCMs. Increase in inter-model variability and variance of the future projections were depicted towards the end of century.

Keywords: climate change, flow, GCMs, LARS-WG, Soil and Water Assessment Tool, uncertainty

---

Manisha Maharjan
Water Engineering and Management
Asian Institute of Technology (AIT), Pathumthani, Thailand
Email: Email:maneesha064@gmail.com
Mukand Singh Babel
Water Engineering and Management
Asian Institute of Technology (AIT), Pathumthani, Thailand
Email: msbabel@ait.asia
Shreedhar Maskey
Department of Water Science and Engineering,
UNESCO-IHE Institute for Water Education Delft, The Netherlands
Email: s.maskey@unesco-ihe.org

PAPER ID: TA02

CLIMATE CHANGE SCENARIO ON SURFACE WATER RESOURCE IN BANGNAMPRIAO DISTRICT, CHACHERNSAO PROVINCE

Charuvan Kasemsap [1, a *] and Suppakorn Chinvanno [2,b]

Abstract. Agriculture including paddy field, fruit farm and aquaculture, in Bangnampriao District, Chachernsao Province, are affected from drought, saline intrusion during January to May and also flood during October to November. The climate change scenario was forecasted by Global Circulation Model (GCM) as ECHAM4 under A2 greenhouse gas scenario and was downscaled using PRECIS regional climate model as base year of 1990 – 2009 and future year of 2040 – 2059. It was estimated that the average minimum temperature at nighttime has trend to increase from 25.14 to 25.6 degree Celsius whereas the average maximum temperature at daytime tends to increase from 34.88 to 35.37 degree Celsius during 2040 – 2059. Mean monthly minimum and maximum temperatures have possibly to increase in the range of 0.35 – 1.83 Degree Celsius. The simulation was indicated that the annual rainfall of the lower Chao Phraya River basin and Pasak basin as the watershed of this area have inclination to rise from 1,374 millimeter to 1,439 millimeter or approximately 5 percent. However, the rainfall during wet season (May – October) contributes to step up whereas that of dry season (November – April) leads to decline. In addition, the sea level rise along inner Thailand gulf, affected saline intrusion in this area through Bangpakong River, was likely to intensify. The increasing of annual sea level are 9.41 and 20.02 centimeter during 2010 – 2029 and 2030 – 2049, respectively. Climate change scenarios are necessary to apply appropriate adaptation strategies to minimize the impact of climate change.

Keywords: Climate Change, Scenario, Surface Water Resource, Bangnampriao District

Charuvan Kasemsap
Faculty of Graduate School
Kasem Bundit University Bangkok, Thailand
Email: charuvan.kas@gmail.com
Suppakorn Chinvanno
Southeast Asia START Regional Center,
Chulalongkorn University, Bangkok, Thailand
Email: Suppakorn.ccadaptation@gmail.com

PAPER ID: TA05

IMPACT OF CLIMATE CHANGE ON GROUNDWATER RECHARGE IN HO CHI MINH CITY AREA

Ha Quang Khai[1, a *], Sucharit Kooltanakulvong[2,b]

Over the past thirty years the climate has begun to change with increased tropical storms, and changes to precipitation and drought patterns. At the same time, groundwater abstraction is sharply increasing in 20 year recently. As a results, groundwater level is strongly decreasing in recent two decades. Besides, groundwater system in this area is strongly affected by climate factors. It seems likely that climate change will be more affected to groundwater in this monsoon Asia area. Consequently, assessment the impact of climate change on groundwater recharge is needed as the key to study impact of climate change on groundwater. However, in order to measure recharge nearly impossible, it must be quantified by indirect methods. Groundwater model is powerful tool to estimate recharge indirectly through by model calibration.
Therefore, this paper will develop a recharge function to establish relationship between climate factors as precipitation, evaporation and temperature with recharge rate under monthly time series data from 1993 to 2012 to be used for impact assessment on groundwater system in the Ho Chi Minh City area. In addition, though GCMs of CMIP5 seem to be more comprehensive than GCMs before, but they still have discrepancies compared with observed data. Hence, this paper will also approach a bias correction method as gamma – gamma transformation method and a spatial disaggregation method to downscale GCMs data. One GCM will be used as result of the selection one of three GCMs like MRI-CGCM3, CSIRO-MK3.6.0, and CMCC-CM model with scenarios RCP4.5 and RCP8.5. Evapotranspiration will be projected by applying the Penman – Monteith equation. The future precipitation, temperature and evapotranspiration will be inputs to recharge function developed to project recharge in Ho Chi Minh City Area in the future for impact assessment on groundwater recharge.

Keywords: Groundwater model, recharge, climate change, CMIP5, Bias correction, spatial disaggregation, Ho Chi Minh City.

Ha QuangKhai
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
quangkhai02@gmail.com
Sucharit Kooltanakulvong
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: Sucharit.k@.chula.ac.th

PAPER ID: TA06

COMPARATIVE EVALUATION OF STORM CHARACTERISTICS DERIVED FROM OBSERVED RAINFALLS AND GCM PRECIPITATION OUTPUTS

Yuan-Fong Su[1,a*] , Jun-Jih Liou[1,b] and Ke-Sheng Cheng[2, c]

Storm characteristics are critical for many hydrologic analyses, such as channel design and water resource management. Some previous studies compared the future changes of typhoon rainfall characteristics, in spatial and temporal, using dynamic downscaling data. However, the agreement between storm characteristics derived from observed rainfalls and GCM precipitation outputs remains unclear. Taiwan Climate Change Projection and Information Platform (TCCIP) project produced a set of dynamic and statistical downscaling data. To evaluate the storm characteristics, we need hourly data such as observed rainfalls and dynamic downscaling data. For the statistical downscaling data, we combined Weather Generator, Artificial Neural Network, and Stochastic Storm Rainfall Simulation Model to generate hourly rainfall from monthly change rate provided by GCM. We compared the typhoon rainfall characteristics including number of events, duration, total rainfall, and inter-event time, derived from observations, dynamic and statistical downscaling data sets. A bias correction of the dynamic downscaled data set was also conducted. Finally, with this comparative evaluation it is possible to learn the changes of storm characteristics in spatial and temporal. Furthermore, the uncertainty of these changes can also be evaluated.

Keywords: storm characteristics, dynamic downscaling, statistical downscaling.

Yuan-Fong Su
National Science and Technology Center for Disaster Reduction
New Taipei City, Taiwan.
Email: yuanfongsu@ncdr.nat.gov.tw
Jun-Jih Liou
National Science and Technology Center for Disaster Reduction
New Taipei City, Taiwan.
Email: jjliou@ncdr.nat.gov.tw
Ke-Sheng Cheng
Dept. of Bioenvironmental Systems Engineering
National Taiwan University, Taipei, Taiwan
Email: rslab@ntu.edu.tw

PAPER ID: TA07

INTRODUCTION TO TCCIP: DYNAMIC AND STATISTICAL DOWNSCALING AND ITS APPLICATIONS

Lee-Yaw Lin [1,a*], Yung-Ming Chen[1, b], Jung-Lien Chu[1,c], Chao-Tzuen Cheng [1,d], Jun-Jih Liou [1,e], Yun-Ju Chen [1,f] and Yuan-Fong Su [1,g]

The Taiwan Climate Change Projection and Information Platform Project (TCCIP) is one of the three national major projects on climate change in Taiwan since 2010. Since TCCIP phase 1 (2010-2012) has produced substantial results such as producing digitalized, homogenized, and gridded meteorological data sets and high spatial-temporal resolution data sets by statistical downscaling and dynamic downscaling; applying climate change data to the studies of disaster reduction and water resources management, publishing "Climate Change in Taiwan: Scientific Report 2011", and constructing TCCIP web service. The TCCIP also supports government agencies to develop climate change projects such as "Climate Change Impacts and Adaptation on Water Environment" project in Water Resource Agency (WRA), and the "National Adaptation Policy Frameworks for Climate Change" and "Adaptation Programmes of Action for Climate Change" approved by National Development Council (NDC) in 2012. Last year (2013) the TCCIP (phase 2 during 2013-2015) continues to play the major role in national climate change-related researches. This paper introduced some applications of dynamic and statistical data such as water-related disasters from a perspective of Intergraded Catchment Management and climate change risk maps of flooding, drought, coastal and slopeland disasters. In TCCIP phase 2, the applications of climate change data sets to agriculture and public health is also one of important focuses. For agricultural application, the future change of rice production in Taiwan was simulated using dynamic downscaling data.

Keywords: Climate change, dynamic and statistic downscaling data, water-related disasters.

Lee-Yaw Lin
National Science and Technology Center for Disaster Reduction
New Taipei City, Taiwan. Email: yaw@ncdr.nat.gov.tw
Yung-Ming Chen Email: ymchen@ncdr.nat.gov.tw
Jung-Lien Chu Email: jlchu@ncdr.nat.gov.tw
Chao- Tzuen Cheng Email: ctcheng@ncdr.nat.gov.tw
Jun- Jih Liou Email: jjliou@ncdr.nat.gov.tw
Yun- Ju Chen Email: yjchen@ncdr.nat.gov.tw
Yuan-Fong Su Email: yuanfongsu@ncdr.nat.gov.tw

PAPER ID: TA08

URBAN-INDUCED RAINFALL IN CHIANG MAI, THAILAND

Pawee Klongvessa[1, a*] and Minjiao Lu[1, b]

Urban-induced rainfall has been found in many cities all over the world. This research shows some trace of urban-induced rainfall in Chiang Mai, the largest city in the northern part of Thailand. The spatial distribution of total rainfall in Ping Basin, in where Chiang Mai is located, is studied in each of pre-monsoon, southwest monsoon and northeast monsoon periods from November 2009 to October 2013. The result shows that Chiang Mai has higher rainfall amount than the surrounding area during all southwest monsoon periods of these 4 years, while during most of the pre-monsoon and northeast monsoon periods, the rainfall amount in Chiang Mai is not far different from that in the surrounding area. However, the data of 850 hPa level wind, sea level pressure, and specific humidity suggest that the rainfall amount in Chiang Mai can be higher than that in the surrounding area during pre-monsoon and northeast monsoon periods when the additional humidity from the ocean is brought the area.

Keywords: Urban-induced Rainfall, Chiang Mai, Thailand, Ping Basin, Monsoon

KLONGVESSA Pawee
Nagaoka University of Technology,
Department of Environmental Systems Engineering,
Graduate School of Engineering, Japan
Email: nineboon@hotmail.com
LU Minjiao
Nagaoka University of Technology,
Department of Environmental Systems Engineering,
Graduate School of Engineering, Japan
Email: lu@nagaokaut.ac.jp

PAPER ID: TA09

BAIS CORRECTION TEST OF SIMULTED RAINFALL FROM PRECIS USING ADJUSTMENT FACTORS BASED ON DISTRIBUTION MAPPING.

Kowit Boonrawd[1, a] Chatchai Jothityangkoon[1, b]

To reduce uncertainty and risk of projection bias of regional climate model (RCM) simulation in climate change studies, many bias correction approaches have been developed to manage these biases. The simple one is distribution mapping based on derived adjustment factors (AF), which is the ratio between observed and simulated rainfall for a given frequency of occurrence. Five methods are used to estimate the distribution between adjustment factors and exceedance probability. Method 1, AFs are derived from all daily rainfall data and used to shift distribution of daily rainfall intensity. Method 2,temporal scaling of input rainfall data is changed from daily to monthly. Method 3 is similar to Method 2, the difference is AFs are used to adjust distribution of daily rainfall. For Method 4,seasonal AFs are derived from monthly rainfall data for each month of all years and used to shift distribution of monthly rainfall of each month.Method 5 is the combination of Method 4 for the first step and Method 1 for the second step. These methods are tested to correct simulated rainfall from Providing Regional Climates for Impacts Studies (PRECIS) and ECHAM4 climate modelswith resolution 0.2 x 0.2 degree (grid size 20x20 km) daily time step, baseline period from year 1982-2005. The performance of all methods is evaluated by using the plot of inter-annual variability, intra-annual variability and daily intensity distribution against exceedance probability. The best improvement of simulated rainfall is achieved with Method 5.

Keywords: RCMs, Climate change, frequency of occurrence, exceedance probability

Kowit Boonrawd
School of Civil Engineering, SuranareeUniversity of Technology
111 University Avenue, Muang District NakhonRatchasima30000
Email: kowit_b@hotmail.com
Chatchai Jothityangkoon
School of Civil Engineering, SuranareeUniversity of Technology
111 University Avenue, Muang District NakhonRatchasima30000
Email: cjothit@sut.ac.th

PAPER ID: TA11

UNCERTAINTY OF STREAM FLOW UNDER CLIMATE CHANGE SCENARIOS USING STATISTICAL DOWNSCALING DATA

Yun-Ju Chen, Yuan-Fong Su, Jun-JihLiouand Yung-Ming Chen

Based on recent studies of climate change, trend assessment of future climate, under global or continental scale, could be carried out confidently. However, the results may have inevitable uncertainty which should not be neglected for impact studies of climate change. The uncertainty analyzed climatic projections include uncertainty in future emissions of greenhouse gases, in modeling global climate and downscaling resolutions (25km2 and 5km2), while the naturel variable is assessed through data resampling. Statistic downscaling method and weather generator are applied in this study, in order to solve the problem which users need higher resolution and daily sequence data to assess impact under climate change. After downscaling and weather generation, we can get precipitation and temperature monthly change of GCM at 25 km scale and precipitation and temperature daily data in a station in Taiwan. A lump and physical mechanisms hydrological model- GWLF model is applied to assess streamflow impacts under climate change. There are four main catchments, including Dansuie River, Dajia River and Zengwun River and Kaoping River, to assess the likely impacts for two future time periods; the 2020~2039, and 2080~2099. This study also discussed the characteristic of precipitation and the change of streamflow of near future and end of 21st century under different emission CO2 scenarios from the result of 24 GCMs. We also choice of suitable GCMs for the users based on characteristic of rainfall change rate in wet and dry spell and performance of East Asia monsoon by GCM simulation result.

Keywords: streamflow, resolution, scenario, GWLF

Yun-Ju Chen
National Science and Technology Center for Disaster Reduction, Taiwan
Email: yjchen@ncdr.nat.gov.tw
Yuan-Fong Su
National Science and Technology Center for Disaster Reduction, Taiwan
Email: yuanfongsu@ncdr.nat.gov.tw
Jun-JihLiou
National Science and Technology Center for Disaster Reduction, Taiwan
Email: jjliou@ncdr.nat.gon.tw
Yung-Ming Chen
National Science and Technology Center for Disaster Reduction, Taiwan
Email: ymchen@ncdr.nat.gov.tw

PAPER ID: TA12

APPLOCATION OF A LAND SURFACE MODEL FOR BIAS CORRECT OF RUNOFF GENERETION DATA FROM MRI-AGCM3.2S DATASET

DUONG DucToan, TACHIKAWA Yasutoand YOROZU Kazuaki

In climate change researches, general circulation models or global climate models (GCMs) have been the most promising tools to project future changes and associated impacts in the hydrological cycle. However, there are biases in GCM outputs due to the coarse spatial resolution, simplified physics processes, numerical schemes, etc. Those biases should be corrected before using GCM data in climate change impact studies.

In this study, runoff generation data from the MRI-AGCM3.2S dataset were fed into distributed flow routing model 1K-FRM to project river discharge under a changing climate. Flow routing model 1K-FRM was developed in the Hydrology and Water Resources Research Laboratory, Kyoto University. The MRI-AGCM3.2S is the latest version of super-high-resolution atmospheric general circulation model which was jointly developed by Japan Meteorological Agency (JMA) and Meteorological Research Institute (MRI). Two river basins located in Kyushu (Japan) were selected as study areas, the Chikugo river basin and the Oyodo river basin.

Since the observed runoff generation data is not available, the land surface model Simple Biosphere including Urban Canopy (SiBUC – Tanaka, 2005) was applied to reproduce runoff generation data to use in bias correction of the MRI-AGCM3.2S's output. SiBUC model was developed in the Disaster Prevention Research Center, Kyoto University. Corrected runoff generation data were used to project river discharge and examine the changes in river discharge in those two basins under a changing climate.

Keywords: Land surface model, SiBUC, flow routing model, 1K-FRM, bias correction, MRI-AGCM3.2S.

DUONG Duc Toan
Graduate School of Engineering, Kyoto University, Japan
Email:duong@hywr.kuciv.kyoto-u.ac.jp
TACHIKAWA Yasuto
Graduate School of Engineering, Kyoto University, Japan
Email:tachikawa@hywr.kuciv.kyoto-u.ac.jp
YOROZU Kazuaki
Graduate School of Engineering, Kyoto University, Japan
Email:yorozu@hywr.kuciv.kyoto-u.ac.jp

PAPER ID: TA13

River Discharge Assessment under a Changing Climate in the Chao Phraya River, Thailand by using MRI-AGCM3.2S

Supattana WICHAKUL[1, a *], YasutoTACHIKAWA[1, b], Michiharu SHIIBA[1, c] and Kazuaki YOROZU [1,d]

In recent years, outputs of a general circulation model (GCM) were widely used in climate change impact studies. It is the effective tool for well understanding of a changing climate behavior in long term. Nowadays, more than twenty GCMs have been developed in many research institutes around the world. We selected the latest version of GCM developed by Meteorological Research Institute (MRI), Japan Meteorology Agency, MRI-AGCM3.2S. The model has a horizontal resolution of triangular truncation 959 (TL959), and the transform grid uses 1920 x 960 grid cells, corresponding to approximately a 20-km grid interval with 64 vertical layers (top at 0.01 hPa).We used a regional distributed hydrologic model based on the concept of the variable infiltration capacity to generate runoff intensity and a kinematic wave model including effects of dam operation and inundation to simulate river discharge. The C.2 gauging station at NakhonSawan was selected to monitor changes in the river discharge.Input data to the distributed hydrological model, GCM precipitation and evapotranspiration, were corrected to remove biases using the quantile-quantilebias-correction method for precipitation and the different factor bias-correction method for evapotranspiration. The results from projection discharge of the Chao Phraya River for the near climate future (2015-2043) and the future climate (2075-2103) experiments by using the bias-corrected GCM data set showed that 1) the mean annual discharge tends to increase in both near future and future projection periods, 2) During a dry season the tendency of low flow in the near future period leads to decrease. However, the flood frequency analysis using Generalized Extreme Value distribution (GEV) indicates that flood risk in the future will have more severities and damages to the country; especially in the near future the magnitude of 80-year return period flood is greater than the devastating 2011 Thai flood.

Keywords: Climate change, Discharge projection, Chao Phraya River, Distributed hydrological mode

S. Wichakul
Email: supattana.w@gmail.com
Research assistant at department of civil and earth resources engineering, Kyoto University, Japan
Y. TACHIKAWA, Professor
Department of civil and earth resources engineering, Kyoto University, Japan
Email: tachikawa@hywr.kuciv.kyoto-u.ac.jp
M. SHIIBA, Professor
Department of civil and earth resources engineering, Kyoto University, Japan
Email: shiiba@hywr.kuciv.kyoto-u.ac.jp
K. YOROZU, Assistant professor
Department of civil and earth resources engineering, Kyoto University, Japan
Email: yorozu@hywr.kuciv.kyoto-u.ac.jp

PAPER ID: TA15

DESIGNED INTENSITY-DURATION-FREQUENCY (IDF) CURVESUNDER CLIMATE CHANGE CONDITION IN URBAN AREA

Ashish Shrestha, SutatWeesakul, Mukand Singh Babel and Zoran

Intensity-Duration-Frequency curves (IDF) are essential for design of storm drainage network especially in the urbanized area where surface runoff is high and localized flooding usually occurs. Climate change is expected to affect the rainfall pattern, prediction of future change in IDF is crucial and important for quantify this change of urban rainfall magnitude. This paper is based on a case study in a capital of Thailand, Bangkok. The objective of study is to develop IDF curves for future climate using stochastic weather generator LARS WG and rainfall disaggregation using HYETOS model which is based on Bartlett Lewis Rectangular Pulse process theory. Field data from Thai Meteorological Department (TMD) from 1980 to 2010 are used. Climate change impact study using Statistical Down Scaling Model (SDSM) and Long Ashton Research Station Weather Generator, (LARS WG) on future climate scenarios showed that LARS WG is more accurate in predicting extreme rainfalls and thus 15 GCMS results are analyzed under SRA1B and SRA2 scenarios for future time periods of 2011-2030 and 2046-2065. IDF curves for present and future cases are developed, using annual maximum series and Gumbel distribution, on sub-daily or hourly scale using observed, downscaled and disaggregated data. Statistical properties of maximum daily rainfall are preserved. IDF curves derived from disaggregated data showed underestimation especially in short rainfall durations less than 6 hours compared to IDF from observed station data. The graphical correction of IDF curves is derived from the existing IDF and the one computed from the present study. The correction equation is proposed using higher order equation which can be applied for variety of return period and all range of rainfall durations. This is improvement from the existing proposed linear correction from other study, which is limited applicable only for rainfall duration greater than 6 hours. The uncertainty band in intensities from different GCMs is found to be greater for higher return period. Further the results showed comparative increments in intensities while considering two particular GCMs of interest in SRA1B and SRA2 scenarios; and return periods of 2, 5 and 20 years. The same methods can be applied to other locations especially large cities to obtain designed IDFs under future climate scenarios.

Keywords: Urban Drainage, Intensity-Duration-Frequency Curves, Climate Change, future Climate.

Ashish Shrestha
Asian Institute of Technology (AIT), Thailand, Email: ashish@ait.ac.th
Sutat Weesakul
Asian Institute of Technology (AIT), Thailand, Email: sutat@ait.ac.th

PAPER ID: TA16

EVALUATION OF PRECIPITATION OVER NORTHERN THAILAND IN CMIP5 MRI-CGCM3 SIMULATIONS

Parichat Wetchayont [1, 3, a *] and Srilert Chotpantarat[1, 2, b]

The objective of this study is to validateprecipitationtrends from a climate model, MRI-CGCM3, which participates in theCoupled Model Intercomparison Project Phase 5 (CMIP5).We focused on historical simulations over continental area in northern Thailand during 2000-2005. The CMIP5 MRI-CGCM3precipitationsagainst rain gauge observations, quantifying seasonal pattern and biases for precipitation distributions were analyzed. Precipitation seasonality of CMIP5 historical simulations from the CMIP5 MRI-CGCM3 was examined using observational datasets. Seasonal and annual precipitations are evaluated on a global scale for 6-year precipitation gridded datasets.
Daily precipitation data recorded from 29 rain gauges over northern Thailand for the period 2000–2005 are used to evaluate spatial and temporal characteristics of precipitation variations in the CMIP5 MRI-CGCM3. The rain gauges analysis over northern Thailand shows that there are two peaks of precipitation during the monsoon onset: first in May and second in September. Comparison of daily rain gauges with the CMIP5 MRI-CGCM3 precipitation shows underestimation, especially the second precipitation peak in September. The mean annual precipitation underestimation was 3 mm $day^{-1}$to 4 mm day^{-1}over the study domain.The CMIP5 MRI-CGCM3 precipitation performed more days with no rainfall.However, there are large uncertainties in the simulation of regional scale precipitation trends.
Scatterplots show that the CMIP5 MRI-CGCM3 precipitation product has large bias and it misses the observed heavy precipitation that occurred in September. Statistics analysis represented the CMIP5 MRI-CGCM3 product underestimates the rain event separations and the event conditional rain rates when compared to the rain gauges. This study points to the need to further improve the CMIP5 MRI-CGCM3 precipitation and improve the estimation of heavy rainfall events in late of year over northern Thailand area.

Keywords: CMIP5, MRI-CGCM3, rain gauge, precipitation, Northern Thailand

---

Parichat Wetchayont, Srilert Chotpantarat
Department of Geology, Faculty of Science,
Chulalongkorn University, Bangkok, Thailand
Email: csrilert@gmail.com
Srilert Chotpantarat
Center of Excellence on Hazardous Substance
Management (HSM), Chulalongkorn University, Bangkok 10330, Thailand
Email: csrilert@gmail.com
Parichat Wetchayont
Environmental Engineering and Disaster
Management Program, Mahidol University, Kanchanaburi, Thailand
Email: pwetchayont@gmail.com

PAPER ID: TA17

CLIMATE CHANGE IMPACT ON GROUNDWATER RECHARGE IN PLAICHUMPOL IRRIGATION PROJECT, THAILAND

Chokchai suthidhummajit [1, a] *, Sucharit Koontanakulvong[2,b]

The Plaichumpol Irrigation Project, in Nan Basin of Thailand, where farmers depended on both surface water and groundwater. Though the Sirikit Dams, store water to be used during dry period and most of agricultural area is in the irrigation project area, water allocated is limited and caused water shortage during dry season. Most of farmers turn to use groundwater to supplement irrigation water in the dry year. Groundwater resources are related to climate change through the direct interaction with surface water resources, and indirectly through the recharge process. The direct effect of climate change on groundwater resources depends upon the change in the volume and distribution of groundwater recharge.

This study will develop the formula in terms of precipitation, evaporation and temperature and soil type with recharge rate under monthly time series data and to study the impact of climate change on groundwater recharge based on future climate scenario. The study used the bias-corrected MRI-GCM data to project the future climate condition and assess the impact on groundwater recharge. The groundwater flow model, MODFLOW, was used to determine groundwater flow movement and recharge parameter. The recharge mechanism, in this study consider only through land recharge, were analyzed in term of soil type data, rainfall and evaporation data and the field experiment data of groundwater flow characteristic in unsaturated zone for formulating the groundwater recharge rate based on soil water balance concept. The result of this study will be the formula for each soil type and the change in groundwater recharge in the climate change scenario and used for guiding the suitable use and yield determination of the aquifer for proper adaptation measures in the future

Keywords: Climate Change, groundwater recharge, Nan basin, Irrigation Project

---

Chokchai Suthidhummajit
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: chokchai.s@chula.ac.th
Sucharit Koontanakulvong
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: sucharit.k@chula.ac.th

PAPER ID: TA19

RAINFALL-RUNOFF-INUNDATION SIMULATION WITH BIAS-CORRECTED SATELLITE BASED RAINFALL: CASE STUDY YOM RIVER BASIN

Teerawat Ram-Indra, AnurakSriariyawat and PiyatidaHosisungwan

Yom River is an upstream branch of the Chao-Phraya River, located in the northern part of Thailand. The upper part of Yom catchment is mountainous area with limited numbers of rainfall stations. Satellite based rainfall is capable for providing information about intensity and spatial distribution of precipitation for the areas that do not have rain gage stations. However, the satellite based rainfall still needs calibration and validation with existing rainfall stations due to the indirect measurements. Two bias correction methods, i.e. Distribution transformation and Geographical differential analysis, were used for calibrating satellite based rainfall data from Tropical Rainfall Measuring Mission (TRMM) with rain gauged network for temporal and spatial rainfall pattern in Yom river basin. The effectiveness of adjusted rainfall data was justified by streamflow data and inundation areas, which were the results of flood simulation using the rainfall-runoff-inundation (RRI) model. Comparison between the simulation results and observed stream flow data in terms of coefficient of determination (R2) and root mean square error (RMSE) were used to validate for effectiveness, while the inundation area were compared with observed flood maps in terms of shape factor.

Keywords: bias correction method, satellite based rainfall, flood simulation, rainfall-runoff-inundation

---

Teerawat Ram-Indra
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: teerawat.ram@gmail.com
Anurak Sriariyawat
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: anurak.s@eng.chula.ac.th
Piyatida Hosisungwan
Department of Water Resources Engineering, Faculty of Engineering,
Chulalongkorn University, Bangkok, Thailand
Email: hpiyatida@gmail.com

Session B

Participatory Management for Water and Irrigation Project

INVITED PAPER B01

CAN REGIONAL CLIMATE MODELS PROVIDE PROXIES FOR SUSTAINABLE WATER RESOURCES MANAGEMENT OVER DATA SPARSE REGIONS?

Shie-Yui Liong1,2*, Minh Tue Vu1 , San Chuin Liew1 and Srivatsan V Raghavan1

This paper presents applications of regional climate model data as good proxies over some data sparse Southeast (SE) Asia regions. Lack of good quality and/or long record rainfall data are common in SE Asia. This situation leads to challenges in, for examples, deriving reliable storm drainage design curves, assessing flow rate in transboundary catchment, anticipating flow rate for hydropower station and overall effective multiple water resources management. Two applications are discussed in this paper: (1) storm drainage design (Intensity-Duration-Frequency curves), and (2) transboundary catchment water resource management. The proposed proxy data come from dynamically downscaled reanalyses data for the domain of interest. In this study, a Regional Climate Model (RCM), Weather Research and Forecasting (WRF), was used for the entire SE Asia. The proxy data for the current climate were derived from WRF, for the SE Asia domain at a high spatial resolution of 30 × 30 km. For data sparse sites it is absolutely crucial to apply regional frequency analysis by using downscaled reanalyses data as proxies to derive IDF curves with longer records. The proposed approach has been successfully demonstrated and implemented on Singapore, Jakarta and Vietnam regions. Another issue is the trans-boundary problem where data sharing between two countries is often a challenge. This paper discusses scenarios over a transboundary catchment, Da River catchment, where upstream lies in the Chinese territory while the downstream lies in the Vietnamese territory. The Soil and Water Assessment Tool (SWAT) model was applied for hydrological simulations using the output derived from the WRF model. The findings suggest that precipitation data originated from downscaling are very useful proxies for the applications discussed herein.

Keywords: Dynamical downscaling, Proxy data, IDF, Trans-boundary

---

S.-Y. Liong, M.T. Vu, S.C. Liew, S.V. Raghavan
Tropical Marine Science Institute
National University of Singapore
tmslsy@nus.edu.sg
S.-Y. Liong
Willis Research Network
Willies Re Inc.,
London, United Kingdom

INVITED PAPER B02

CLIMATE CHANGE MITIGATION: WATER AND ENERGY NEXUS IN URBAN ENVIRONMENTS

Dr. TamimYounos

Energy demand for water infrastructure continues to increase globally due to growing population, increasing potable water demand and wastewater generation. In general, urban areas are characterized by high population density, high potable water demand and wastewater generation, and therefore energy consumption for water services in urban environments is substantial and constitute a significant portion of total energy resources consumed around the world. At present, energy is mostly extracted from fossil fuels and it's recognized that fossil fuel-based energy production and consumption is major contributor to global climate change. Worldwide, there is a significant need to develop adaptation and mitigation strategies to cope with climate change. The objective of this paper is to discuss mitigation strategies for reducing fossil fuel-based energy use in water infrastructure. Mitigation strategies discussed include energy use efficiency for water source development, water and wastewater treatment, and water distribution; approaches for water conservation by consumers; implementing decentralized water infrastructure such as rainwater harvesting systems and small-scale packaged water treatment systems; and using renewable energy. Concepts and case studies related to climate change mitigation described in this paper can serve as a guide for providing safe water to global communities with a reduced carbon footprint. However, there is a need for developing structured strategies, financial incentives and regulations so that these systems become a norm in developing and implementing futuristic water infrastructure around the world.

Keywords: water infrastructure, energy consumption, water conservation, decentralized water systems, renewable energy

Tamim Younos
The Cabell Brand Center for Global Poverty and
Resource Sustainability Studies
Roanoke, Virginia USA
Email: tyounos@gmail.com

INVITED PAPER B03

INTEGRATED STUDY OF THE WATER-ECOSYSTEM-ECONOMY IN THE HEIHE RIVER BASIN AND ITS IMPLICATION FOR WATER RESOURCE MANAGEMENT IN WORLD'S INLAND RIVER BASINS

Xin Li, Guodong Cheng

The competition for water betweeneconomy and ecosystem is getting moreintense in inland river basins all over the world. In all of these cases, the water, the ecosystem and the economy are closely interrelated. Therefore, the solution to this problem must involve the careful and rational use of the limited water resources in such a way that not only supports economic development but also sustains the health of the ecosystems.

The Heihe River Basin(HRB) is a typical inland river basin located in arid region of northwest China. It alsoacts as an experimental watershed where integrated studies of the water-ecosystem-economyhave been carried out. Scientific research has been playing a key role in supporting ecosystem rehabilitation in the HRB. In 2000, based on a large amount of previous research work, an ecological water diversion project was successfully implemented by the central government of China, and as a result, the severe deterioration of ecosystems in the downstream areas of the HRB has been greatly alleviated. However, there are also negative influencesin other parts of the river basin. On the whole, how to manage the water resources is still a big challenge.

To address these challenges, an integrated platform, which incorporates monitoring, modelling and data manipulation, has been developed to support the integrated study in the HRB. Integrated models have beenused for understanding complex interactions within the ‘water–soil–air–plant–human’ continuumand some decision support systems have been developed. Futurework is to develop a fully integrated water–ecosystem–economy model and a spatial explicitDSS that takes integrated scientific modelsas its framework for supporting sustainabledevelopment of the river basin.We believe that the experiences in the HRB areuseful for sustaining both the ecological healthand socio-economic development of otherinland river basins.

Keywords: Integrated study, inland river basin, arid region, integrated river basin management

Xin Li, Guodong Cheng
Cold and Arid Regions Environmental and Engineering Research Institute,
Chinese Academy of Sciences
Email: lixin@lzb.ac.cn

PAPER ID: TB01

PARTICIPATORY APPROACH ON MANAGEMENT OF COMMIMAL IRRIGATION SYSTEMS IN UPLAND AREAS: CASE STUDIES OF WATER GOVERNANCE IN THREE PROVINCESOF NORTHERN LUZON

Agnes M. Ramos, Orlando F. Balderama

The study was conducted in three provinces in Northern Philippines to assess the impact of participatory approach for development and management system employed for Communal Irrigation System (CIS) which are owned and operated by Irrigators Association (IA).

In terms of net present value, internal rate of return and payback period, positive economic impact was due to increase in productivity and cropping intensity. Across all crops, average productivity per hectare was highest in vegetable producing areas.

The social impact, at the organization level, revealed the following benefits; 1) recognition of new leaders; 2) improved leadership and organizational skills; 3). increased participation of members in IA related activities; 4) enhanced cohesiveness among members and 5) better partnership and mutual existence between Local Government Unit (LGU) and the IA's. The LGU – IA partnership encouraged maximum utilization of the project as evidenced by increased cropping intensity and crop diversification.

The sustainability of the CIS are ensured through; (a) the internalized rules in the proper usage and maintenance of the systems ;(b) security of community livelihood against water scarcity and (c) improved leadership capabilities and high level of control in the IAs. Generated information and lessons learned are strategic information for proper governance of water resources in the upland areas.

Keywords: communal irrigation system, irrigators' association, economic impact, social impact

Agnes M. Ramos
College of Business and Management, Isabela State University, Philippines
aisuagnesramos@yahoo.com
Orlando F. Balderama
Department of Agricultural Engineering, Isabela State University, Philippines
Email: borly_isu@yahoo.com

PAPER ID: TB02

ASSESSMENT OF WATER REQUIREMENT OF CHULSA RICE BY USING CROPWAT MODEL

Mrs. Men Nareth

Abstract. Field experiment with the dimension of 47.7m × 55.5m were performed at Cambodian Agricultural Research and Development Institute (CARDI), Cambodia, from February 01, 2014 to May 11, 2014 to calculate the reference and actual crop evapotranspiration, derived the crop coefficient, and collected requirements input data for the CROPWAT model to estimate the crop water requirements of Chulsa rice, 100 days growing period. The rice crop coefficients were divided in two types, Kc (wet) were 1.05, 1.1, 1.2, 1.05, and Kc (dry) were 0.3, 0.5, 1.05, 0.7; in the initial, development, mid-season and late-season stages, respectively. With implementation of CROPWAT model, followed FAO Paper No 56 Penman-Monteith method, the annual evapotranspiration was 518 mm.

In the field, the rice water requirements and average of evapotranspiration are 518 mm and 5 mm/day. In the initial stage, ETc is around 73 mm, but ETc much increases in mid-season, approximately 180 mm, while ETc in the development is around 150 mm, and 116 mm at the late-season stage.

Keywords: Crop water requirement, Rice, Crop coefficient, Evapotranspiration, CROPWAT model, Cambodia

Men Nareth
Department of Rural Engineering
Institute of Technology of Cambodia, ITC
Phnom Penh, Cambodia.
Email: nareth@itc.edu.kh

PAPER ID: TB05

ANALYSIS OF HYDROLOGIC VARIABLES CHANGES RELATED TO LARGE SCALE RESERVOIR OPERATION BY USING MANN-KENDALL STATISTICAL TESTS IN THAILAND

MANEE Donpapob, TACHIKAWA Yasuto and YOROZU Kazuaki

recently, global warming or climate changes have significantly affected various hydrologic processes. The large scale of multiple purposes reservoir is one of countermeasure structure to manage and design both flood and drought problems. Therefore, the forecasted hydrological data is very important. It will help the operators to support their decision making to release the water subjected to the rules or constraint in advance and be consisted of the development plan in future. This study is to apply a Mann-Kendall (MK) statistical trend test, which can detect the increasing, decreasing or trendless significant phenomena of inflow, release, storage volume and rainfall to reservoir in Thailand from starting historical operation recorded data. There are five large scale reservoirs which are located in northern and central parts of Thailand, are selected to analysis with rainfall data over the Ping river basin (Bhumibol Dam) , Nan river basin (Sirikit Dam), Pasak river basin (PasakJolasid Dam) and Mae Klong river basin (Srinagarind and Vajiralongkorn dams). Those reservoir operations time series consist of monthly, mean annual, maximum annual and minimum annual of inflow, release and rainfall were analyzed and consider many aspects of change for magnitude of various events. The results found generally increasing significant trends in dry season of release flow in all reservoirs. The future work will examine the effected of climate change to reservoir by using GCM data, hydrological and reservoir operation model to evaluate hydrologic variable changes in near and far future.

Keywords: Trend Analysis, Mann-Kendall test

MANEE Donpapob
Doctoral Student at Department of Civil and Earth Resources Engineering, Kyoto University, Japan
Japan, Kyoto University Katsura Campus, Nishikyo-ku, Kyoto 615-8540, Japan, Tel. (+81)75-383-3365
Email: amanee.donpapob.85v@st.kyoto-u.ac.jp
TACHIKAWA Yasuto
Professor at Department of Civil and Earth Resources Engineering, Kyoto University, Japan
Japan, Kyoto University Katsura Campus, Nishikyo-ku, Kyoto 615-8540, Japan, Tel. (+81)75-383-3365
Email: tachikawa@hywr.kuciv.kyoto-u.ac.jp
YOROZU Kazuaki
Assistant Professor at Department of Civil and Earth Resources Engineering, Kyoto University, Japan,Kyoto University Katsura Campus, Nishikyo-ku, Kyoto 615-8540, Japan, Tel. (+81)75-383-3365
Email: yorozu@hywr.kuciv.kyoto-u.ac.jp

PAPER ID: TB06

Effect of AWDI Practices on GHG Emission in a Small Scale Lysimeter

Mr. Ishwar Pun, Japan

Rice is the most important cereal crops in the world. The demand of rice is rising with the increasing population. Rice paddy fields are thought to be major GHG emitter. There are several studies to reduce the GHG emission from paddy field by applying AWDI (Alternate Wetting and Drying Irrigation). AWDI is a practice of water application in paddy field intermittently during rice growing period. The study was conducted in small scale lysimeter (500X160) cm2 on the roof top of the University of Tokyo, Kashiwa campus. The study was conducted from May to December, 2013. The transplanted rice nursery was koshihikari. Water management depending on rainfall was applied throughout the experiment. The lysimeter was left in natural condition without application of fertilizer.

The main objective of the research is to make clear mechanism of GHG emission by observing the depth-wise soil characters. For the observation, pH, Eh, temperature and moisture of the soil were measured in depth-wise. At the same time, gas sampling was performed depending on the ponding condition of lysimeter. For the observation of plants development plant height, tillers, leaves, spikelet and grain yield were counted. The 12 rice plants were selected randomly to check the yield component. Compare to four independent variables plant height, leaves, tillers and spikelet, number of grain yield shows the correlation with no of spikelet and then with no of tillers. Further, gas data will be analyzed to understand the GHG emission and soil condition of lysimeter.

Keywords: GHG, Lysimeter, AWDI (Alternate wetting and Drying Irrigation), Soil Redox Potential, Ponding depth, Soil temperature

Ishwar Pun
Tokyo University, Japan
Email: punisr@gmail.com

PAPER ID: TB07

IRRIGATION DEMAND AND THE FLOOD RETENTION POTENTIAL BY CHANGING OF CROPPING CALENDER OF THE IN-SEASON RICE AND OFF- SEASON IN CHAO PRAYA BASIN AREA

Songsak Puttrawutichai, Buncha Kwanyuen and Thongplew Kongjun

The Chao Phraya river basin covers area of 157,926 sq.km., which is about 30 percent of Thailand area. The basin drains into the gulf of Thailand. Bangkok, the city of more than 8 million people, is located near the mouth of the Chao Phraya river.

The Chao Phraya river basin is Thailand's largest and most important geographical unit in terms of land and water resources development. Irrigation projects in the Chao Phraya river basin consist of 26 large projects, 14 medium projects, and 119 small projects, located in 15 provinces. Total project area is 70.4 percent of the Chao Phraya river basin. This area often suffers from water shortage and flooding. Therefore, water operation is essential for the prosperity of the area.

The headwaters of the Chao Phraya river originate in the mountainous terrain of the northern part of the country and consist of four large tributaries: the Ping, Wang, Yom and Nan rivers. There are three large reservoirs in the Upper Chao Phraya area including Bhumibol Dam, Sirikit Dam and KhwaeNoiBamrungdan Dam. In 2011 the Chao Phraya river basin had a large flood. It is considered to be the worst damage in the history of Thailand, extensive damage and losses which amounted to THB 1.43 trillion. The extreme flood harshly attacked the urbanized low-lying area, and caused heavy economic damage by disrupting production activities in industries for several months.

The changing of cropping pattern by adjusting the calendar of paddy transplanting from year round (3 crops/year) to 2 crops per year, which breaking period is in August – November. This approach reduces the flood damage, by diverting water into no cultivating paddy fields as retention area. Thus, it reduces flood peak in the Chao Phraya basin area.

The main motives of this research are irrigation demand and the flood retention potential. The changing of cropping calendar of the In-season rice and Off-season rice has the impacts directly on the irrigation demand. It is to calculate to what extent the capacity the flood retention potential in such areas is, where water diversion is planning to, in Chao Phraya river basin area.

Keywords: Chao Phraya River Basin, Cropping Calendar, Irrigation Demand and Flood Retention Potential

Songsak Puttrawutichai
Faculty of Engineering at Kamphaengsaen Kasertsart University, Thailand
Email: songsak.tee@gmail.com
Buncha Kwanyeun
Faculty of Engineering at Kamphaengsaen Kasertsart University, Thailand
Email: fengbak@ku.ac.th
Thongplew Kongjun
Office of Water Management and Hydrology, Royal Irrigation Department, Thailand
Email: tkongjun35@yahoo.com

PAPER ID: TB10

BENCHMARKING FOR PERFORMANCE ASSESSMENT OF IRRIGATION SCHEMES: COMPARISON OF NATIONAL IRRIGATION SYSTEMS (NIS) AND COMMUNAL IRRIGATION SYSTEM (CIS) IN CAGAYAN RIVER BASIN, PHILIPPINES

Eduardo Ramos [1,a], Orlando Balderama, [2,b]

Degradation of irrigation schemes, low and variable land productivity, and inefficient use of production inputs are major concerns in the country today. That prompted this benchmarking analysis of three-small and one-large irrigation schemes located in the Cagayan River Basin. The objectives were to establish benchmarks for both productivity and performance of irrigation schemes along the valley, and to determine whether Communal systems function better than NIS or large schemes.

The performance evaluation study of the systems composed of three performance indicators, based on three (3) domains (a) System Operation Performance (b) Agricultural Productivity and Economics, and (c) Financial Performance. Each indicator was assessed based on the prescribed descriptors used by the International Water Management Institute (IWMI) and Food and Agriculture Organization (FAO).

Analysis showed an overall system performance efficiency of 59%, 55%, 47% and 36% for NIA-MARIIS, Lucban, Garab, and Divisoria CIS's, respectively. In terms of annual productivity performance, Lucban CIS dominates the three other systems with 0.35 kg m-3, which was classified moderately performing system while the rest were classified with low productivity index; financial sustainability of the systems were extremely poor with cost recovery ratio of 0.00, 0.33, 0.41 and 0.49 for Divisoria, Garab, Lucban and MARIIS, respectively, which were exceptionally below the standard value of at least one (1). Also, analysis of the indicators revealed that, on average, large schemes performed similarly to small-scale schemes, but small schemes were more variable, particularly in input-use efficiency.

Keywords: national irrigation system, communal irrigation system, cagayan river basin, performance indicators

---

Eduardo Ramos
Magat River Irrigation System, National Irrigation Administration,
Isabela Philippines
Email: aisuagnesramos@yahoo.com
Orlando Balderama
Isabela State University, Philippines
Email: borly_isu@yahoo.com

Session C

Emerging Technologies in Water and Environment Management

INVITED PAPER C01

Assessment of climate change impact on large scale flooding - a case study in the Chao Phraya River Basin via new modeling technology

Takahiro Sayama[1], Yusuke Yamazaki[1], Yuya Tatebe[1, 2], Akira Hasegawa[1] and Yoichi Iwami[1]

Assessing the impact of climate change on large-scale flooding is one of the major concerns for water management. This paper presents a method to evaluate the impact of climate change by using GCM output and a Rainfall-Runoff-Inundation (RRI) model. The GCM used in this study is MRI-AGCM3.2S and MRI-AGCM3.2H, the former of which is the finest spatial resolution GCM in the world (20 km), while the latter of which (60 km) is used as the ensemble members with different cumulous schemes and sea surface temperature clusters to assess the uncertainty. The RRI model simulates river discharge and inundation simultaneously at the river basin scale. In particular, this study focuses on the Chao Phraya River basin in Thailand to evaluate how the frequency of the devastating flood like the one in 2011 will change in future under SRES-A1B scenario (2075-2099). The simulation results indicated the possible increase in average monsoon rainfall by approximately 1.1 times and the average flood inundation volume by 1.4 times, and accordingly shorten the return period of the large scale flooding in the future.

Keywords: Climate change, Rainfall-Runoff-Inundation Model, Chao Phraya River, Thai flood, Sensitivity, AGCM

1 International Center for Water Hazard and Risk Management (ICHARM), Public Works Research Institute, Tsukuba, Japan
2 Currently at CTI Engineering, Co. Ltd., Tokyo Japan

INVITED PAPER C02

Artificial Intelligence Techniques for Urban Flood Control

Fi-John Chang[1,2,*], Pin-An Chen[1], Ying-Ray Lu[1], Shun-Nien Yang[1]

Urban flood control is an important task in developed cities, and fast rising peak flows usually occur due to urbanization. The urban flood hydrographs in Taiwan typically have large peak flows and fast-rising limbs in a matter of minutes, which could cause serious disasters. This study aims to construct an on-line forecasting model of inundation levels and a real-time operation model of pumps during flood periods for alleviating flood damages. The Yu-Cheng Pumping Station located in Taipei City of Taiwan is selected as the study area. The time span of rainfall affecting the rise of the water level in the floodwater storage pond (FSP) at the pumping station is identified by the correlation coefficient analysis; effective factors significantly affecting the FSP water level are extracted by the Gamma test (GT); and multi-step-ahead FSP water level forecasting models are constructed by artificial neural networks (ANNs). The results demonstrate that the GT can efficiently identify effective rainfall stations as important inputs to the ANNs, and the nonlinear autoregressive network with exogenous inputs (NARX) network performs the best in forecasting the FSP water level. The adaptive network-based fuzzy inference system (ANFIS) is further used to construct pumping operation models. The results demonstrate that the ANFIS can suitably and reliably simulates historical pumping operations and provide managers and operators of pumping stations with a guideline for making real-time pumping operation in response to drastic water level variations during flood periods, which is beneficial to urban flood control management.

Keywords: Artificial neural networks (ANNs), Nonlinear autoregressive network with exogenous inputs (NARX) network, Gamma test, Flood forecasting, Urban flood control.

[1] Department of Bioenvironmental System Engineering, National Taiwan University, Taipei 10617, Taiwan, ROC
[2] International Society of Paddy and Water Environment Engineering (PAWEES)
. *Corresponding author: Distinguished Professor Fi-John Chang (changfj@ntu.edu.tw)

INVITED PAPER C03

IWRM FOR CLIMATE CHANGE ADAPTATION IN THE MEKONG RIVER BASIN

Kittiwet Kuntiyawichai[1, a *], Stefan Uhlenbrook[2,b], Wim Douven[2,b], Jaap Evers[2,b], Piet Lens[2,b], Assela Pathirana[2,b], Maine Pieter van Dijk[2,b], Joyeeta Gupta[2,b], Dimitri Solomatine[2,b], Erik de Ruyter van Steveninck[2,b], Charlotte de Fraiture[2,b], Shreedhar Maskey[2,b], Yong Jiang[2,b] and Mukand Babel[3,c]

It is widely accepted that Integrated Water Resources Management (IWRM) is the way forward to respond to efficient, equitable and sustainable development and management of water resources. Additionally, IWRM has also strong linkages with variability in climate conditions which causes various problems for IWRM approaches. Besides the annual climatic trends and periodicities, the climate is still subject to change and its severe impacts, e.g. floods, droughts, etc. are being recognized increasingly. It is therefore important to find out what actually drives the climate towards current and future changes. In response to climatic shifts, the programme called "Post-doctoral Research programme on Adaptation to Climate Change (PRoACC) in the Mekong River Basin" was initiated with its main objective to strengthen research output in the field of climate change adaptation and to better inform decision making. The project carried out by more than 20 researchers from all Mekong/Lancang countries led by UNESCO-IHE in collaboration with many regional and national partner institutes. Scientific and societal findings are expected as a minimum requirement from each individual post-doc research, which include journal articles, synergy papers, policy brief outlining the potential implementation of research outputs, and educational materials for curriculum and training. Collaborative platforms have been carried out to allow researchers and experts to share research and discuss their creative solutions related to climate change impacts on water resources. Moreover, developing model-based climate variation and change scenarios to determine potential vulnerabilities and adaptations was also executed to explore how mitigation/adaptation strategies can be made. To enable the synthesized research results to deliver their maximum impact, a continuing and facilitated dialogue for raising awareness to stakeholders on climatic extremes/risk is further required.

Keywords: Integrated Water Resources Management (IWRM), climate change adaptation, PRoACC

[1] Department of Civil Engineering, Faculty of Engineering, Khon Kaen University, Thailand
[2] UNESCO-IHE Institute for Water Education, Delft, the Netherlands
[3] School of Engineering and Technology, Asian Institute of Technology, Thailand
[a] kitti@kku.ac.th, [b]s.uhlenbrook@unesco-ihe.org, [b]w.douven@unesco-ihe.org, [b]j.evers@unesco-ihe.org,
[b] p.lens@unesco-ihe.org, [b]a.pathirana@unesco-ihe.org, [b]m.vandijk@unesco-ihe.org, [b]j.gupta@unesco-ihe.org, [b]d.solomatine@unesco-ihe.org, [b]e.deruytervansteveninck@unesco-ihe.org,
[b] c.defraiture@unesco-ihe.org, [b]s.maskey@unesco-ihe.org, [b]y.jiang@unesco-ihe.org, [c]msbabel@ait.asia

PAPER ID: TC01

AEROBIC RICE TECHNOLOGY(ART) IN THE PHILIPPINES AND SOUTHEAST ASIA: IMPROVING PRODUCTIVITY AND ENHANCING TECHNOLOGY ADAPTION TOWARDS RICE SUFFICIENCY AND CLIMATE CHANGE RESILIENCY

Orlando F. Balderama[1,a,*]

ART is a new water-saving technology for rice production which involves growing drought and disease tolerant, high yielding and short-duration rice varieties in non-flooded and non-puddled soil in water-scarce areas such as rain fed lowland and upland and tail-end portions of gravity irrigation systems. The project aimed to improve eco-system based rice farming system through appropriate water-saving technologies to increase rice production and farmers' income through innovative research and extension modalities.
As a result, farmer-managed on-farm trials yielded 4-6 tons per hectare across climate types and variation of varieties, ecosystem, planting dates and planting methods. The water use efficiency obtained 2.2 grams per kg as compared with the traditional flooded rice production practice which has only about 0.4 g/kg. The financial viability of ART is also promising. For a low yield of 4.2 tons per hectare will yield the following: cost of production is P34,135.20; gross sales at prevailing rate is P84,000; net income of P49,864.8; with return of investment at 1.46.
Extension work activities such as training of trainors to agricultural extension workers & farmer leaders, farmer participatory trial & field day, and production & distribution of brochures & training manuals were conducted to enhance the information dissemination and adaption of technology. Upscaling of Aerobic Rice Technology was pursued through the conduct of National Aerobic Rice Conference and organization of ASEAN network.

Keywords: aerobic rice, climate change, rice sufficiency, ASEAN.

Orlando F. Balderama
Isabela State University,Echague, Isabela Philippines
Email:orly_isu@yahoo.com

PAPER ID: TC02

AUTONOMOUS SURFACE VEHICLE FOR BATHYMETRIC AND ENVIRONMENTAL SURVEY: IMPLEMENTATION AND RESULTS

Pasan Kulvanit[1*] and Pradya Prempraneerach[2]

This paper is focusing on the deployment of robotic vehicle in the role of a surveyor for the task of bathymetric or environmental survey of water resources. The autonomous surface vehicles (ASV) developed are either in the form of a modified electric kayak boat or an outboard motor boat with deft capability to maneuver the water environment ranging from small canals, reservoir, and the ocean. The robot can be controlled remotely via 2.4 GHz. radio frequency or can do self navigation via autonomous waypoints tracking algorithm. The on-board navigational sensors include global positioning system (GPS) and attitude/heading reference system (AHRS). The ASV's autonomous waypoint tracking is custom designed to track a group of waypoints in any formation that are distributed around the targeting survey area. The robot is equipped with monitoring sensor such as an echo sounder to measure the water depth. The depth data and the GPS data are acquired at 1 Hz. The data set, in text format will be stored on board the robot's computer before the user fetches it at the end of the survey run. The data will be analyzed using common GIS program such as ARCGIS to estimate upper-bound estimation of the volume of the water body. For the future work, the method can be integrated with a terrestrial or airborne LiDAR system to obtain the estimation of the water resource capacity. Three missions, related to water management or environmental survey, are demonstrated in the paper as examples of successful implementation of this method.

Keywords: Field mobile robot, Autonomous surface vehicle (ASV), Bathymetric survey, Hydrographic survey, Underwater photography

---

1*Corresponding Author
Department of Science Service,
Ministry of Science and Technology
Bangkok, Thailand
Email: pasan@dss.go.th
2 2nd Author
Rajamangala University of Technology Thanyaburi
Pathum Thani, Thailand
Email: ppradya@gmail.com

PAPER ID: TC03

APPLYING SATELLITE COMMUNICATION FOR WEATHER DATA TO IMPROVE THE EFFICIENCY OF TELEMETRY SYSTEM IN THE UPSTREAM AREA

Wasukree Sae-tia[1, a *], Thakolpat Khampuengson[2,b], Piyamarn Sisomphon [3,c] and Surajate Boonya-aroonnet [4,d]

At present, data from weather station is transmitted over the cellular network. This is convenient because the network covers most areas of the country and the service is cheap. Problem is due to limitation of the cellular network the transmission of weather data in the remote area eg. river upstream is ineffective. The weather data especially from the upstream area is critical for water management and flood early warning but since the area is remotely located in the high mountain or within the forest area the transmission of weather data through the cellular network is very limited or not available. This paper presents the development of telemetering system applying the use of satellite communication at Khao Phanoen Thung in Phetchaburi Province, the upstream of Petchaburi river basin. The application of skywave mobile communication is used to transmit the weather data via Inmarsat satellite which is a geostationary satellite type. Messaging a weather data via a satellite terminal making it possible to send and receive data at any time providing a real time data access with low power consumption. Therefore it reduces the limitation of data transmission over the cellular network and at the same time enhances the real time data transmission in the remote area. Satellite communication for weather data telemetering helps the assessment of real time monitoring providing an overview of a situation and a decision support for water management and early warning in a timely manner.

Keywords: Telemetering, Satellite

Wasukree Sae-tia
Hydro and Agro Informatics Institute 108 Bangkok Thai Tower, 8th floor, Rangnam Rd., Phayathai, Ratchatewi,Bangkok 10400, Thailand
Email: awasukree@haii.or.th
Thakolpat Khampuengson
Email: thakolpat@haii.or.th
Piyamarn Sisomphon
Email: piyamarn@haii.or.th
Surajate Boonya-aroonnet
Email: surajate@haii.or.th

PAPER ID: TC07

Development of a User-Friendly Web-based Rainfall Runoff Model

Khin Htay Kyi[1,a *], Minjiao Lu[2,3,b] and Xiao Li[4,c]

Parameter calibration is required for the implementation and operation of a hydrological model at the study basins. To support this process with user-friendly interfaces, an open access web-based conceptual Xinanjiang model was developed. This makes it possible to input model parameters and run the model repeatedly through a web page. After running model, automatically calculated Nash model efficiency and RMSE between predicted and observed discharge will be displayed together with the parameter set to show the model accuracy. One can run the model repeatedly by adjusting values of 15 parameters based on the user's experience and listed results of previous trials. With the help of "sorting" service which sorts the model efficiencies of previous trials in decreasing order, it is easy to pick up parameter sets providing good results. And rendering graph facility visualizes observed hydrograph and predicted hydrographs of selected trials, and helps the user to visually inspect the results and to find a parameter set which will probably improve the model accuracy. After getting satisfactory result, users can download the simulation result files through web browsers without any difficulties. In addition to the web-based model, a calibration support system is planned to further support the calibration process. At current point, a method proposed by Li and Lu (2014) is implemented to recommend suitable values for two data adjustment parameters by analyzing observed hydrological data.

Keywords: Web-based Rainfall Runoff Model, Xinanjiang Model, Calibration, Aridity Index.

Khin Htay Kyi
Master Student, Dept. of Civil and Environmental Engineering,
Nagaoka University of Technology (Nagaoka, Niigata 940-2136, Japan)
Email: ms.khinhtaykyi@gmail.com
Minjiao Lu
Dr. Eng., Professor, Dept. of Civil and Environmental Engineering, Nagaoka University of Technology (Nagaoka, Niigata 940-2136, Japan)
Dr. Eng., Adjunct Professor, Chongqing Jiaotong University, Chongqing, China
Email: blu@ nagaokaut.ac.jp
Xiao Li
Ph. D. Student, Dept. of Civil and Environmental Engineering, Nagaoka University of Technology (Nagaoka, Niigata 940-2136, Japan)
Email: clix8448@sina.com

PAPER ID: TC08

Strategy to Automatically Calibrate Parameters of a Hydrological Model: A Multi-step Optimization Scheme and its Application to Xinanjinag Model

Minjiao Lu[1, 2,a*] and Xiao Li[3,b]

Parameter calibration is fundamental for the implementation and operation of a hydrological model. Because hydrological models have been becoming more and more comprehensive and complicated, it is tedious and time consuming procedure even for an expert. The automatic calibration technique has been studied widely. However, even the most modern optimization schemes can not always help us to obtain optimal parameter set due to high dimensionality of the parameter space and complex interactions between parameters. The main purpose of this study is test our strategy for automatic parameter calibration which includes two parts: lowing the dimensionality and narrowing the parameter space. The Xinanjiang model which is the most popular rainfall-runoff model in China and also widely used all over the world is selected as an example of hydrological model. Our modified Xinanjiang model include 15 parameters controlling data adjustment, runoff generation, runoff separation and runoff routing. A global sensitivity analysis technique proposed by Morris is used to get better understanding about the structure of the parameter space. It is found that the parameters have significantly different sensitivities at annual, monthly and daily scale. Also strong interactions between the parameters are detected at all three temporal scales. Based on these results, a multi-step optimization scheme is developed and tested. The 15 parameters are divided into three groups and optimized group by group at time scale they are sensitive by using SCEM-UA algorithm, a global optimization algorithm. It is shown that the newly developed multi-step optimization scheme is very efficient and robust.

Keywords: Automatic calibration, Optimization, Global sensitivity analysis, Rainfall runoff model, Xinanjiang model.

Minjiao Lu
Dr. Eng., Professor, Nagaoka University of Technology, Nagaoka, Niigata 940-2188 Japan
Dr. Eng., Adjunct Professor, Chongqing Jiaotong University, Chongqing, China
Email: lu@nagaokaut.ac.jp
Xiao Li
Ph. D. Student, Nagaoka University of Technology, Nagaoka, Niigata 940-2188 Japan
Email: lix8448@sina.com

PAPER ID: TC09

Characteristics of Fluctuation in Air and Water temperatures at Kracak Dam, West Java – Indonesia

Luki Subehi[1]

Water temperature is one of the important parameters in the aquatic systems, and it remains as the interesting subject of world-wide environmental research. The objective of this study is to identify the parameter characteristics of air and water temperatures at Kracak Dam on data from June 2011 to October 2012. In addition, the changes in water temperature during rainfall events could identify the mechanism that generates the initial response as direct inputs of rainwater. In order to gain insight on water temperature fluctuations, water temperature data for two years were statistically analyzed using root mean square (Rms) and harmonic methods. From our analysis, the average values of Ta and Tw at Karacak dam were 25.0 ± 1.0 and 25.0 ± 0.7, respectively. In addition, monthly Rms 7-days of daily air and water temperatures changed nearly simultaneously. Next, the average value of Tw fluctuations expressed by Rms Tw/Rms Ta was 0.66 ± 0.36. This high value can be explained by noting that the seasonal variability of atmospheric conditions influenced air and water temperature fluctuations nearly proportionally. Information on, and control of, water temperature and water quality are of great importance for a wide range of purposes, including water supply and public health, agricultural and industrial uses.

Keywords: Water temperature – Air temperature - Root mean square – Harmonic method - River

Luki Subehi
Research Centre for Limnology, Indonesian Institute of Sciences, Cibinong 16911, Indonesia
Email: luki@limnologi.lipi.go.id

PAPER ID: TC10

DETECTION OF PADDY FIELDS IN SUB-STATE LEVEL BY COMBINED USE OF MODIS AND LANDSAT IMAGERY

Takanori NAGANO[1, a] *, Yumiko ONO[1], Akihiko KOTERA[1] and Ranvir SINGH[2]

Countries which keep monitoring land use/land cover change at plot/district level every year are limited. Although such information is vital for various strategies e.g. regional planning, validating subsidies and assessing flood/drought damages, monitoring is hampered by high cost of labor and information management.
For detection of paddy fields at state or country scales, MODIS images were often used in previous studies. While high temporal resolution and wide spatial coverage are advantages of MODIS, its coarse spatial resolution (250 m x 250 m) inhibited accurate detection of small paddy fields in Asian Monsoon regions. We developed a new method to detect paddy area by combined use of MODIS and Landsat. The methodology was designed for regions where ground truth data are poorly available for supervised classification. The study area was set to Haryana State in India where average farm plot size is small (4,000 m2) and cultivated areas are largely fluctuating from year to year due to water availability.
Firstly, paddy cultivated areas were detected by unsupervised classification of a set of multiple Landsat images available in a growing season of a specific year. Secondly two conditional parameters for time-series Enhanced Vegetation Indices and Land Surface Water Indices were optimized by Powell's method to best match the paddy area detected by MODIS to the area detected by Landsat. Thirdly calculated paddy areas were compared to municipal records. Until results showed reasonable agreements, paddy cultivated areas were reclassified in Landsat images and following procedures were repeated.
Calculated area of cultivation from 2001 to 2013 were not in good agreement with the state's municipal record which had little change over the years. The fluctuation of calculated area was in fact well correlated to India's national production record. Our methodology of detection has more likely captured harvested paddy area than planted/cultivated area.

Keywords: MODIS, Landsat, paddy, cultivated area

Takanori Nagano, Yumiko Ono, Akihiko Kotera
Department of Agr. Engineering and socio-economics
Graduate School of Agric. Science, Kobe University
Kobe, Japan
anaganot@ruby.kobe-u.ac.jp
Ranvir SINGH
Institute of Natural Resources, Massey University, PB11222, Palmerston North 4442 New Zealand

PAPER ID: TC12

Estimation of Evapotranspiration in Lam Ta Kong Basin using Surface Energy Balance Algorithm for Land (SEBAL) Model

Haruetai Maskong[1, a] *, Preeyaporn Kosa[2,b] and Chatchai Jothityangkoon[3,c]

Evapotranspiration (ET) is a primary interest to many end-users of water management because it represents a loss of usable water from the hydrologic supply. Evapotranspiration is highly variable in both space and time similar to other climate data (precipitation, soil, vegetation). A remote image-processing model has been applied to estimate evapotranspiration in Lam Ta Kong Basin using Surface Energy Balance Algorithm for Land (SEBAL) model. For this SEBAL model, evapotranspiration is computed from Landsat 5 satellite images on 7th May 2010 and weather data from weather station. SEBAL calculates evapotranspiration through a time series of input parameters including net surface radiation (Rn), soil heat flux (G) and sensible heat flux to the air (H) for energy balance equation: ET=Rn – G – H. Results of estimated evapotranspiration over Lam Ta Kong basin can be presented with high temporal and spatial resolution. The SEBAL model is useful tool for estimating spatial pattern of evapotranspiration to fulfill the limitation of evapotranspiration data from weather station.

Keywords: Remote sensing, Penman–Monteith, weather data, spatial data

Authors Name/s per 1st Affiliation (Author)
line 1 (of Affiliation): School of Civil Engineering
line 2- Institute of Engineering, Suranaree University of Technology
line 3- Nakhon Ratchasima 30000, Thailand
line 4- aharuetai.m@gmail.com
Authors Name/s per 2nd Affiliation (Author)
line 1 (of Affiliation): School of Civil Engineering
line 2- Institute of Engineering, Suranaree University of Technology
line 3- Nakhon Ratchasima 30000, Thailand
line 4-bkosa@sut.ac.th
Authors Name/s per 3rd Affiliation (Author)
line 1 (of Affiliation): School of Civil Engineering
line 2- Institute of Engineering, Suranaree University of Technology
line 3- Nakhon Ratchasima 30000, Thailand
line 4- ccjothit@sut.ac.th

PAPER ID: TC13

Deep Groundwater and Possible Signals for Human and Climatic Effects

UMA Seeboonruang*

Groundwater data reflects hydrological processes, climate change and variability, as well as any anthropogenic influence. Hence, inversion of groundwater signals can provide significant information of the historic exposure to groundwater. This study aims to present a method of decomposing deep groundwater signals monitored at stations in the lower Chao Phraya basin in Thailand to reveal the effects of two major forces; anthropogenic and climatic effects. The anthropogenic effect and the impact from climate change are assumed to possess the long-term trend on the groundwater signal, while the impact of climate variability is assumed to be in the periodic pattern. The classical decomposition partitions a signal into three elemental components called trend, periodicity and random or irregular components. A detrending method is the first step applied to obtain the anthropogenic effects, e.g. those from a long-term groundwater development, and possibly climate change. Consequently, wavelet analysis is performed on the groundwater detrended residuals and the wavelet power spectrums are then related to some climatic variability indices, representing three important climate forces. The outcome from the decomposition examination finds that the groundwater in the region is significantly under the influence of anthropogenic effect and the El Nino/Southern Oscillation and the Asian Summer Monsoons result in the periodic cycle of the groundwater signal. In addition, non-stationarity of the climate variability and groundwater oscillation are evident in the region. Therefore, future groundwater management should take into account of not only climate change but also climate variability as well for better sustainability and resilience.

Keywords: Groundwater, time series analysis, wavelet analysis, climate variability

UMA Seeboonruang
Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
Email: kseuma@kmitl.ac.th

PAPER ID: TC14

Improvement of a Kinemative Wave-based Distributed Hydrologic Model to Predict Flow Regimes in Arid Areas

Tomohiro TANAKA[1*], Soe THIHA[2] , Yasuto TACHIKAWA[3] and Kazuaki YOROZU[4]

To predict river discharge for Japanese river basins surrounded by the mountainous terrain, many studies have applied distributed hydrologic modelsbased on a kinematic wave approximation with surface and subsurface flow components (DHM-KWSS). These modelsreproduceobserved river discharge of catchments in Japan well; however, the applicability of DHM-KWSS to catchments with different geographical or climatic conditionshas not been sufficiently examined.

This study applied1K-DHM, which is one of distributed hydrologic models havingthe DHM-KWSS structure, to tworivers basins.One is characterized by relatively stable rainfall throughout the year, which is a similar climatic conditionin Japanese river basins;another is located in an arid area climaticallydifferent from river basins in Japan. To examine the applicability of the DHM-KWSS model structure for basins with different climate and topography, model parameters were calibrated, and then the calibrated modelwas validated for other periods.

Our results showed that the model structure of the DHM-KWSS expresses flow regimes with wet conditions as well asmain flood events in arid basins. On the other hand, this model structure cannot describe flow behavior inarid areas.One of the difficulties in the current model structure is a low predictability of flash floods at the beginning of rainy season. Therefore, we added one component to express the changein vertical infiltration due to dynamics of soil moisture into the model structure to improve reproducibility of flow regimes in arid areas.The performance of the improved modelis demonstrated for two arid basins in Australia and Myanmar.

Keywords: Distributed rainfall-runoff models, vertical infiltration, the Ayeyarwady river basin, arid basin, kinematic wave model

Tomohiro Tanaka
Graduate School of Engineering, Kyoto University, Kyoto Japan
Email: tanaka@hywr.kuciv.kyoto-u.ac.jp
Soe Thiha
Graduate School of Engineering, Kyoto University, Kyoto Japan
Email: thiha@hywr.kuciv.kyoto-u.ac.jp
Yasuto Tacikawa
Graduate School of Engineering, Kyoto University, Kyoto Japan
Email: tachikawa@hywr.kuciv.kyoto-u.ac.jp
Kazuaki Yorozu
Graduate School of Engineering, Kyoto University, Kyoto Japan
Email: yorozu@hywr.kuciv.kyoto-u.ac.jp

PAPER ID: TC15

SENSITIVITY OF SNOW COVERED AREA OF BRAHMAPUTRA RIVER BASIN TO TEMPERATURE

Swapnali Barman[1,a*], R.K. Bhattacharjya[2,b]

. The glacier cover of Himalaya has undergone significant retreat due to the impact of climate change. The retreat of Himalayan glacier has been reported in many national and international literatures including the report published by IPCC. The retreat has in turn significant impact on the flow discharge of the Himalayan Rivers. River Brahmaputra is one of the Himalayan rivers and many parts of the Brahmaputra River Basin is covered by snow and glaciers. In this paper, an attempt has been made to study how the Snow Covered Area of the Brahmaputra River Basin changes with respect to the change in temperature. For this, MODIS image MOD09A1.5 (MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid) of 500m resolution consisting of seven bands has been taken to prepare the Normalized Difference Snow Index Maps of the study area. The NDSI map is then used to obtain the areal extent of snow in the Brahmaputra River Basin. The NDSI maps are prepared starting from 2002 to 2012 at three months interval, i.e. January, April, July and October. For, temperature data, HadCM3 data of spatial resolution 2.5˚ X 3.75˚ (latitude by longitude) has been used. From the study, it is observed that, except for the month of January, for other three months, there is a decreasing trend of snow covered area with an increasing trend of temperature.

Keywords: Remote Sensing and GIS, NDSI, GCM, Snow Cover, Himalaya, Brahmaputra.

Swapnali Barman
Swapnali Barman, Indian Institute of Technology, Guwahati, India
Email: swapnali.barman@gmail.com
R.K. Bhattacharjya
Rajib Kumar Bhattacharjya, Indian Institute of Technology, Guwahati, India
Email: rkbc@iitg.ernet.in

PAPER ID: TC16

Estimation of urban asset value for natural disaster risk assessment at the macro scale

Tiratas Suwathep[1, a *], Wee Ho Lim[1,b *], Yoshihiko Iseri[1,c] and Shinjiro Kanae[1,d]

Natural disasters (e.g., flood, tropical cyclone, bushfire and earthquake) could cause damaging effect on the human society. To understand the magnitude of risk of a natural disaster at the macro scale (i.e., at the country level and beyond), basic socioeconomic parameters such as population or gross domestic product (GDP) are often used as proxy. Ideally, we would have enough information to evaluate the exposure and risk of a specific asset. However, such information is not always available. To that end, previous study (Hallegatte et al., 2013) demonstrated the prospects of relating the country GDP data to the produced capita (a term representing the urban asset class). That analysis used the market exchange rate (MER) instead of the purchasing power parity (PPP) to measure GDP, which is an important issue in examination of costs of policies in climate debate (Manne et al., 2005). This study aims to consider the PPP-based analysis of country GDP data to produced capita. We introduce a mathematical approach to quantify the statistically-justified range of uncertainty in our analysis. From that, we develop a more generalized method that incorporates the uncertainty range to quantify the produced capita. This is an improvement from previous studies (Hallegatte et al., 2013, Winsemius et al., 2013, Nicholls et al., 2008). The new approach might be useful for macro scale natural disaster risk assessment under climate change.

Keywords: natural disaster, risk, socioeconomic, produced capita, GDP

Tiratas Suwathep
Tokyo Institute of Technology, 2-12-1-M1-6 O-okayama, Meguro-ku, Tokyo 152-8552, Japan
Email: com suwathep.t.aa@m.titech.ac.jp
Wee Ho Lim
Email: lim.w.aa@m.titech.ac.jp
Yoshihiko Iseri
Email: ciseri.y.aa@m.titech.ac.jp
Shinjiro Kanae
Email: dkanae@cv.titech.ac.jp

PAPER ID: TC19

Water quality and hydraulic performances of the HMGDS Drainage Module

Nor Amirah A.S[1]., Abustan, I[2]., Remy Rozainy M. A. Z[3]., Salwa M. Z. M[4]., Mahyun A.W[4]

This paper discuss the new system of storm-water best management practice (BMPs) used extensively to reduce the peak flow of surface runoff and to remove runoff pollutant by infiltration as well as enhance the amenity value of water for both quality and quantity of groundwater discharge. Storm-water problem have become severe due to increase in urbanization. The increase in the amount of impermeable surface areas produces more storm-water runoff that is carried along to the receiving bodies of water which significantly will degrade the water quality in streams. The development of new urban storm-water drainage called Hexagonal Modular Green Drainage System (HMGDS) applied as drainage module when a series of hexagonal connect on a base grade system. A new drainage module is overlaid by a layer of porous media disclosed which capable of filtration whereas enhance the quantity and quality of the receiving water bodies. A laboratory experiment were conducted to test the infiltration rate and volume of surface runoff which HMGDS can captured through a series of rainfall events, furthermore for the water quality analysis the contaminated water seeping through module were investigated. As a result, the introduction of the new drainage module can handle excessive runoff and improved the filtration rate in higher flow condition. In laboratory testing, the prototype HMGDS was capable of achieving good infiltration rate efficiency over 80 % and increase the water quality over 60 % as well.

Keywords: Drainage module, storm-water management, rainfall-runoff, BMPs

[1] PhD Candidates, School of Civil Engineering, Universiti Sains Malaysia
Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia
[2] Professor, School of Civil Engineering, Universiti Sains Malaysia
Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia
[3] Lecturer, School of Civil Engineering, Universiti Sains Malaysia
Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia
[4] Lecturer, School of Environmental Engineering, Universiti Malaysia Perlis
02600 Arau, Perlis, Malaysia
[a] naashamira@yahoo.com

PAPER ID: TC20

ZN REMOVAL FROM SYNTHETIC WASTEWATER USING ZEOLITE MODIFIED WITH OXIDIZING AGENT

SALWA Mohd Zaini Makhtar[1, a *], ISMAIL Abustan[1,b], MAHYUN Ab Wahab[1,c], NOR AMIRAH Abu Seman[1,d], NUR ATIQAH Ahmad Awalluddin[1]

In this study, the technical feasibility of zeolite for Zn removal is investigated in batch studies using synthetic industrial wastewater. Zeolite is one of the minerals in Indonesia. Natural zeolites are still containing organic and inorganic impurities covering the pore. Thus to increase absorption capacity it must be firstly modified. Surface modification of zeolite with oxidizing agent, such as natrium hydroxide (NaOH), respectively, is also conducted to improve removal performance. The adsorption efficiency of the adsorbent was evaluated by measuring the extent of adsorption of zinc in synthetic beverage industrial wastewater. Operational parameters such as dosage, speed and agitation time were also studied. Adsorption data fitted well with the Langmuir and Freundlich models. However, Langmuir isotherm displayed a better fitting model than Freundlich isotherm because of the higher correlation coefficient that the former exhibited, thus, indicating to the applicability of monolayer coverage of the zinc on the surface of adsorbent.

Keywords: Zeolite; NaOH, Industrial wastewater, Adsorption

[1] School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia.
[a] salwa@unimap.edu.my ,
[b] ceismailmail.eng.usm.my,
[c] mahyun@unimap.edu.my,
[d] aashamira@yahoo.com

PAPER ID: TC21

Study on the Sustainable Sand Removal Capacity on Sand Mining Activities.

Syamsul Azlan Saleh[1, a]*, Ismail Abustan[2,b], and Mohd Remy Rozainy Mohd Arif Zainol[3,c]

Sand is the most important and valued material in construction industry for over the thousand years. In Malaysia, the main source of sand is from river (in-stream). In-stream sand mining is a common practice in Malaysia because it is more economic and suitable for construction material. Recently, the demand of sand is very high due to rapid development in Malaysia. The increasing of demand in river sand can cause bad implication such as illegal sand mining operation and improper management sand mining (such as over extraction). Excessive in-stream mining activities due to poor planning and management by mining operator can cause many major problems to the river and environment. The sand mining activities could give impacts to environment, physical of river, and structures nearby river such as bridge. The new technology is able to simplify and assist the researcher works. New technology also can give more accurate data than conventional method. This paper will be discussed about coupled ADCP and resistivity method to study the capacity of minable river sand.

Keywords: Sand mining, ADCP, Resistivity method

Syamsul Azlan Saleh
MSc. Student, School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia
14300 Nibong Tebal, Penang, Malaysia.
Email: azlansaleh10@gmail.com
Ismail Abustan
Professor and Visiting Professor of King Saud University, School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia 14300 Nibong Tebal, Penang, Malaysia.
Email: ceismail@usm.my
Mohd Remy Rozainy Mohd Arif Zainol
Lecturer, School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia 14300 Nibong Tebal, Penang, Malaysia.
Email: ceremy@usm.my

PAPER ID: TC23

The Study of Relationship between Deciles and VCI in the Northern Part of Thailand

Aphantree Yuttaphan [1, 2, a *], Sombat Chuenchooklin [2,b] and Somchai Baimoung [3,c]

Drought is one of the most adverse weather related disasters that occur almost every year in the Northern part of Thailand. The main source of drought is the variation of rainfall amount. This study is based simply on the use of two databases: the first one was containing of Deciles - meteorological drought index that calculated from monthly rainfall data over the period 1950-2012 at 25 meteorological stations. The other was containing of Vegetation Condition Index (VCI) derived from The Moderate Resolution Imaging Spectro-radiometer so-called "MODIS" imageries over the period 2000-2012. To determine the effect of rainfall variation which is the main source of drought on the natural vegetation and agricultural crops therefore, the analysis of relationship between the average pixel values of monthly VCI with in 3 kilometers radius of surrounding station area and moving timescale of 1,2 and 3 month deciles index during 2000-2012 using SPSS techniques were used. Then, it was found that the preceding 2 and 3 monthly deciles were mostly correlated with the VCI products during January-April and December with R value ≥ 0.5. The Maximum R value is 0.893 on February at Chiangrai meteorological station. Therefore, it was concluded that these relationship techniques can be used for drought monitoring appropriately and furthermore also be applied for drought forecast using the numerical weather prediction products within 3-4 months ahead.

Keywords: Decile, VCI, Drought.

Aphantree Yuttaphan
Thai Meteorological Department, Bangkok, Thailand.
Naresuan University,Phitsanulok, Thailand
Email: Aphantreey@yahoo.com
Sombat Chuenchooklin
Naresuan University,Phitsanulok, Thailand
Email: sombatc@nu.ac.th
Somchai Baimoung
National Research Council of Thailand, Bangkok, Thailand
Email: somchaib.mict@gmail.com

PAPER ID: TC24

Effect of Particle Size Distribution to Remove Colour and Escherichia coli in Groundwater

Nur Aziemah Abd Rashid[1,a*], Ismail Abustan[2,b], Mohd Nordin Adlan[3,c]

The underground ability to transmit water is an important criteria in riverbank filtration (RBF). Particle size distribution (PSD) below ground may influence the groundwater flow rate. Due to that, this study focuses on laboratory scale using local alluvial soil to remove contaminants from river water using different sand samples. A physical model was made to measure sand horizontal permeability (m/s). The sand capability to improve water quality is studied. PSD of sand real-life from Dengkil, Selangor at different depth shows that the range of alluvial soil beside of riverbank differs. In horizontal permeability modelling shows permeability was influenced by the coefficient of uniformity (Cu) of sand. Sand with large Cu will having high horizontal permeability. However, the permeability changes was differ between well and poorly graded sand. Well graded sands Cu between 4 to 5 the permeability changes are only between 7.8 – 7.9 $x10^{-4}$ m/s. Whereas poorly graded sands Cu are between 2.5 to 4 the permeability change between 6.9 – 9.0 x 10^{-4} m/s. Permeability of poorly graded shows significant changes towards coefficient of uniformity rather than in well graded soil. Whereas poorly graded sand was shows as consistent media than well graded to remove contaminants even the permeability rate is low than poorly graded sand. Well graded (Sand A) removes colour and *E. coli* up to 70% and 100%. Because of that poorly graded soil is preferable for RBF application. This finding was consistent with the removal mechanism of the contaminants.

Keywords: Riverbank, physical model, alluvium soil, permeability, dry density

Nur Aziemah Abd Rashid
School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang. Malaysia.
Email: nuraziemahabdrashid@gmail.com
Ismail Abustan
School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang. Malaysia
Email: ceismail@usm.my
Mohd Nordin Adlan
School of Civil Engineering, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang. Malaysia
Email: cenordin@usm.my

Session D

Water Related Disaster Management

INVTED PAPER D01

ANALYSES AND STRATEGIES FOR HANDLING OF CLIMATE CHANGE IMPACTS ON FLOODING

Ole Mark[1*], Birgit Paludan[2]

It is in the interest of society to provide protection for the population and to protect infrastructure against flooding and to protect the aquatic environments against polluted sewer overflows in a timely and cost efficient way. Climate changes (precipitation, increase in temperature and mean sea level) may have significant impacts on the urban water cycle. Hence, it is important to identify and quantify the impact on the main urban water systems, such as sewer systems, wastewater treatment plants, storm water overflows and combined sewer overflows, to receiving waters,such as rivers, lakes, estuaries and the sea.

In the past, infrastructure, located facilities, buildings or new urban areas were designed based on the assumption that the future was like the past. Parameters were measured in nature, and they were used as design basis, for infrastructure, which should last for many years (100+) into the future. Today, we are in a situation where we know that it is insufficient to make decisions that have consequences far into the future - without taking into account the changes that we already know will happen in nature due to climate change. A climate adaptation strategy for urban water systems shall therefore be based on the protection of the society on the basis of the knowledge we already have, and optimize both existing and new infrastructure based on the knowledge we currently have about the movements of climate change. An adaptation strategy based on informed decisions for urban water systems will be presented.

Keywords: Adaptation, Climate Change, Informed Decisions, Modelling, Urban Flooding

Ole Mark
Urban & Industry
DHI, Denmark
Email: Ole.Mark@dhigroup.com
Birgit Paludan
M.Sc., Hydraulics,
Greve Solrød Water Utility
Denmark

INVTED PAPER D02

MITIGATING WATER INSECURITY THROUGH DISASTER PREPAREDNESS IN KOREA

CHOI Byungman

including climate change, is the hot discussion topic in water resources and efficient water use, securement and management are emphasized for solution of urgent water insecurity problem. In Korea's water resources status, the annual average precipitation is 1,274mm and it is 1.6
times of the world average 807mm. The total amount of precipitation per capita is 2,660 ㎥/yr and it is only 1/6 times comparing with 16,427 ㎥ /yr due to the high population density. Most of the rainfall is concentrated on Jun – Sep in Korea. For water insecurity in Korea, according to the impacts of climate change, such as floods, drought and rising average temperature in parallel with the water management difficulties, a variety of efforts are need to solve mitigate these insecurity. As the concept of water activities, many water resources management techniques are integrated and applied such as national, regional and international levels of policy and structural/nonstructural
measures and related water management guidelines To secure stable water and cope with climate change, the whole world including Korea has seek countermeasures for water-related disasters such as extreme floods and droughts, earthquakes, tsunamis, etc. In recent years, for conjunction with the concept of water insecurity, a variety of research, international activities and policy to
response water insecurity are carried out and especially in terms of water quantity and quality. Detailed field activities led to major institutions around the water related are as follows ① itigation of water-related disasters ② Water dispute ③ Water divide for a stable water supply ④ Balanced environment ⑤ Water reuse ⑥ reduce water pollution. Finally, the integration of a various measurement and policy is close to solve mitigation of water insecurity. Keywords Climate change, water disaster, insecurity, water security, enhancement

Keywords: Overland flow, floods, low-lying land, hydrodynamics simulation

CHOI Byungman
Executive Director of K-water Institute and Co-chair of the Regional Process Commission of the 7th World Water Forum
Daejeon, Korea
bmchoi@kwater.or.kr

INVTED PAPER D03

IMPACT ASSESSMENT OF CLIMATE CHANGE ON WATER-RELATED DISASTERS FOR BUILDING UP AN ADEPTATION STRATEGY

Yasuto TACHIKAWA

To estimate probabilistic characteristics of extreme floods and thelargest-class floodmagnitude under a changing climate is a key issue for building up an adaptation strategy. In this research, a physically-based method to estimate a probable largest-class flood is presented firstly, and then a flood risk curve considering a probabilistic rainfall distribution is demonstrated. To estimate a largest-class flood, multi-track ensemblenumerical typhoon simulationsfor the historical large typhoon, the Ise Bay Typhoon in 1959 were conducted under a pseudo global warming condition (Takemi et al, 2012), and the estimated precipitation wasgiven to a distributed rainfall-runoff model. The estimated river discharge under a pseudo global warming conditionis discussed with respect to an adaptation measure to avoid catastrophic damage. Secondly, development of a flood risk curve is presented to assess flood damage probabilistically. A flood risk curve is a relation between flood inundation damage and its exceedance probability. A procedure to develop a flood risk curve is below: 1) a probability distribution of annual maximum rainfall is obtained from historicalrecord; 2) the relations between T-year annual maximum rainfall and the maximum inundation water depth are obtained through rainfall-runoff and inundation simulations for different spatio-temporal rainfall patterns; 3) economic damage is estimated for each rainfall-runoff and inundation simulation; and finally 4) the relation between economic damage and its exceedance probability is obtained by integrating the exceedance probability of the annual maximum rainfall that causes the inundation damage for all spatio-temporal rainfall patterns. This method requires many rainfall-runoff and inundation simulations, thus a nesting rainfall-runoff-inundation method is newly developedto reduce computational burden of inundation simulations. Finally, an adaptation strategy based on a largest-class flood simulation and a probabilistic flood damage assessment though the flood risk curve isdiscussed.

Keywords: river discharge projection under a changing climate; a largest-class flood, flood risk curve.

Yasuto TACHIKAWA
Department of Civil and Earth Resources Engineering,
Kyoto University, Kyoto, Japan
tachikawa@hywr.kuciv.kyoto-u.ac.jp

PAPER ID: TD01

DEVELOPMENT OF OPERATIONAL FLOOD OPTIMIZATION WITHIN THE FLOOD FORECASTING SYSTEM TO DETERMINE THE OPTIMAL RELEASE FOR UBONRAT RESERVOIR FOR FLOOD MITIGATION

Sathit Chantip[1, a *], Piyamarn Sisomphon[2,b] Surajate Boonya-aroonnet[3,c]

The development of flood forecasting and optimization system aim to determine the optimal reservoir release within the 7-days forecasting horizon. By taking into account the impact of the flood forecast together with the downstream flooding criteria, the optimal release can be computed to minimize the downstream flooding while still keeping the safety of the reservoir and its rule curve operation. The system has been developed on the platform of Chi-Mun Flood Forecasting System using DHI Solution Software. The Shuffled Complex Evolution (SCE) is used in the optimizing of reservoir release. The objective functions are reservoir safety, downstream flooding, rule curve and spills. The condition at discharge stations E.22B and E.8A are used as downstream flood control. The system works in parallel with the Chi-Mun flood forecasting system. Trickling by downstream flooding criteria, the system will run automatically when the forecast water level is above the control level. Based on the study results using the flood in 2006, the system performs satisfactory. It provides a better trade-off solution between reservoir safety and downstream adverse effects than considering only the rule curve operation.

Keywords: Optimization, Shuffled Complex Evolution, flood mitigation

Sathit Chantip
Hydro and Agro Informatics Institute, Thailaind
180 Bangkok Thai Tower, 8th FL. Rangnam Rd., Phayathai Ratchatewi, Bangkok 10400 Thailand:
Tel:+66(0)6427132
Email:sathit@haii.or.th
Piyamarn Sisomphon
Email:piyamarn@haii.or.th
Surajate Boonya-aroonnet
Email:surajate@haii.or.th

PAPER ID: TD02

HYDRODYNAMICS SIMULATION OF AN OVERLAND FLOW OVER LOW LYING FLAT LAND: A CASE STUDY OF THE 2011 SEVERE FLOOD IN SAM-KHOK AND KHLONG LUANG DISTRICTS

SAIFHON Tomkratoke[a*] and SIROD sirisup[b]

The unprecedented flood event in the central Chao Phraya basin 2011 became one of the most catastrophic natural disasters affecting all Thai society and economic sectors in immense scales. In this event, the massive overland flow plays the major in damaging properties and environment systems. Besides, it is typical that natural drainage systems are rather ineffective in low lying flat land. Capability to effectively handle a flood problem under the mentioned condition is indeed a great challenge. To achieve the goal, the hydrological management schemes needed to be improved with an insightful knowledge of flood hydrodynamics as the key to provide essential foundations to derive those schemes.

In this study, we aim to gain insight into the aforementioned issue by performing hydrodynamics simulation of overland flow in low lying flat land. The flood plain around Sam-Khok and Khong Luang districts is selected as the study area. The simulation has been performed with an unstructured-grid shallow water model together with a high-fidelity topographic data (LIDAR). The simulation results has been validated with the field observed data (water trace height). The major hydrodynamics mechanisms such as flow patterns, flow magnitudes will be characterized and the effective discharge quantity will be quantified.

Keywords: Overland flow , floods, low lying land, hydrodynamics simulation

SAIFHON Tomkratoke
Large-Scale Simulation Research Laboratory, National Electronics and Computer Technology Center
112 Thailand Science Park, Phahonyothin Rd., Khlong Nueng, Khlong Luang, Pathum Thani 12120 Thailand
Email: saifhon.tomkratoke@nectec.or.th
SIROD sirisup
Email: sirod.sirisup@nectec.or.th

PAPER ID: TD03

ASSESSMENT OF RIVER BANK EROSION AND VULNERABILITY OF EMBANKMENT TO BREACHING: A RS AND GIS BASED STUDY IN SUBANSIRI RIVER IN ASSAM, INDIA

BIPUL TALUKDAR[1,a*], RANJIT DAS[2,b]

A common practice for flood management in the state of Assam, India is construction of embankment. Approximately 4464 km of embankments are being constructed in the Brahmaputra basin itself. The embankments are highly vulnerable to flood and flood disaster for embankment breaching is frequent in Assam. 48 numbers of embankment failure took place in a single flood in the year 2004. Temporal Satellite Remote Sensing data of a river system of highly unstable bank can be analyzed in GIS environment for identification of river bank erosion as well as patches of embankment vulnerable to breaching. A case study was carried out in the Subansiri river, a tributary of river Brahmaputra of Assam, to identify bank erosion location and patches of embankment vulnerable to breaching. Temporal dataset of cartosat1 imagery for the year 2007 and 2009 were used for mapping the flow channel of river Subansiri. Embankments present in the river were mapped from the cartosat1 data with the help of embankment index map collected from Assam State Water Resource Department. Based on the degree of convergence and narrowness between the flow channel and embankment, some patches of embankment identified as vulnerable to breaching and classified as very high, high and moderate vulnerable to breaching. Three patches of embankment were identified as very high vulnerable to breaching which came to be true in successive flood season of 2010. The method may be a good tool for predicting embankment vulnerability to breaching and can be implemented for planning of river bank protection work and preparedness for flood season for a flood prone state like Assam.

Keywords: RS and GIS; bank erosion; embankment; vulnerability

BIPUL TALUKDAR
Associate Professor, Civil Engineering Department, Assam Engineering College, Guwahati, Assam, India.
Email: bipulaec@gmail.com
RANJIT DAS
Research Scholar, Civil Engineering Department, Assam Engineering College, Guwahati, Assam, India.
Email: ranjit1_das@rediffmail.com

PAPER ID: TD04

DEVELOPMENT OF TECHNOLOGY FOR MONITORING, EVALUATION AND PREDICTION OF GLOBAL AND LOCAL WATER RELATED DISASTER USING VARIOUS OBSERVATION SYSTEM

LEE Eulrae[1*] , CHAE Hyosok[2] , Hwang Euiho[3] , SHIN Hyungjin[4]

In South Korea, application system on the efficient operation of several observation systems, for water disaster management, should be developed and upgraded accordingly. Because the shortage of linkage and confluence of the observation data and use a little information, the accuracy and the reliability of the observed data is mitigated. Both the information production and the application on ungagged areas are necessary to determine the flood damage information.

Therefore, the construction of global-based and local-based observation systems regarding water disaster on stream and basin are necessary. Furthermore, the development of operations technology for safety land and water industry should also be addressed accordingly. Due to the massive information held by big data, performing analyses and data manipulation are challenging. Therefore, technologies based on the application of public information and policies will be established by related agencies should be developed. Based from the information gathered, the detailed composition of the contents of the study are as follows: 1) The development of X-Net for the generation and forecasting of hydrological information. 2) Water Security reinforcement by estimating and through the use of forecasting technologies on drought events. 3) Water disaster mitigation by estimating and through the use of forecasting technologies. 4) The development of Global-Local water resources information service platform technology based on big data. Through the application of the said technology, the prevention of drought, food and water related disasters are possible.

Keywords: Observation system, water disaster, global and local, monitoring, evaluation, prediction

LEE Eulrae (ph.D)
Water Resources Research Center, K-water Institute, Daejeon, Korea
Email: erlee@kwater.or.kr
CHAE Hyosok (ph.D)
Water Resources Research Center, K-water Institute, Daejeon, Korea
Email: hyosok.chae@kwater.or.kr
HWANG Euiho (ph.D)
Water Resources Research Center, K-water Institute, Daejeon, Korea
Email: ehhwang@kwater.or.kr
SHIN Hyungjin (ph.D)
Water Resources Research Center, K-water Institute, Daejeon, Korea
Email: shjin@kwater.or.kr

PAPER ID: TD06

QUASI-REAL SATELLITE MONITORING FOR ASSESSING AGRONOMIC FLOOD DAMAGE

Akihiko KOTERA[1, a *], Youtaro UENO[1] and Takanori NAGANO[1]

This study aims to realize prompt, reliable, and safety survey for agronomic flood-damage assessment, performed by a quasi-real-time satellite image analysis. For damage detection, we focused on crop failure due to submergence of rice in the field before harvest. To detect the spatial distribution of crop failure, we examined the temporal relationship between the harvest time, estimated from the time-series enhanced-vegetation index (EVI), and the onset of inundation, estimated from the time-series land surface-water index (LSWI) and EVI. These time-series indices were derived from MODIS satellite data with an adequately downscaled 250-m resolution in 8-days (for regional scale) or daily (for local scale) interval. Quasi-real-time MODIS images are provided by U.S. Geological Survey (USGS) and they are then immediately processed by a system of WAIASS (World Atlas of Irrigated Agriculture for Sustainability Science) with PDP (Parallel Distributed Processing). Validations compared with local flood damage reports in 9 districts in Thailand showed large underestimation in MODIS analysis, whereas validations with 7 states in Cambodia showed high consistency (R^2 = 0.95). Error in former result could be caused by a discrepancy in definitions of the flood damages. The new methodology and system using quasi-real-time imageries proposed in this study proved to be promising for agronomic flood-damage survey and assessment.

Keywords: inundation damage, MODIS, near real-time monitoring, submerged rice, WAIASS

Akihiko KOTERA
Graduate School of Agricultural Science, Kobe University,
Nada, Kobe, 657-8501, Japan
Email:akotera@ruby.kjobe-u.ac.jp
Youtaro UENO
Graduate School of Agricultural Science, Kobe University,
Nada, Kobe, 657-8501, Japan
Email:akotera@ruby.kjobe-u.ac.jp
Takanori NAGANO
Graduate School of Agricultural Science, Kobe University,
Nada, Kobe, 657-8501, Japan
Email:akotera@ruby.kjobe-u.ac.jp

PAPER ID: TD07

TECHNOLOGY ASSISTED FLOOD MANAGEMENT

**Surajate Boonya-aroonnet[1, a], Peraya Tantianuparp.[1,b] Sutat Weesakul[1,2,c*]
and Royol Chitradon[1,d]**

The great flood of Thailand in 2011 caused tremendous damage to the country. It is a long duration flood approximate 2 months in the central plain of Chao Phraya river basin with the flood depth varied from 0.5 to 2.5 m. Survey technologies were effectively applied to provide field information for operational flood management. Unnamed Aerial Vehicles (UAV) were deployed to investigate the inundation area, flood extent, flood conditions, obstruction in drainage system and to validate the field operation. There were totally 32 flights of UAV conducted in Bangkok and its vicinity. The recorded video were systematically stored and broadcasted for both official and private uses. Information was disseminated to public using social Medias. Other type of survey is the autonomous surveyed-vessel to survey the depth of drainage conveyance system in order to keep the effective flow of flooded water through Bangkok. Water depth could be quickly scanned during survey. Deposited sediment location could be identified and remedial can be conducted.

Keywords: Flood management, survey technology, Unmanned Aerial Vehicles (UAV)

Surajate Boonya-aroonnet
Hydro and Agro Informatics Institute (HAII) , 108 BangkokThai Tower Fl.8, Rangnam Rd. , Phayathai, Ratchatewi, Bangkok 10400, Thailand
Peraya Tantianuparp
Emai:peraya@haii.or.th
Sutat Weesakul
Email:sutat@haii.or.th

PAPER ID: TD08

DERIVATION OF OPTIMAL RULE CURVES FOR FLOOD CONTROL STUDY OF UBOLRATANA RESERVOIR, THAILAND

Pich Hirun[1, a *] and Areeya Rittima[1,b]

The significant requirement of reservoir operation in Thailand is mainly focused on the effectiveness of water allocation for irrigation and other activities on the downstream side. However, the flood control purpose is highly emphasized and included for multi-purpose reservoir operations since some regions of Thailand encountered with the worst floods in 2011. In general, rule curves have been used as a major reservoir operation toolto achieve the expected outcome especially from large reservoirs. Owing to the effects of critical events, theoptimal rule curves have been initiatedusing the embedded simulation-optimization techniques with various solving algorithms. This research proposed the optimal rule derived by GAs technique to manage the reservoir storage zone for flood control purpose and to satisfy the downstream water demand of the Ubolratana reservoir in Khonkean province.

The daily hydrological data associated with the conventional mass balance principle since 2000 to 2014 was adopted to construct the reservoir operation model and the diverted water at Nong Wai weir was employed as the irrigation demand in the model. Three scenarios of operating policy to cope with incoming floods were created to derive the different types the optimal rule curves and the simulated results were compared to the existing operation. The results indicated that these optimal rule curves could provide the progressive performances specifically flood reduction in both volume and frequency not to encroach the surcharge storage zone of Ubolratana reservoir. Moreover, they could satisfy the downstream water demand at reasonable level including the hydropower benefit.

Keywords: Reservoir operation, genetic algorithm, optimization technique, rule curves, Ubolratana reservoir

Pich Hirun
Department of Environmental and Water Resources Engineering, Faculty of Engineering,
Mahidol University, Nakhon Pathom 73170, Thailand.
Email: hirunpich@gmail.com
Areeya Rittima
Email:egart@mahidol.ac.th

PAPER ID: TD09

THE BASIN-WIDE FLOODING LOSS ASSESSMENTS UNDER EXTREME CLIMATE SCENARIO

Hsin-Chi Li[1] , Hsiao-Ping Wei[1] ,Tingyeh Wu[1], Hung-Ju Shih[1] , Wei-Bo Chen[1], Yuan-Fong Su[1] and Yung-Ming Chen[1]

This study selected the Gao-Ping River Basin, Taiwan, one of the most serve disaster area during the period of typhoon Morakot, as a demonstration area and adopted dynamical downscaling data to simulate the future the most extreme typhoon precipitation events (from 2075 to 2099) under climate change condition. The SOBEK flood model was used to build a model of the Gao-Ping River Basin, and data regarding the river channel cross-sections, hydraulic constructions, precipitation in future climates, land use, and water levels were used to simulate potential flooding caused by extreme typhoon events in the future. The Taiwan Typhoon Loss Assessment System (TLAS) established by the National Science and Technology Center of Disaster Reduction (NCDR) was used to evaluate the potential losses associated with the extreme events. The calculation of property loss includes 27 types of land use modules, such as agriculture, forestry, fishery, and animal husbandry loss; industrial and commercial service loss; public building loss; and traffic and hydraulic facilities loss. Finally, the results indicate that the most serve loss of Gao-Ping River Basin in the end of century is the land-usage of commerce, which even worse than typhoon Morakot, followed by industry and household.

Keywords: extreme climate, flood, loss assessment, SOBEK, TLAS

Hsin-Chi Li:	National Science and Technology Center for Disaster Reduction, Taiwan
Hsiao-Ping Wei:	National Science and Technology Center for Disaster Reduction, Taiwan
Tingyeh Wu:	National Science and Technology Center for Disaster Reduction, Taiwan
Hung-Ju Shih:	National Science and Technology Center for Disaster Reduction, Taiwan
Wei-Bo Chen:	National Science and Technology Center for Disaster Reduction, Taiwan
Yuan-Fong Su :	National Science and Technology Center for Disaster Reduction, Taiwan
Yung-Ming Chen:	National Science and Technology Center for Disaster Reduction, Taiwan

PAPER ID: TD10

IMPACT OF CLIMATE CHANGE ON URBAN FLOOD MANAGEMENT: A CASE STUDY IN MAE SOT MUNICIPALITY IN TAK PROVINCE, THAILAND

CHUENCHOOKLIN Sombat[1, a *] and PUROTAGANON Man[2, b]

From the current issue of impacts of climate change, it is impacting on the urban water management in the small basins containing with many large community areas. Because of most of small basins are ungauged catchments which usually they are lacking of some useful hydrological data of both stream gagging recorded and basin information. Therefore, more frequent flood events with more intensity, higher flow velocity, stronger flood peak, and losses from severe floods were increased. The large community, such as Mae Sot Municipality in Tak Province of Thailand, located in the Mae Sot Watershed, which is a small catchment of the Moei and one branch of the Salween River Basin in the national border of Thailand-Myanmar countries. Lack of information about useful hydrological data related to contribute to flood management was reported. Moreover, no one uses climatological data and basin characteristic to contribute to flood management in this area yet. The events of the flood include overflow from the streams and flood ponded in agricultural lands and lowland urban area in the Mae Sot Municipality after heavy rain occurs. Moreover, the side slopes of drainage channels easily collapse during a flood flow pass. The evidence in 2013 with most severely flood events and losses in this area already occurred. This research was aimed to increase capability and strengthening participation of those community leaders and related local agencies whom conducted in the process of system water management in this urban area. They can further develop the activities, programs, and projects by themselves regarding the water resources management within existing condition and the impact of climate change as well. Moreover, some modernized technique related to the ahead short period rainfall forecasting system, such as using the global forecast system via the integrated data viewer program was introduced. It can be further applied for flood forecasting and mapping systems in their urban areas. Therefore, the community leaders and related agencies could understand the behavior of existing flood events and the impact of climate change on flood using their own collection and data analysis. This will encourage a very closed relationship with those participants and further connection to the higher levels in order to increase efficiency of urban water management of the Mae Sot Municipality.

Keywords: Climate change, urban, flood, drainage, water management

CHUENCHOOKLIN Sombat
Director of Water Resources Research Centre,
Faculty of Engineering, Naresuan University, Phitsanulok, Thailand
Email: sombatc@nu.ac.th
PUROTAGANON Man
Secretary for Thai Water Partnerships, Bangkok, Thailand
Email: purotaganon@gmail.com

PAPER ID: TD11

DROUGHT MONITORING USING THE NORMALIZED DIFFERENCE INFRARED INDEX (NDII) FOR THE UPPER PING RIVER BASIN

Nutchanart Sriwongsitanona*, Thanongsak Suksirib, Ekkarin Maekanc, and Sansarith Thianpopirugd

Remotely sensed data were used to monitor drought conditions for the Upper Ping River Basin (UPRB) in northern Thailand. The 8 day-period satellite data sensed by the Terra's Moderate Resolution Imaging Spectroradiometer covering the study area between 2001 and 2013 were used to evaluate the Normalized Difference Infrared Index (NDII). The results showed that the values of NDII are relatively high during the wet season and low during the dry season. Monthly averaged NDII values for the UPRB varied between 0.041 and 0.235 occurring in March and September, respectively, with the averaged values within the wet season (May to October) and the dry season (November to April) of around 0.211 and 0.117, respectively. The maximum and the minimum monthly averaged NDII values of around 0.206 and 0.128 were detected at Mae Tang and Mae Ping Section 1 sub-catchments, respectively. The results also showed that the averaged NDII values within 24 days are highly related to the accumulated rainfall depth within 56 days at all 14 sub-catchments of the UPRB with the averaged correlation coefficient value of around 0.76. The maximum and the minimum correlation coefficient values were found to be 0.66 and 0.84 evaluated at Mae Klang and Mae Ping Section 1 sub-basins, respectively. The results indicated that NDII is a promising drought index that can be effectively used for drought monitoring of the river basin.

Keywords: Remote Sensing; Drought Monitoring; NDII; Rainfall Depth; Upper Ping River Basin.

Nutchanart Sriwongsitanona
Department of Water Resources Engineering
Faculty of Engineering, Kasetsart University
Bangkok, Thailand Email:afengnns@ku.ac.th
Thanongsak Suksirib Email:bthanongsaksuk@gmail.com
Ekkarin Maekanc Email:cson_petroleum@hotmail.com
Sansarith Thianpopirugd Email:dsansarith@hotmail.com
*corresponding author

PAPER ID: TD12

MAINSTREAMING DISASTER RISK MANAGEMENT IN THE GOVERNANCE OF CAGAYAN RIVER BASIN: INSTITUTIONAL DESIGN AND STAKEHOLDER PARTICIPATION TOWARDS DEVELOPMENT OF INTEGRATED RIVER BASIN MASTERPLAN

Eugenio Diaz[1,a], Orlando Balderama, [2,b*]

The Cagayan River basin is the largest in the Philippines with an estimated drainage area of about 27,300 square kilometers and length of 520 kilometers (km). Quite recently, there are more frequent and intensive as well as extensive flooding during the monsoon season from May to October and droughty during the years with dry months such as the effect of El Nino. The inundation and drying of of Cagayan River and its tributaries have caused great loss of lives and property and substantial losses to the local and national economies.

In the preparation of development and management plans, an integrated river basin management approach is applied to Cagayan River basin. It is intended to address several concerns related to watershed conservation and rehabilitation, climate change adaptation and disaster risk reduction due to flood and water related hazards.

The study involves collection and analysis of secondary data as well as conduct of key informants interview, focus group discussions and workshop series with stakeholders, for benchmarking and analysis of perceived problems.

This paper presents situationer and analysis of problems on the water resources, social, institutional and organizational conditions of the basin and framework in the implementation of watershed and water resources management in the river basin scale.

Keywords: integrated river basin management, disaster risk reduction, climate change adaptation, cagayan river basin

Eugenio Diaz
River Basin Control Office, Department of Environment and Natural Resources, Q.C. Philippines
Orlando Balderama
Isabela State University, Philippines
Email:aeugene2066@yahoo.com borly_isu@yahoo.com

Appendix I

Participants List
28 January 2015

28/01/15

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
1	His Excellency Mr. Ampol Senanarong	Privy Councillor		Ampol Senanarong	
2	Dr. Subin Pinkayan	President of Thai Hydrologist Association			
3	Prof. Dr. Mongkol Techakumphu	Vice President of Chulalongkorn University			
4		Vice President of Chulalongkorn University			
5	Dr. Shrestha Sangam	Asian Institute of Technology		[signature]	[signature]
6	Mr. Lertviroj Kowattana	Director General of Royal Irrigation Department		[signature]	[signature]
7	Mr. Niwatchai Khamphi	Director General of Department of Water Resources		[signature]	[signature]
8	Dr. Suthipun Jitpimolmard, M.D.	Director General of Thailand Research Fund		[signature]	[signature]
9	Prof. Dr. Bundhit Eua-arporn	Dean of Chulalongkorn University			

14.

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
10	Dr. Gwang-Jo Kim (Geuest sp.)	UNESCO Bangkok			
11	Mr. Miguel Musngi (Geuest sp.)	Senior Officer of DMHA Division, ASEAN Secretariat			
12	Miss. Ladawan Kumpa (Geuest sp.)	Deputy Secretary General, Office of the National Economic and Social Development Board (NESDB), Thailand			
13	Assoc. Prof. Dr. Chetsada Kaeokanlaya (รศ.ดร. เจษฎา แก้วกัลยา)				
14	Dr. Ramasamy Jayakumar	UNESCO-IHE			
15	Assoc. Prof. Dr. Sucharit Koontanakulvong	Chulalongkorn University	sucharit.l@chula.ac.th		
16	Assoc. Prof. Dr. Bancha Kwanyuen	Dean of Kasetsart University			
17	Dr. Thongplew Kongjun	Royal Irrigation Department	tkongjunrid@gmail.com		
18	Mr. Chaiporn Siripornpibul	Department of Water Resources			

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
19	**Mrs. Supranee Jongdeepaisarl**	Thailand Research Fund			
20	**Assoc. Prof. Amnat Chidthaisong**	King Mongkut's University of Technology Thonburi, TRF	amnat_c@jgsee.kmutt.ac.th	[signature]	[signature]
	Chanathip Pharino	TRF		chanathip@trf.or.th	[signature]
	Damrong Sripraram	KU.			[signature]
	Ekasit Kositsakulchai	Kasetsart U.	ekasit.ko@gmail.com	[signature] 8/1/-	[signature] 8/1/-

28/01/15

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Invited speaker)	Office/ Position/ Institute	E-mail	Signature	
1	**Dr. Ailikun**	Chinese Academy of Sciences, China	aili@mairs-essp.org	[signature]	
2	**Prof. Tissa Illangasekare**	Colorado School of Mines, USA	tillanga@mines.edu	[signature]	[signature]
3	**Prof. Jiaguo Qi**	Zhejinag University China, China	jiaguo.qi@gmail.com	[signature]	[signature]
4	**Prof. LIONG Shie-Yui**	National University of Singapore, Singapore	tmslsy@nus.edu.sg	[signature]	[signature]
5	**Dr. Tamim Younos**	The Cabell Brand Center for Global Poverty and Resource Sustainability	tyounos@gmail.com	[signature]	[signature]
6	**Prof Xin Li**	Director of Laboratory of Remote Sensing and Geospatial Science at CAREERI/Chinese	lixin@lzb.ac.cn	[signature]	[signature]
7	**Prof. Dr. Takahiro SAYAMA**	ICHARM, Public Works Research Institute, Japan	t-sayama@pwri.go.jp	[signature]	[signature]
8	**Dr.Fi John Chang**	National Taiwan University, Taiwan	changfj@ntu.edu.tw	[signature]	[signature]
9	**Dr. Kittiwet Kuntiyawichai**	Faculty of Engineering, Khon Kaen University	kittiwet_k@hotmail.com	[signature]	[signature]

11

No.	Name (Invited speaker)	Office/ Position/ Institute	E-mail	Signature	
10	**Dr. Ole Mark**	DHI, Denmark	OMJ@DHI.DK		
11	**Dr. CHOI Byung man**	K-water Institute	bmchoi@kwater.or.kr		X
12	**Prof. Dr. Yasuto TACHIKAWA**	Kyoto University, Japan	tachikawa@hywr.kuciv.kyoto-u.ac.jp		

28/01/58

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
1	**Mr. Thada Sukhapunnaphan**	Royal Irrigation Department			
2	**Mr. Adisorn Champathong**	Royal Irrigation Department			
3	**Mr. Thirawutthi Sukhonthapradit**	Department of Water Resources			
4	**Mrs. Wasna Proiamphaeng**	Department of Water Resources			
5	**Mrs. Orathai Ongrattana**	Department of Water Resources		[signature]	[signature]
6	**Ms. Kanokwan Yoowong**	Department of Water Resources			
7	**Assoc. Prof. Dr. Tuantan Kitpaisalsakul (Chair)**	Chulalongkorn University	tuantan.k@chula.ac.th	[signature]	[signature]
8	**Asst. Prof. Dr. Aksara Putthividhya (Chair)**	Chulalongkorn University	dr.putthividhya@gmail.com	[signature]	[signature]
9	**Dr. Piyatida Hoisungwan**	Chulalongkorn University	hpiyatida@gmail.com	[signature]	[signature]
10	**Dr. Pongsak Suttinon (Chair)**	Chulalongkorn University	pongsak.su@chula.ac.th		
11	**Dr. Anurak Sriariyawat**	Chulalongkorn University	anurak.s@eng.chula.ac.th	[signature]	[signature]

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
12	Dr. Yutthana Talaluxmana	Kasetsart University	fengymt@ku.ac.th		
13	Dr. Jeerasorn Santisirisomboon	Ramkhamhaeng University			
14	Dr. Sutat Weesakul (Chair) รองอธิการ	Asian Institute of Technology	sutat@hoii.or.th		
15	Dr. Somchai Chonwattana	Asian Institute of Technology		sch@dhigroup.com	
16	Prof. Kuniyoshi Takeuhi	ICHARM, Japan			
17	Prof. Makoto KIMURA	Kyoto University, Japan			
18	Prof. Wei-Fuu Yang	President of PAWEES, Japan			
19	Prof. Kwansue Jung	Chungnam National University, Korea	KSjung@cnu.ac.kr		
20	Prof. Ke-Sheng Cheng	National Taiwan University, Taiwan			
21	Dr. Dusadee Sukawat (Chair)	King Mongkut's University of Technology Thonburi	dusadee.suk@kmutt.ac.th		
22	Dr. Chaiwat Ekkawatpanit (Chair)	King Mongkut's University of Technology Thonburi			

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
23	Dr. Pariwate Varnakovida (Chair)	King Mongkut's University of Technology Thonburi			
24	Dr. Saisunee Budhakooncharoen (Briefing)	Thai Hydrologist Association	dr.saisunee@gmail.com		
25	Dr. Sarawut Jansuwan (Briefing)		sarawutj@gmail.com		
26	Dr. Sompong Boonprasert (Briefing)		drsompong@yahoo.com		
27	Dr. Suppattana Wichakul (Briefing)		supattana_w@teami.co.th		
28	Dr. Siriluk Chumchean (Briefing)		sililuck_p@panyyaconsult.co.th		
29	Dr. Duangruedi Khosit kittiwong (Briefing)		duangrudee.k@gmail.com		

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
TA01	**Miss. Manisha Maharjan**	AIT (200USD)	maneesha064@gmail.com	Manisha	Manisha
TA02	**Dr. Charuvan Kasemsap**	Kasem Bundit University (5400THB)	charuvan.kas@gmail.com		
TA03	**Dr. Thannob Aribarg (Mr. Seree Supratid)**	Chulalongkorn University (100USD)	thannob.a@rsu.ac.th		
TA05	**Mr. Ha Quang Khai** Devision for Water Resources planning and Investigation for the South WR	National Science and Technology Center for Disaster Reduction (50USD)	quangkhai02@gmail.com		
TA06	**Dr. Yuan-Fong SU**	National Science and Technology Center for Disaster Reduction	yuanfongsu@ncdr.nat.gov.tw		
TA07	**Dr. Yuan-Fong SU**	Nagaoka University of Technology	yuanfongsu@ncdr.nat.gov.tw		
TA08	**Mr. Pawee KLONGVESSA**	Suranaree University of Technology (50USD)	nineboon@hotmail.com		
TA09	**Mr. Kowit Boonrawd**	National Science and Technology Center for Disaster Reduction (50USD)	kowit_b@hotmail.com		

39.

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
TA11	**Dr. YUN-JU CHEN**	~~Kyoto University (280USD)~~ National science and Technology center for Disaster Reduction	yjchen@ncdr.nat.gov.tw	[signature]	[signature]
TA12	**Mr. DUONG Duc Toan**	Kyoto University	duongductoan@wru.vn	[signature]	[signature]
TA13	**Miss. Supattana Wichakul**	Asian Institute of Technology	supattana.w@gmail.com		
TA15	**Mr. Ashish Shrestha**	Chulalongkorn University (280USD)	ashish.shrs@gmail.com	[signature]	
TA16	**Dr. Parichat Wetchayont**	Chulalongkorn University (100USD) [illegible]	nokcole@yahoo.com	[signature]	[signature]
TA17	**Mr. chokchai suthidhummajit**	Ministry of Science and Technology	chokchai.s@chula.ac.th	[signature]	[signature]
TA18	**Mrs. thasorn**	Chulalongkorn University	thasorn@nimt.or.th		
TA19	**Mr. Teerawat ram-indra**	Rangsit university (50USD)	Teerawat.ram@gmail.com	[signature]	[signature]
TB01	**Dr. Agnes Ramos**	San Fabian Echague, Isabela Philippines (250USD)	orly_isu@yahoo.com	[signature]	[signature]
TB02	**Mrs. Men Nareth**	[illegible]	nareth@itc.edu.kh		
TB05	**Mr. MANEE Donpapob**	Kyoto University (50USD) จ่ายแล้ว [illegible]	manee.donpapob.85v@st.kyoto-u.ac.jp	[signature]	[signature]

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
TB06	**Mr. Ishwar Pun**	The University Tokyo (50USD)	punisr@gmail.com		
TB07	**Mr. Sonsak Puttrawutichai**	Kasetsart University	songsak.tee@gmail.com	Songsak	Songsak
TB10	**Lanie Alejo**	(250USD) จองทัวร์	orly_isu@yahoo.com lhan_1023@yahoo.com		
TB11	**Mr. mehdi**		mehdijafari_89@yahoo.com		
TC01	**Prof. Dr. Orlando Balderama**	(250USD) จองทัวร์	orly_isu@yahoo.com		
TC02	**Dr. Pasan Kulvanit**	Ministry of Science and Technology (100USD)	pasan.kulvanit@gmail.com		
TC03	**Mr. Wasukree Sae-tia**	Hydro and Agro Informatics Institute (100USD)	wasukree@haii.or.th		
TC07	**Miss. Khin Htay Kyi**	Nagaoka University of Technology (50USD)	ms.khinhtaykyi@gmail.com	Minjiao Lu	Minjiao Lu
TC08	**Prof. Minjiao Lu**	Nagaoka University of Technology (280USD)	lu@nagaokaut.ac.jp	Minjiao Lu	Minjiao Lu
TC09	**Dr. Luki Subehi**	International Water Resources Research Institute, Koroa (200USD)	luki@limnologi.lipi.go.id		
TC10	**Assoc.Prof. Dr. Takanori Nagano**	Kobe University (280USD)	naganot@ruby.kobe-u.ac.jp	長野 宇規	長野 宇規

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
TC12	**Miss. Haruetai maskong**	Suranaree University of Technology (50USD)	haruetai.m@gmail.com	Haruetai. M	Haruetai. M
TC13	**Assoc.Prof. Uma Seeboonruang**	KMITL	kseuma@kmitl.ac.th		
TC14	**Tomohiro Tanaka**	Kyoto University	tanaka.tomohiro.65m@st.kyoto-u.ac.jp		
TC15	**Dr. Rajib Kumar Bhattacharjya**	(200USD)	rajibkbc@gmail.com		
TC16	**Mr. Tiratas Suwathep**	Tokyo Institute of Technology (50USD)	suwathep.t.aa@m.titech.ac.jp		
TC20	**Mrs. SALWA MOHD ZAINI MAKHTAR**	UNIVERSITI SAINS MALAYSIA (50USD)	salwamohdzainimakhtar@gmail.com		
TC21	**Mr. Syamsul Azlan Saleh**	(50USD)	azlansaleh10@gmail.com		
TC23	**Miss. Aphantree Yuttaphan**	Naresuan University (50USD)	aphantreey@yahoo.com		
TC24	**Miss. Nur Aziemah bt Abd Rashid**	Universiti Sains Malaysia (USM) (50USD)	nuraziemahabdrashid@gmail.com		
TC19	**Mrs. NOR AMIRAH BT ABU SEMAN @ HJ AHMAD**	(50USD)	naashamira@yahoo.com		
TD01	**Mr. Sathit Chantip**	Hydro and Agro Informatics Institute (100USD)	sathit@haii.or.th		

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
TD02	**Sirod Sirisup**	National Electronics and Computer Technology Center (100USD)	sirod.sirisup@nectec.or.th	Saifhon Tomkratoke	pilunt@gmail.com
TD03	**Assoc.Prof. Dr. Bipul Talukdar**	Assam Engineering College, India (200USD)	bipulaec@gmail.com		
TD04	**Dr. LEE Eulrae**	K-water (200USD)	erlee@kwater.or.kr		
TD06	**Dr. Akihiko KOTERA**	Kobe University (280USD)	akotera@ruby.kobe-u.ac.jp		
TD07	**Dr. Sutat Weesakul**	Hydro and Agro Informatics Institute	sutat@haii.or.th		
TD08	**Miss. Pich Hirun**	Mahidol University (50USD)	hirunpich@gmail.com		
TD09	**Dr. Hsin-Chi Li**	National Science and Technology Center for Disaster Reduction (280USD)	hsinchi@ncdr.nat.gov.tw	Li Hsin Chi	Li Hsin-Chi
TD10	**Assoc.Prof. Sombat CHUENCHOOKLIN**	Naresuan University (100USD)	sombatc@nu.ac.th		
TD11	**Assoc.Prof. Dr. Nutchanart Sriwongsitanon**	Kasetsart University (100USD)	fengnns@ku.ac.th		
TD12	**Prof. Dr. Orlando Balderama**		orly_isu@yahoo.com	มาแล้ว	

28/01/2015

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (TH participant)			Office/ Position/ Institute	E-mail	Signature	
1	Mr.	Chatchai	Jothityangkoon	Suranaree University of Technology, School of Civil Engineering	cjothit@sut.ac.th	Chatchai	Chatchai
2	Mr.	Watin	Thanathanphon	Hydro and Agro Informatics Institute (HAII)	watin@haii.or.th		
3	Mr.	Thakolpat	Khampuengson	Hydro And Agro Informatica Institute	Thakolpat@haii.or.th		
4	Mr.	Cherid	Kalayanamitr	Electricity Generating Authority of Thaiand (EGAT)	cherid.k@egat.co.th	Lalita Meekaew Lalita.m@egat.co.th.	Lalita.
5	Mr.	Somchai	Baimoung	National Research Council of Thailand (NRCT)	somchaib.mict@gmail.com		
6	Mr.	Worasak	Yakanmool	Electricity Generating Authority of Thailand (EGAT)	worasak.y@egat.co.th		
7	Miss	Warangkana	Larbkich	Department of Groundwater Resources	dgr.iru@gmail.com	Warangkana	Warangkana
8	Mrs.	Thitima	Yamchong	Provincial Waterworks Authority	Titimas@pwa.co.th	Thitima Y.	Thitima Y.
9	Mr.	Atichat	Rucksajit	Chaipattana Foundation	atichat_rucksajit@yahoo.com		

No.	Name (TH participant)			Office/ Position/ Institute	E-mail	Signature	
10	Miss	Pichaya	Amornpantang	Provincial Waterworks Authority	pichayaa@pwa.co.th		
11	Mr.	Vutinun	Pothongnark	Provincial Waterworks Authority	vutinunp@pwa.co.th		
12	Miss. Porpattama Hammachukiattikul			ศูนย์วิจัยระบบพยากรณ์อากาศรายฤดูสำหรับประเทศไทย มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี	Porpatthama@gmail.com		
13	Miss. WACHIRAPOND PERMPOONSINSUP			ศูนย์วิจัยระบบพยากรณ์อากาศรายฤดูสำหรับประเทศไทย มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี	nachirapond@gmail.com		
14	Mr	Odoemena	Kenneth	University Putra Malaysis	gs40668@mutiara.upm.edu.my		
15	Mr.	Khaykeo					
16	Mr.	ANONGRIT	KANGRANG	Mahasarakham University	anongrit.k@msu.ac.th		
17	Mr.	Yotaro	Ueno จ่ายเงิน	50 USD Kobe University	youda870@yahoo.co.jp	Yotaro Ueno	
18	Mr.	Suppakorn	Chinvanno	Chulalongkorn U.	suppakorn@start.or.th		โกวิท ศกว
19	MR.	PHITSANU	VORANARD	NESDB	PHITSANU@NESDB.GO.TH		

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Student)			Office/ Position/ Institute	E-mail	Signature
1	Mr.	Odoemena	Kenneth Ikenna	Universiti Putra Malaysia	gs40668@mutiara.upm.edu.my	Participant
2	Mr.	PATINYA	HANITTINAN	Kyoto University (ยังไม่ได้จ่ายเงิน)	Patinyah@hotmail.com	
3	Mr.	Yotaro	Ueno	Graduate School of Agricultural Science, Kobe University	1006004a@stu.kobe-u.ac.jp	
4	Miss	Rujiporn	Suthisanonth	Chulalongkorn University	toktak.suthisanonth@gmail.com	
5	Miss.	Swapnali	Barman	Indian Institute of Technology, Guwahati, India	swapnali.barman@gmail.com	Flash Drive
6	Mr.	Seree	Supratid	Climate Change and Disaster Center	thannob.a@rsu.ac.th	
7	Mr.	Watcharapong	Noimunwai	Environmental Science, Graduate School, Chulalongkorn University	watcharapong@start.or.th	
8						
9						
10						

28/01/2015

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
1	นายวีระ วงศ์แสงนาค	สมาคมนักอุทกวิทยาไทย	Vongsangnak@gmail	[signature]	[signature]
2	ดร. วีระพล แต้สมบัติ	สมาคมนักอุทกวิทยาไทย	Viraphol_t@yahoo.com	[signature]	
3	นายปรีชา เศษรฤทธิ์	สมาคมนักอุทกวิทยาไทย	prechas2555@hotmail.com 081-823-9727	[signature]	[signature]
4	นางศรีสุพร ศรีสุภาพ	สมาคมนักอุทกวิทยาไทย			
5	ดร. ยิ่งปลิว ศุภกิตติวงศ์	สมาคมนักอุทกวิทยาไทย	yingplew@truemail.co.th	[signature]	[signature]
6	นายเจริญสุข วรพรรณโสภาค	สมาคมนักอุทกวิทยาไทย (29/01/2015)			
7	ดร. เกษม ปิ่นทอง	สมาคมนักอุทกวิทยาไทย	kasemai@hotmail.com	[signature]	[signature]
8	นายประสิทธิ์ ผลวิไล	สมาคมนักอุทกวิทยาไทย	prasit@panyaconsult.co.th	[signature]	[signature]
9	นางสาวสมคิด บัวเพ็ง	สมาคมนักอุทกวิทยาไทย			
10	นายชูลิต วัชรสินธุ์	สมาคมนักอุทกวิทยาไทย		[signature]	[signature]
11	ดร. ภาณุวัฒน์ ปิ่นทอง	สมาคมนักอุทกวิทยาไทย			
12	ดร. ธนสิทธิ์ ธรรมศิริโรจน์	สมาคมนักอุทกวิทยาไทย	thanasit.t@tgo.or.th	[signature]	[signature]

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
13	ดร. วจี รามณรงค์	สมาคมนักอุทกวิทยาไทย (29/01/2015)			
14	นายรุ่งเรือง จุลชาต	สมาคมนักอุทกวิทยาไทย			
15	ดร. สมิทธ ธรรมสโรช	สมาคมนักอุทกวิทยาไทย			
16	ม.ล.ชนะพันธุ์ กฤดากร	สมาคมนักอุทกวิทยาไทย		[signature]	
17	ดร.สมศรี อรุณินท์	สมาคมนักอุทกวิทยาไทย	ssarunin@gmail.com ssarunin@gmail.com	[signature]	
18	นางกรณิการ์ ทวีทรัพย์	สมาคมนักอุทกวิทยาไทย	[signature]	[signature]	
19	ดร. วัฒนา กันบัว	สมาคมนักอุทกวิทยาไทย	[signature]	[signature]	
20	นายสุพจน์ โลห์วัชรินทร์	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			
21	นายสุพจน์ เจียมจรัสรัศมี	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย	SUPHOT2500@HOTMAIL.COM.	[signature]	
22	ดร. อภิชาติ สระมูล	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย	aphichat_s@team.co.th	[signature]	
23	ดร. พลเดช เทอดพิทักษ์วานิช	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย	pholdej@gmail.com	[signature]	
24	นายนพดล ใจซื่อ	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย	noppadol@projectalliance.co.th	[signature]	

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
25	**นายอิสรา ประภาสวัสดิ์**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย (29/01/2015)			
26	ดร.ทองเปลว กองจันทร์	กรมชลประทาน.	Hongjan3535@gmail.com	[illegible]	[illegible]
27	ดร.สุทัศน์ วีสกุล	AIT		Sutat	Sutat W.
28	ดร. ยุพา ชิดทอง	บริษัท ปัญญา คอนซัลแทนท์	chidthong_y@yahoo.co.th	Yupa	
29	คุณสมเกียรติ กิจสงวนกุล	MDX	sombe1@hotmail.com	[illegible]	[illegible]

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
1	Mr. Dollachet Klahan (นายดลเชษฐ กล้าหาญ)	การประปานครหลวง	Dallachet@mwa.co.th		
2	Mrs. Praphawedee Otarawanna (นางประภาวดี	กรมทรัพยากรน้ำบาดาล	praphawadee@hotmail.com		
3	Dr. Tanita Suepa (ดร. ฐนิตา เสือป่า)	สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ	tanita@gistda.or.th		
4	Mrs. Aiyanut Chalermchairattanakul	การประปาส่วนภูมิภาค	aiyanutc@pwa.co.th		
5	Dr. Sukrit Kirtsaeng (ดร. สุกฤษฏิ์ เกิดแสง)	กรมอุตุนิยมวิทยา	sukritk@hotmail.com		
6	Mr. Arun Pinta (นายอรุณ ปินตา) อรุณ	กรมป้องกันและบรรเทาสาธารณภัย	arunpinta@gmail.com		
7	Dr. Kanoksri Sarinnapakorn (ดร. กนกศรี ศรีนนภากร)	สถาบันสารสนเทศทรัพยากรน้ำและการเกษตร	kanoksri@haii.or.th		
8	~~Dr. Nawarat Krairapanond (ดร. นวรัตน์ ไกรพานนท์)~~ paisan. padungsiri	สำนักนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม	drnawarat@hotmail.com		
9	Mr. Tanit Chanraksa (นายธนิต จันทร์รักษา)	การไฟฟ้าส่วนภูมิภาค	Tanit.CRS@hotmail.com		
10	Ms. Rawiwan Boonchai	สถาบันสิ่งแวดล้อมไทย	rawiwan@tei.or.th		

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
11	Mr. Teerapong Pomun (คุณธีรพงษ์ โพธิ์มั่น)	ผู้อำนวยการสมาคมแม่น้ำเพื่อชีวิต (สถาบันสิ่งแวดล้อมไทย)			
12	Dr. Tin Tun Aung	Myanmar	banεatta.banea@gmail.com		
13	Mr. Komkrit Innanchai	กรมทรัพยากรน้ำ	krishchai.ia@gmail.com		
14	Mr. Kiattiyod Yodteenthean	กรมทรัพยากรน้ำ	kiattiyot.y@dwrmail.go.th		
15	Mr. Woradet Pinpat	กรมทรัพยากรน้ำ	opeclng@hotmail.com		
16	Mr. Pinit Thaisiam	กรมทรัพยากรน้ำ	Pinit5478@hotmail.Com		
17	Mr. Pradittha Prommachan	กรมทรัพยากรน้ำ	tun07@hotmail.com		
18	Ms. Wasna Roiamphaeng	กรมทรัพยากรน้ำ	WAS1PRO2@yahoo...		
19	Ms. Naree Intharawichian	กรมทรัพยากรน้ำ	naree_mim@hotmail.com		
20	Mr. Teeradet Kuruwuth	กรมทรัพยากรน้ำ	teeradethk@hotmail.com		
21	Ms. Jirayu Sakdasiristaporn	กรมทรัพยากรน้ำ			
22	Mr. Pinyo Ketsa	กรมทรัพยากรน้ำ	Ketsayakam@hotmail.com		

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
23	**Mrs. Supranee Jongdeepaisal**	สำนักงานกองทุนสนับสนุนการวิจัย		Supranee	Supranee
24	**Mr. Cholapat Jongdeepaisal**	บ. โตโย- ไทย คอร์ปอเรชั่น จำกัด (มหาชน)		Cholapat	Cholapat
25	**Dr. Voranuch Wangsuphachart (ผศ. ดร. วรนุช หวังศุภชาติ)**	Mahidol University (โควต้า สกว.)		[signature]	[signature]
26	[illegible]	สำนักงานกองทุนสนับสนุนการวิจัย		[signature]	[signature]
27	[illegible]	สำนักงานกองทุนสนับสนุนการวิจัย		[signature]	[signature]
28.	Chonaya poonpvotra	[illegible]	dostats@yahoo.com	[signature]	[signature]
29	Chanakod Chasidpon	[illegible]	chanakod.chasidpon@gmail.com	Ch	Ch
30	Jinna Tansaravipart	NESDB	jinna@nesdb.go.th	[signature]	[signature]

28/01/58

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย.
1	**Mr. Thanasak Poomchaivej**	CH. KARNCHANG PLC.	Profresh_LP@Hotmail.com	Thanasak	Thanasak
2	**Kirana Somsook**	CH. KARNCHANG PLC.	kirana.s@xayaburi.com	Kirana	Kiran...
3	**Phat Pumchawsaun**	CH. KARNCHANG PLC.	phat.p@ckpower.co.th	PHAT PUMCHAWSAUN	PHAT PUMCHAWSAUN
4	**Pongkoon Maseekeaw**	CH. KARNCHANG PLC.	pongkoon.m@ckpower.co.th	[signature]	[signature]
5	**วราภรณ์ บูรณะอัตม์**	DHI	Varaporn@dhigroup.com	วราภรณ์	วราภรณ์
6	**ดร.เจนจิรา ชูทอง**	TEAM Group of Companies Co., Ltd.	janjira-c@teamgroup.co.th	[signature]	[signature]
7	**ดร.ชฎิล จุฑาจินดาเขต**	TEAM Group of Companies Co., Ltd.	chadin_c@team.co.th	[signature]	[signature]
8	**คุณกรรณิการ์ พหลพิพัฒน์**	TEAM Group of Companies Co., Ltd.	knudang@gmail.com	กรรณิการ์	กรรณิการ์
9	**คุณอินทิรา เศวตประวิชกุล**	TEAM Group of Companies Co., Ltd.	Intira_nuch@hotmail.com	อินทิรา	อินทิรา
10.	ARTURO ROA	ASIAN INSTITUTE OF TECHNOLOGY	artgroa@ait.asia	[signature]	[signature]

23

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
10	คุณอรรถพล ชำนาญเวชกิจ	Consultants of Technology Co.,Ltd.	attapol@cot.co.th	[signature]	[signature]
11	คุณชัยวัฒน์ ผลพิรุฬห์	Southeast Asia Technology Co., Ltd.	chaiwat.seatec.gmail.com	[signature]	[signature]
12	คุณปิยาภรณ์ ภาสกานนท์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED		เชิดชาย (แทน)	เชิดชาย (แทน)
13	คุณเชิดชาย ศรีวงษ์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED		เชิดชาย	เชิดชาย
14	คุณธนิตย์ อินทรัตน์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED		ธนิตย์	ธนิตย์
15	คุณ ธรรมนูญ อมรรัชยาวิจารณ์	Siampollutek Co., Ltd.			
16	คุณ สิตา เลขะสมาน	Siampollutek Co., Ltd.	sita@siampollutek.com	สิตา เลขะสมาน	
17		RITTA CO.,LTD.			
18	คุณธนภูมิ เหมือนสน	EastWater PLC.	Thanapum_mua@eastwater.com	[signature]	
19	คุณวีระชัย กิตติวงศ์วัฒนไชย	Siam Steel International PLC.	WE	[signature]	
20		Siam Steel International PLC.			
21		Siam Steel International PLC.			
22	นฤดี วิจิตรรัตน์	Siampollutek. Co., Ltd.	support@siampollutek.com	086 329 6146	(ชมพู)

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
22	**Mr. Jongkon Chongwilaikasem(คุณจงกล จงวิไลเกษม)**	Panya Consultants Co., Ltd.	jongkon_c@panyaconsult.com	[signature]	
23	สมเกต มหรรณพเนศ	Panya Consultants Co., Ltd.	080-6033346 Scm346@gmail.com	[signature]	
24	สันติ ศรีทองสม	Panya Consultants Co., Ltd.	sunti_s@panyaconsult.co.th	สันติ	สันติ
25	**Chaiyuth Jarupattananon**	EGAT	Chaiyuthj@hotmail.com	[signature]	[signature]
26	**Boonsong Peetanonchai**	EGAT	maitree.f@egat.co.th	[signature]	[signature]
27	**Ekaphop Thera-oran**	EGAT	ekaphop.t@egat.co.th	[signature]	[signature]
28	**นางสาวสุภาพร พรมสีดา**	River Engineering Co., Ltd.		[signature]	[signature]
29	**นายศรันยู ทิพย์ดนตรี**	River Engineering Co., Ltd.	[signature]	[signature]	[signature]
30	**นายอาทิตย์ โภคัยวณิช**	River Engineering Co., Ltd.		[signature]	[signature]
31	นาย ปัญญา พลแสน	SCG COT	ppolsan@gmail.com	[signature]	
	น.ส. ดลฤทัย ต้นคำภาภรณ์	EGAT	donruethai.t@egat.co.th	ดลฤทัย	
	สิริรัตน์ โพธิ์ศรีพยาแดง		การไฟฟ้า	[signature]	[signature]

28/01/15

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name	Office/ Position/ Institute	E-mail
1.	พันโทหญิง รสริน ชาญเลขา	สำนักนโยบายและแผนกลาโหม	rosemod@yahoo.co
2.	พันเอกหญิง วริศรา ใจเชี่ยว	สำนักนโยบายและแผนกลาโหม	disaster@mod.go.th
3	ผ.ศ. เกวลิน ศรีจันทร์ (ไม่ได้ลงชื่อ)	ภาควิชาวิศวกรรมชลประทาน ม.ก. (ม.เกษตร)	kavalins@yahoo.com
4	MANEE DONPAPOB	Kyoto University	manee.donpapob.85v@st.kyoto-u.a
5	Tomohiro Tanaka	Kyoto University	tanaka.tomohiro.65m@st.kyoto-u.ac.j
6	HANITTINAN PATINYA	Kyoto University	Patinyah@hotmail.com
7.	Duong Duc Toan	Hydrology and [illegible]	duongductoan@[illegible]

สื่อมวลชน

28/01/15

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name	Office/ Position/ Institute	E-mail
1	[illegible]	[illegible] RADIO	divicut@hotmail.
2	[illegible]	วพท. ๙๐.๕	riti.u93@gmail.co
3	[illegible]	[illegible]	
4	[illegible]	NBT WORLD	suchanee.ru@gmail.com
5	[illegible]	IPM NEWS	RAKFUNGTHON@G—
6	ประวิณฑ พลเขตต์	ASTV-ผู้จัดการ	p.polkett@gmail.com.
7	[illegible]	เดลินิวส์	nsfk71@hotmail.co
8	[illegible]	[illegible]	plee.napatr@gmail.com
9	[illegible]	[illegible]	stang2rick@gm.com
10	[illegible]	TV3	noomunix@gmail.com
11	[illegible]	TV5 .	faiy841@hotmail.com
12	[illegible]	TV3	
13	[illegible]	TV3	
14	[illegible]	NBT WorLD	champsatee@live.com.
15	[illegible]	T.V. 5.	
16	[illegible]	Asia Morning (IPM95)	ipress1213@gmail.com
17	[illegible]	IPM TV	
18	[illegible] จันทวงษ์	สทท.	
19	วรรณสม สีสังข์	[illegible]	

สื่อมวลชน

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name	Office/ Position/ Institute	E-mail
20	ศิริมา [illegible]	NBT	tetor_@hotmail.com
21	[illegible]	[illegible]	phalparsert@hotmail.co.th
22	[illegible]	[illegible]	—
23	ประกาย [illegible]	บ้านเมือง	-
24	[illegible]	ไทยรัฐ	-
25	สิทธิชัย [illegible]	[illegible]	sittineep@gmail
26	[illegible]	NBT	pattanachai.[illegible]@hotmail.com
27	ปราวิทย์ เปลี่ยนแก้ว	NBT	
28	[illegible]	[illegible]	am138news@yahoo.com
29	[illegible]	"	"
30	[illegible]	[illegible]	chatchai.ks@gmail.com
ส่งรูป → 31	[illegible]	—	vosะ KWANJAI.KT@GMAIL.COM *
32	[illegible]	[illegible]	
33	[illegible]	[illegible]	mitipracha@yahoo.com
34	[illegible]	[illegible]	
35	[illegible]	[illegible]	aeg_dwr@hotmail.com
36	[illegible]	[illegible]	
37	[illegible]	TV7	boy[illegible]
38	[illegible]	T.V.5	

สื่อมวลชน

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name	Office/ Position/ Institute	E-mail
39	ทิพวรรณ แก้วศรีภวรว	ไทยโพสต์	Thipthaipost@gmail.com

Participants List
29 January 2015

29/01/15

21

Registration

THA 2015 International Conference on “Climate Change and Water & Environment Management in Monsoon Asia”

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
1	Mr. Thanasak Poomchaivej	CH. KARNCHANG PLC.		[signature]	[signature]
2	Kirana Somsook	CH. KARNCHANG PLC.		[signature]	[signature]
3	Phat Pumchawsaun	CH. KARNCHANG PLC.	phat.p@ckpower.co.th	[signature]	[signature]
4	Pongkoon Maseekeaw	CH. KARNCHANG PLC.	pongkoon.m@ckpower.co.th	[signature]	[signature]
5	วราภรณ์ บูรณะอัตม์	DHI	varaporn_n@hotmail.com	[signature]	[signature]
6	ดร.เจนจิรา ชูทอง	TEAM Group of Companies Co., Ltd.		[signature]	[signature]
7	ดร.ชฎิล จุฑาจินดาเขต	TEAM Group of Companies Co., Ltd.		[signature]	[signature]
8	คุณกรรณิการ์ พหลพิพัฒน์	TEAM Group of Companies Co., Ltd.		[signature]	[signature]
9	คุณอินทิรา เศวตประวิชกุล	TEAM Group of Companies Co., Ltd.		[signature]	[signature]
10	คุณอรรถพล ชำนาญเวชกิจ	Consultants of Technology Co.,Ltd.		[signature]	[signature]

29/01/15

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
11	คุณชัยวัฒน์ ผลพิรุฬห์	Southeast Asia Technology Co., Ltd.			
12	คุณปิยาภรณ์ ภาสกานนท์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED			
13	คุณเชิดชาย ศรีวงษ์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED			
14	คุณธนิตย์ อินทรัตน์	BANGKOK PRODUCE MERCHANDISING PUBLIC COMPANY LIMITED			
15	คุณ ธรรมนูญ อมรรัชยาวิจารณ์	Siampollutek Co., Ltd.			
16	คุณ สิตา เลขะสมาน	Siampollutek Co., Ltd.			
17		RITTA CO.,LTD.			
18	คุณธนภูมิ เหมือนสน	EastWater PLC.			
19	คุณวีระชัย กิตติวงศ์วัฒนไชย	Siam Steel International PLC.		[signature]	[signature]
20		Siam Steel International PLC.			
21		Siam Steel International PLC.			

29/01/15

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
22	Mr. Jongkon Chongwilaikasem(คุณจงกล จงวิไลเกษม)	Panya Consultants Co., Ltd.	jongkon_c@panyaconsult.com		
23	คุณสมชาย มหรรณพพ์	Panya Consultants Co., Ltd.			
24	คุณสันติ ศรีทองสม	Panya Consultants Co., Ltd.			
25	Chaiyuth Jarupattananon	EGAT			
26	Boonsong Peetanonchai	EGAT			
27	Ekaphop Thera-oran	EGAT			
28	นางสาวสุภาพร พรมสีดา	River Engineering Co., Ltd.			
29	นายศรันย สิทธิ์คีรี	River Engineering Co., Ltd.			
30	นายอาทิตย์ โภคัยวณิช	River Engineering Co., Ltd.			
31	นายปัญญา พลแสน	SCG COT			
32	ARTURO ROA	ASIAN INSTITUTE OF TECHNOLOGY	artgroa@ait.asia		
33	คุณนฤดี วิจิตรรัตน์	Siampollutek Co., Ltd.	support@siampollutek.com		

29/01/15

No.	Name (Sponsor)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
34	น.ส.ดลฤทัย ต้นติวราภรณ์	EGAT	donruethai.t@egat.co.th donruethai@egat.co.th	ดลฤทัย	ดลฤทัย
35	คุณวิบูรณ์ เศรษฐบรรจง	การไฟฟ้า	[signature]	[signature]	[signature]

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
1	Mr. Dollachet Klahan (นายดลเชษฐ กล้าหาญ)	การประปานครหลวง	Dallachet@mwa.co.th		
2	Mrs. Praphawedee Otarawanna (นางประภาวดี	กรมทรัพยากรน้ำบาดาล	praphawadee@hotmail.com		
3	Dr. Tanita Suepa (ดร. ฐนิตา เสือป่า)	สำนักงานพัฒนาเทคโนโลยีอวกาศและภูมิสารสนเทศ	tanita@gistda.or.th		
4	Mrs. Aiyanut Chalermchairattanakul (นางอัยณัฎฐ์ เฉลิมชัยรัตนกุล)	การประปาส่วนภูมิภาค	aiyanutc@pwa.co.th		
5	Dr. Sukrit Kirtsaeng (ดร. สุกฤษฎิ์ เกิดแสง)	กรมอุตุนิยมวิทยา	sukritk@hotmail.com		
6	Mr. Arun Pinta (นายอรุณ ปินตา)	กรมป้องกันและบรรเทาสาธารณภัย	arunpinta@gmail.com		
7	Dr. Kanoksri Sarinnapakorn (ดร. กนกศรี ศรินนภากร)	สถาบันสารสนเทศทรัพยากรน้ำและการเกษตร	kanoksri@haii.or.th		
8	Dr. Nawarat Krairapanond (ดร. นวรัตน์ ไกรพานนท์)	สำนักนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม	drnawarat@hotmail.com		
9	Mr. Tanit Chanraksa (นายธนิต จันทร์รักษา)	การไฟฟ้าส่วนภูมิภาค	Tanit.CRS@hotmail.com		

29/01/15

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
10	Ms. Rawiwan Boonchai	สถาบันสิ่งแวดล้อมไทย		[signature]	[signature]
11	Mr. Teerapong Pomun (คุณธีรพงษ์ โพธิ์มั่น)	ผู้อำนวยการสมาคมแม่น้ำเพื่อชีวิต (สถาบันสิ่งแวดล้อมไทย)		[signature]	[signature]
12	Dr. Tin Tun Aung	Myanmar	banea.tta.banea@gmail.com	[signature]	[signature]
13	Mr. Komkrit Innanchai	กรมทรัพยากรน้ำ	krishchai.in@gmail	[signature]	[signature]
14	Mr. Kiattiyod Yodteenthean	กรมทรัพยากรน้ำ	kiattiyot.y@dwr.mail.go.th	[signature]	[signature]
15	Mr. Woradet Pinpat	กรมทรัพยากรน้ำ	opecing@hotmail.com	[signature]	[signature]
16	Mr. Pinit Thaisiam	กรมทรัพยากรน้ำ			
17	Mr. Pradittha Prommachan	กรมทรัพยากรน้ำ			
18	Ms. Wasna Roiamphaeng	กรมทรัพยากรน้ำ	WAS1@yahoo.com	Wasna R.	Wasna R.
19	Ms. Naree Intharawichian	กรมทรัพยากรน้ำ	naree_mim@hotmail.com	[signature]	[signature]
20	Mr. Teeradet Kuruwuth	กรมทรัพยากรน้ำ	teeradethk@hotmail.com	[signature]	[signature]
21	Ms. Jirayu Sakdasiristaporn	กรมทรัพยากรน้ำ	jirayu.s@dwr.mail.go.th	[signature]	[signature]

29/01/15

No.	Name (โควต้า)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
22	Mr. Pinyo Ketsa	กรมทรัพยากรน้ำ		[signature]	[signature]
23	Mrs. Supranee Jongdeepaisal	สำนักงานกองทุนสนับสนุนการวิจัย		[signature]	[signature]
24	Mr. Cholapat Jongdeepaisal	บ. โตโย- ไทย คอร์ปอเรชั่น จำกัด (มหาชน)		Cholapat	Cholapat
25	Dr. Voranuch Wangsuphachart (ผศ. ดร. วรนุช หวังศุภชาติ)	Mahidol University (โควต้า สกว.)		[signature]	[signature]
26	คุณสุรีรัตน์ ชะนะมา	สำนักงานกองทุนสนับสนุนการวิจัย			
27	คุณนิสา แก้วแกมทอง	สำนักงานกองทุนสนับสนุนการวิจัย			
28	นายพิสิฐศักดิ์ คล่ำพันธ์	การประปานครหลวง	pisitsak.k@mwa.co.th		
29	ธีรพร เกตุพันธ์	THAI CARBON FUND	KATUPHAN@YAHOO.com	[signature]	[signature]
30	น.ส. ศศิกานต์ เจริญสัตย์สิริ	DWR	sasikanch@hotmail.com	ศศิกานต์	ศศิกานต์
31	นายภูมิสิทธิ์ [illegible]	DWR	phoomsit@yahoo.com	[signature]	[signature]
32	วรพล เกษุ่ย	TCF	KATOPWAN@YAHOO.COM	[signature]	

27

Registration

THA 2015 International Conference on “Climate Change and Water & Environment Management in Monsoon Asia”

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
TA01	**Miss. Manisha Maharjan**	AIT (200USD)	maneesha064@gmail.com		
TA02	**Dr. Charuvan Kasemsap**	Kasem Bundit University (5400THB)	charuvan.kas@gmail.com		
TA03	**Dr. Thannob Aribarg (Mr. Seree Supratid)**	Chulalongkorn University (100USD)	thannob.a@rsu.ac.th		
TA05	**Mr. Ha Quang Khai** Chulalongkorn	~~National Science and Technology Center for Disaster Reduction (50USD)~~	quangkhai02@gmail.com		
TA06	**Dr. Yuan-Fong SU**	National Science and Technology Center for Disaster Reduction	yuanfongsu@ncdr.nat.gov.tw		
TA07	**Dr. Yuan-Fong SU**	Nagaoka University of Technology	yuanfongsu@ncdr.nat.gov.tw		
TA08	**Mr. Pawee KLONGVESSA**	Suranaree University of Technology (50USD)	nineboon@hotmail.com		
TA09	**Mr. Kowit Boonrawd**	National Science and Technology Center for Disaster Reduction (50USD)	kowit_b@hotmail.com		

29/01/15

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
TA11	**Dr. YUN-JU CHEN**	Kyoto University (280USD)	yjchen@ncdr.nat.gov.tw		
TA12	**Mr. DUONG Duc Toan**	Kyoto University	duongductoan@wru.vn	[signature]	[signature]
TA13	**Miss. Supattana Wichakul** present บ่าย	~~Asian Institute of Technology~~ Kyoto U.	supattana.w@gmail.com	[signature]	[signature]
TA15	**Mr. Ashish Shrestha**	Chulalongkorn University (280USD)	ashish.shrs@gmail.com	[signature]	[signature]
TA16	**Dr. Parichat Wetchayont**	Chulalongkorn University (100USD)	nokcole@yahoo.com	[signature]	[signature]
TA17	**Mr. chokchai suthidhummajit**	Ministry of Science and Technology	chokchai.s@chula.ac.th	[signature]	[signature]
TA18	**Mrs. thasorn**	Chulalongkorn University	thasorn@nimt.or.th		
TA19	**Mr. Teerawat ram-indra**	Rangsit university (50USD)	Teerawat.ram@gmail.com		
TB01	**Dr. Agnes Ramos**	San Fabian Echague, Isabela Philippines (250USD)	orly_isu@yahoo.com	[signature]	[signature]
TB02	**Mrs. Men Nareth**		nareth@itc.edu.kh		
TB05	**Mr. MANEE Donpapob**	Kyoto University (50USD)	manee.donpapob.85v@st.kyoto-u.ac.jp	Manee Donpapob	Manee Donpapob

29/01/15

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
TB06	**Mr. Ishwar Pun**	The University Tokyo (50USD)	punisr@gmail.com	[signature]	[signature]
TB07	**Mr. Sonsak Puttrawutichai**	Kasetsart University	songsak.tee@gmail.com		
TB10	**Lanie Alejo**	(250USD) จองทัวร์	orly_isu@yahoo.com	[signature]	[signature]
TB11	**Mr. mehdi**		mehdijafari_89@yahoo.com		
TC01	**Prof. Dr. Orlando Balderama**	(250USD) จองทัวร์	orly_isu@yahoo.com	[signature]	[signature]
TC02	**Dr. Pasan Kulvanit**	Ministry of Science and Technology (100USD)	pasan.kulvanit@gmail.com	[signature]	[signature]
TC03	**Mr. Wasukree Sae-tia**	Hydro and Agro Informatics Institute (100USD)	wasukree@haii.or.th	[signature]	[signature]
TC07	**Miss. Khin Htay Kyi**	Nagaoka University of Technology (50USD)	ms.khinhtaykyi@gmail.com		
TC08	**Prof. Minjiao Lu**	Nagaoka University of Technology (280USD)	lu@nagaokaut.ac.jp		
TC09	**Dr. Luki Subehi**	International Water Resources Research Institute, Koroa (200USD)	luki@limnologi.lipi.go.id		
TC10	**Assoc.Prof. Dr. Takanori Nagano**	Kobe University (280USD)	naganot@ruby.kobe-u.ac.jp	長野 宇規	長野 宇規

24/07/15

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
TC12	**Miss. Haruetai maskong**	Suranaree University of Technology (50USD)	haruetai.m@gmail.com	[signature]	[signature]
TC13	**Assoc.Prof. Uma Seeboonruang**	KMITL	kseuma@kmitl.ac.th	[signature]	[signature]
TC14	**Tomohiro Tanaka**	Kyoto University	tanaka.tomohiro.65m@st.kyoto-u.ac.jp		
TC15	**Dr. Rajib Kumar Bhattacharjya**	(200USD)	rajibkbc@gmail.com	[signature]	[signature]
TC16	**Mr. Tiratas Suwathep**	Tokyo Institute of Technology (50USD)	suwathep.t.aa@m.titech.ac.jp	[signature]	[signature]
TC20	**Mrs. SALWA MOHD ZAINI MAKHTAR**	UNIVERSITI SAINS MALAYSIA (50USD)	salwamohdzainimakhtar@gmail.com		
TC21	**Mr. Syamsul Azlan Saleh**	(50USD)	azlansaleh10@gmail.com		
TC23	**Miss. Aphantree Yuttaphan**	Naresuan University (50USD)	aphantreey@yahoo.com	[signature]	[signature]
TC24	**Miss. Nur Aziemah bt Abd Rashid**	Universiti Sains Malaysia (USM) (50USD)	nuraziemahabdrashid@gmail.com		
TC19	**Mrs. NOR AMIRAH BT ABU SEMAN @ HJ AHMAD**	(50USD)	naashamira@yahoo.com		
TD01	**Mr. Sathit Chantip**	Hydro and Agro Informatics Institute (100USD)	sathit@haii.or.th	[signature]	[signature]

29/01/15

No.	Name (Presenter)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
TD02	**Sirod Sirisup**	National Electronics and Computer Technology Center (100USD)	sirod.sirisup@nectec.or.th		
TD03	**Assoc.Prof. Dr. Bipul Talukdar**	Assam Engineering College, India (200USD)	bipulaec@gmail.com	[signature]	[signature]
TD04	**Dr. LEE Eulrae**	K-water (200USD)	erlee@kwater.or.kr		
TD06	**Dr. Akihiko KOTERA**	Kobe University (280USD)	akotera@ruby.kobe-u.ac.jp		
TD07	**Dr. Sutat Weesakul**	Hydro and Agro Informatics Institute	sutat@haii.or.th		
TD08	**Miss. Pich Hirun**	Mahidol University (50USD)	hirunpich@gmail.com		
TD09	**Dr. Hsin-Chi Li**	National Science and Technology Center for Disaster Reduction (280USD)	hsinchi@ncdr.nat.gov.tw		
TD10	**Assoc.Prof. Sombat CHUENCHOOKLIN**	Naresuan University (100USD)	sombatc@nu.ac.th	[signature]	[signature]
TD11	**Assoc.Prof. Dr. Nutchanart Sriwongsitanon**	Kasetsart University (100USD)	fengnns@ku.ac.th	[signature]	[signature]
TD12	**Prof. Dr. Orlando Balderama**		orly_isu@yahoo.com		

29/01/15

7

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"
28-29 January 2015
2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
1	นายวีระ วงศ์แสงนาค	สมาคมนักอุทกวิทยาไทย			
2	ดร. วีระพล แต้สมบัติ	สมาคมนักอุทกวิทยาไทย			
3	นายปรีชา เศขรฤทธิ์	สมาคมนักอุทกวิทยาไทย		[signature]	[signature]
4	นางศรีสุพร ศรีสุภาพ	สมาคมนักอุทกวิทยาไทย			
5	ดร. ยิ่งปลิว ศุภกิตติวงศ์	สมาคมนักอุทกวิทยาไทย	✓	✓	✓
6	นายเจริญสุข วรพรรณโสภาค	สมาคมนักอุทกวิทยาไทย (29/01/2015)			
7	ดร. เกษม ปิ่นทอง	สมาคมนักอุทกวิทยาไทย	kasemai@hotmail.com	[signature]	[signature]
8	นายประสิทธิ์ ผลวิไล	สมาคมนักอุทกวิทยาไทย			[signature]
9	นางสาวสมคิด บัวเพิ้ง	สมาคมนักอุทกวิทยาไทย			
10	นายชูลิต วัชรสินธุ์	สมาคมนักอุทกวิทยาไทย			
11	ดร. ภาณุวัฒน์ ปิ่นทอง	สมาคมนักอุทกวิทยาไทย			
12	ดร. ธนสิทธิ์ ธรรมศิริโรจน์	สมาคมนักอุทกวิทยาไทย			

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
13	**ดร. วจี รามณรงค์**	สมาคมนักอุทกวิทยาไทย (29/01/2015)	vachi1938@gmail.com	[signature]	
14	**นายรุ่งเรือง จุลชาต**	สมาคมนักอุทกวิทยาไทย			
15	**ดร. สมิทธ ธรรมสโรช**	สมาคมนักอุทกวิทยาไทย			
16	**ม.ล.ชนะพันธุ์ กฤดากร**	สมาคมนักอุทกวิทยาไทย			
17	**ดร.สมศรี อรุณินท์**	สมาคมนักอุทกวิทยาไทย	[signature]	[signature]	[signature]
18	**นางกรณิการ์ ทวีทรัพย์**	สมาคมนักอุทกวิทยาไทย			
19	**ดร. วัฒนา กันบัว**	สมาคมนักอุทกวิทยาไทย	[signature]	[signature]	[signature]
20	**นายสุพจน์ โลห์วัชรินทร์**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			
21	**นายสุพจน์ เจียมจรัสรัศมี**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			
22	**ดร. อภิชาติ สระมูล**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			
23	**ดร. พลเดช เทอดพิทักษ์วานิช**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			
24	**นายนพดล ใจซื่อ**	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย			

29/01/15

No.	Name (สมาคมฯ)	Office/ Position/ Institute	E-mail	Signature	
				เช้า	บ่าย
25	นายอิสรา ประภาสวัสดิ์	สมาคมวิศวกรที่ปรึกษาแห่งประเทศไทย (29/01/2015)			
26	ดร.ทองเปลว กองจันทร์	กรมชลประทาน	tkongjun3535@gmail.com	✓	
27	ดร.สุทัศน์ วีสกุล	AIT			
28	ดร.ยุพา ชิดทอง	บริษัทปัญญา คอนซัลแตนท์	chithong_y@yahoo.co.th		
29	คุณสมเกียรติ กิจสุวรรณกุล	MDX			

29/01/15

13

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Student)	Office/ Position/ Institute	E-mail	Signature
1	Mr. Odoemena Kenneth Ikenna	Universiti Putra Malaysia	gs40668@mutiara.upm.edu.my	[signature]
2	Mr. PATINYA HANITTINAN	Kyoto University	Patinyah@hotmail.com	[signature]
3	MANEE DONPAPOB	Kyoto University	manee.dorpapcb.85@st.kyoto.ac.th	
4	Tomohiro Tanaka	Kyoto University	tanaka.tomohiro.65@st.kyoto.ac.jp	Tomohiro Tanaka
5	Mr. Yotaro Ueno	Graduate School of Agricultural Science, Kobe University	1006004a@stu.kobe-u.ac.jp	Yotaro Ueno
6	Miss Rujiporn Suthisanonth	Chulalongkorn University	toktak.suthisanonth@gmail.com	
7	Miss. Swapnali Barman	Indian Institute of Technology, Guwahati, India	swapnali.barman@gmail.com	Barman
8	Mr. Seree Supratid	Climate Change and Disaster Center	thannob.a@rsu.ac.th	[signature]
9	Mr. Watcharapong Noimunwai	Environmental Science, Graduate School, Chulalongkorn University	watcharapong@start.or.th	[signature]
10	Duong Due Toan	Hydrology and land	duongductoan@wru.vn	[signature]

29/01/15

9

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (TH participant)			Office/ Position/ Institute	E-mail	Signature	
1	**Mr.**	**Chatchai**	**Jothityangkoon**	Suranaree University of Technology, School of Civil Engineering	cjothit@sut.ac.th		
2	**Mr.**	**Watin**	**Thanathanphon**	Hydro and Agro Informatics Institute (HAII)	watin@haii.or.th		
3	**Mr.**	**Thakolpat**	**Khampuengson**	Hydro And Agro Informatica Institute	Thakolpat@haii.or.th		
4	**Mr.**	**Cherid**	**Kalayanamitr**	Electricity Generating Authority of Thaiand (EGAT)	cherid.k@egat.co.th		
5	**Mr.**	**Somchai**	**Baimoung**	National Research Council of Thailand (NRCT)	somchaib.mict@gmail.co m		
6	**Mr.**	**Worasak**	**Yakanmool**	Electricity Generating Authority of Thailand (EGAT)	worasak.y@egat.co.th		
7	**Miss**	**Warangkana**	**Larbkich**	Department of Groundwater Resources	dgr.iru@gmail.com		

13 29/01/15

No.	Name (TH participant)	Office/ Position/ Institute	E-mail	Signature	
8	Mrs. Thitima Yamchong	Provincial Waterworks Authority	Titimas@pwa.co.th	Thitima Y.	Thitima Y.
9	Mr. Atichat Rucksajit	Chaipattana Foundation	atichat_rucksajit@yahoo.com	[signature]	[signature]
10	Miss Pichaya Amornpantang	Provincial Waterworks Authority	pichayaa@pwa.co.th	[signature]	[signature]
11	Mr. Vutinun Pothongnark	Provincial Waterworks Authority	vutinunp@pwa.co.th	[signature]	[signature]
12	Miss. Porpattama Hammachukiattikul	ศูนย์วิจัยระบบพยากรณ์อากาศรายฤดูสำหรับประเทศไทย มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี	Porpattama@gmail.com		
13	Miss. WACHIRAPOND PERMPOONSINSUP	ศูนย์วิจัยระบบพยากรณ์อากาศรายฤดูสำหรับประเทศไทย มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี	wachirapond@gmail.com		
14	Mr. ANONGRIT KANGRANG	Mahasarakham University	anongrit.kcmsu.ac.th	[signature]	[signature]
15	Mr. Yotaro Ueno	Kobe University	youda87@yahoo.co.jp		
16	Mr. Suppakorn Chinvanno	Chulalongkorn University	suppakorn@start.or.th		

29/01/15

No.	Name (TH participant)	Office/ Position/ Institute	E-mail	Signature	
17	Mr. PHITSANU VORANARD	NESDB	phitsanu@nesdb.go.th		
18	พันโทหญิงรสริน ชาญเลขา	สำนักนโยบายและแผนกลาโหม	romsemod@yahoo.com	รสริน.	รสริน
19	พันเอกหญิง ใจเปี่ยม	สำนักนโยบายและแผนกลาโหม	disaster@mod.go.th	[illegible]	[illegible]
20	น.ส.เกวลิน ศรีจันทร์	ภาควิชาวิศวกรรมชลประทาน มหาวิทยาลัยเกษตรศาสตร์	kavalins@yahoo.com	[illegible]	[illegible]

29/01/15

6

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
1	**His Excellency Mr. Ampol Senanarong**	Privy Councillor			
2	**Dr. Subin Pinkayan**	President of Thai Hydrologist Association			
3	**Prof. Dr. Mongkol Techakumphu**	Vice President of Chulalongkorn University			
4		Vice President of Kasetsart University			
5	**Dr. Shrestha Sangam**	Asian Institute of Technology			
6	**Mr. Lertviroj Kowattana**	Director General of Royal Irrigation Department			
7	**Mr. Niwatchai Khamphi**	Director General of Department of Water Resources			
8	**Dr. Suthipun Jitpimolmard, M.D.**	Director General of Thailand Research Fund			
9	**Prof. Dr. Bundhit Eua-arporn**	Dean of Chulalongkorn University			

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
10	Dr. Gwang-Jo Kim (Geuest sp.)	UNESCO Bangkok			
11	Mr. Miguel Musngi (Geuest sp.)	Senior Officer of DMHA Division, ASEAN Secretariat			
12	Miss. Ladawan Kumpa (Geuest sp.)	Deputy Secretary General, Office of the National Economic and Social Development Board (NESDB), Thailand			
13	Assoc. Prof. Dr. Chetsada Kaeokanlaya (รศ.ดร. เจษฎา แก้วกัลยา)				
14	Dr. Ramasamy Jayakumar	UNESCO-IHE			
15	Assoc. Prof. Dr. Sucharit Koontanakulvong	Chulalongkorn University			
16	Assoc. Prof. Dr. Bancha Kwanyuen	Dean of Kasetsart University			
17	Dr. Thongplew Kongjun	Royal Irrigation Department			
18	Mr. Chaiporn Siripornpibul	Department of Water Resources			

29/01/15

No.	Name (VIP)	Office/ Position/ Institute	E-mail	Signature	
19	**Mrs. Supranee Jongdeepaisarl**	Thailand Research Fund			
20	**Assoc. Prof. Amnat Chidthaisong**	King Mongkut's University of Technology Thonburi, TRF			
21	**Dr. Chanathip Pharino**	TRF			
22	**Dr. Damrong Sripraran**	KU			
23	**Dr. Ekasit Kositsakulchai**	Kasetsart University	ekasit.ko@gmail.com		
24	Dr. Sanit Wongsa	KMUTT	sanit.won@kmutt.ac.th	[illegible]	[illegible]
25	Dr. Yutthana Talaluxmana	KU	fengynt@ku.ac.th	[illegible]	[illegible]

Registration

THA 2015 International Conference on “Climate Change and Water & Environment Management in Monsoon Asia”

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (Invited speaker)	Office/ Position/ Institute	E-mail	Signature	
1	**Dr. Ailikun**	Chinese Academy of Sciences, China	aili@mairs-essp.org		
2	**Prof. Tissa Illangasekare**	Colorado School of Mines, USA	tillanga@mines.edu		
3	**Prof. Jiaguo Qi**	Zhejinag University China, China	jiaguo.qi@gmail.com		
4	**Prof. LIONG Shie-Yui**	National University of Singapore, Singapore	tmslsy@nus.edu.sg		
5	**Dr. Tamim Younos**	The Cabell Brand Center for Global Poverty and Resource Sustainability	tyounos@gmail.com		
6	**Prof Xin Li**	Director of Laboratory of Remote Sensing and Geospatial Science at CAREERI/Chinese	lixin@lzb.ac.cn		
7	**Prof. Dr. Takahiro SAYAMA**	ICHARM, Public Works Research Institute, Japan	t-sayama@pwri.go.jp		
8	**Dr.Fi John Chang**	National Taiwan University, Taiwan	changfj@ntu.edu.tw		
9	**Dr. Kittiwet Kuntiyawichai**	Faculty of Engineering, Khon Kaen University	kittiwet_k@hotmail.com		

No.	Name (Invited speaker)	Office/ Position/ Institute	E-mail	Signature	
10	**Dr. Ole Mark**	DHI, Denmark			
11	**Dr. CHOI Byung man**	K-water Institute	bmchoi@kwater.or.kr		
12	**Prof. Dr. Yasuto TACHIKAWA**	Kyoto University, Japan	tachikawa@hywr.kuciv.kyoto-u.ac.jp		

29/01/15
15.

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
1	**Mr. Thada Sukhapunnaphan**	Royal Irrigation Department		[signature]	[signature]
2	**Mr. Adisorn Champathong**	Royal Irrigation Department		[signature]	[signature]
3	**Mr. ~~Thirawutthi Sukhonthapradit~~** Nirut Koonphol	Department of Water Resources		[signature]	[signature]
4	**Mrs. Wasna Proiamphaeng**	Department of Water Resources		[signature]	[signature]
5	**Mrs. Orathai Ongrattana**	Department of Water Resources		[signature]	[signature]
6	**Ms. Kanokwan Yoowong**	Department of Water Resources			
7	**Assoc. Prof. Dr. Tuantan Kitpaisalsakul (Chair)**	Chulalongkorn University		[signature]	[signature]
8	**Asst. Prof. Dr. Aksara Putthividhya (Chair)**	Chulalongkorn University			
9	**Dr. Piyatida Hoisungwan**	Chulalongkorn University			
10	**Dr. Pongsak Suttinon (Chair)**	Chulalongkorn University			
11	**Dr. Anurak Sriariyawat**	Chulalongkorn University		[signature]	[signature]

29/01/15

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
12	Dr. Yutthana Talaluxmana	Kasetsart University			
13	Dr. Jeerasorn Santisirisomboon	Ramkhamhaeng University			
14	Dr. Sutat Weesakul (Chair)	Asian Institute of Technology			
15	Dr. Somchai Chonwattana	Asian Institute of Technology	sch@dhigroup.com	Somchai Ch.	Somchai Ch.
16	Prof. Kuniyoshi Takeuhi	ICHARM, Japan			
17	Prof. Makoto KIMURA	Kyoto University, Japan			
18	Prof. Wei-Fuu Yang	President of PAWEES, Japan			
19	Prof. Kwansue Jung	Chungnam National University, Korea	ksjung@cnu.ac.kr	[signature]	[signature]
20	Prof. Ke-Sheng Cheng	National Taiwan University, Taiwan			
21	Dr. Dusadee Sukawat (Chair)	King Mongkut's University of Technology Thonburi			
22	Dr. Chaiwat Ekkawatpanit (Chair)	King Mongkut's University of Technology Thonburi	chaiwat.ekk@kmutt.ac.th	[signature]	[signature]

29/01/15.

No.	Name (organized-chair-briefing)	Office/ Position/ Institute	E-mail	Signature	
23	Dr. Pariwate Varnakovida (Chair)	King Mongkut's University of Technology Thonburi	pariwate@gmail.com		089-866-5958
24	Dr. Saisunee Budhakooncharoen (Briefing)	Thai Hydrologist Association	dr.saisunee@gmail.com		
25	Dr. Sarawut Jansuwan (Briefing)		sarawutj@gmail.com		
26	Dr. Sompong Boonprasert (Briefing)		drsompong@yahoo.com		
27	Dr. Suppattana Wichakul (Briefing)		supattana_w@teami.co.th		
28	Dr. Siriluk Chumchean (Briefing)		sililuck_p@panyyaconsult.co.th		
29	Dr. Duangruedi Khosit kittiwong (Briefing) Duangrudee		duangrudee.k@gmail.com		
10.	Dr. SANGAM SHRESTHA (Chair)				

3.

Registration

THA 2015 International Conference on "Climate Change and Water & Environment Management in Monsoon Asia"

28-29 January 2015

2nd floor, Swissôtel Le Concorde, Bankok, Thailand

No.	Name	Office/ Position/ Institute	E-mail
1	Chayut Kalakan	Fac. Eng Burapha U.	chayut@eng.buu.ac.th
~~2~~	~~Tin Tun Aung~~	~~Programme Manager~~	~~bancatta.banca@gmail.com~~
3	Sompratana Ritphring	Eng. Kasetsart	fengstr@ku.ac.th
4	Pakorn Ditthakit	Eng. Walailak	dpakorn@hotmail.com

Appendix II

Opening ceremony

Keynote presentations

Press conference

THA 2015 International Conference

THA 2015 International Conference

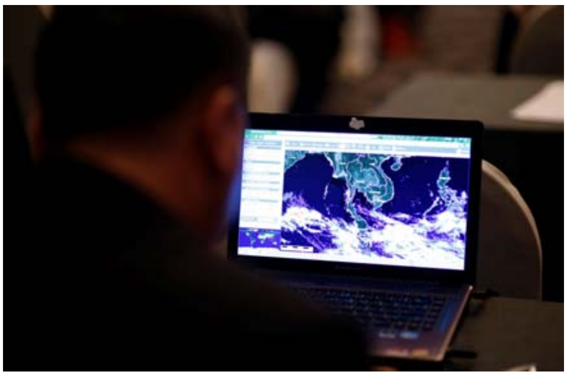







THA 2015 International Conference






ASEAN Workshop

Poster exhibition

Welcome party








Farewell party