

# **An International Meeting on Land Cover/Land Use Changes and Water Energy Food (WEF) Nexus in Southeast Asia, National University of Laos, Vientiane, LAOS, August 11-17th, 2018**

and

## **Advanced Training in Remote Sensing and Geospatial Technologies, 18-20th August, 2018**

### **Introduction**

Increasing land-use/cover changes and human development combined with climate variability are imposing significant threats to water, energy and food security in Asia and around the globe. Competition for water resources, hydropower, irrigated agriculture and fisheries in the Mekong River Basin presents a major challenge in sustainable development in the basin. There have been research efforts by international communities to address these issues and some progress has been made in better understanding of the dynamic interactions among water resources, food security and energy production and consumption. However, challenges remain and are even mounting, resulting from increased climate extremes and large-scale human developments such as urbanization, dam construction and agricultural intensification. The purpose of this meeting was to bring international experts and stakeholders from a variety of agencies and institutions in the US and other countries to share and exchange their ideas, methods, technologies and knowledge to address the emerging water-energy-food nexus issues in the region. The goal is to develop a better knowledge and solutions to synergistically manage water resources for all sectors, communities and ecosystems.

The meeting was attended by some 85 researchers from different countries which included USA, Laos, Cambodia, Myanmar, Thailand, Vietnam, Philippines, and South Korea. The meeting was hosted by the National University of Laos, Vientiane, Laos and supported by several other regional and US institutions which included National University of Laos, National Agriculture and Forestry Research Institute, Laos; Mekong River Commission; Khon Kaen University-Nong Khai, Nakhon Phanom University, and King Mongkut's University of Technology Thonburi, and Mae Fah Laung University, all in Thailand.

The international supporting organizations included, Future Earth in Asia, Japan; Future Earth NEXUS KAN; Global Land Program; Khon Kaen University - Nong Khai, Thailand; Mekong Regional Information Network; Mekong River Commissions, Laos; Michigan State University, USA; Monsoon Asia Regional Integrated Studies for Sustainability; Nakhon Phanom University, Thailand; Nanjing Agricultural University, China; the NASA Land-Cover/Land-Use Program, USA; South/Southeast Asia Research Initiative (SAR); START Inc. international program, Washington D.C and the GOF-C-GOLD Program. Researchers from the GOF-C-GOLD Southeast Asia regional network also attended the meeting and training. START GOF-C-GOLD program sponsored the training which was attended by 26 participants from regional countries including the Laos.

The meeting was organized into following sessions:

Session one was on "International Programs and Initiatives" with the presentations on NASA LCLUC Activities in Southeast Asia by Garik Gutman, NASA, USA; the SARI Program, priorities and progress by Krishna Vadrevu, NASA Marshall Center and SARI Project Scientist, USA; SERVIR-Mekong: Connecting Space to Village in the Lower Mekong by Peeranan Towashiraporn, SERVIR Program, Bangkok, Thailand; Introducing the Future Earth Water-Energy-Food Nexus Knowledge-Action Network by Kaela Slavik, Future Earth NEXUS KAN; and MAIRS-Future Earth, WEF Nexus Theme in Asia by Wei Wan, MAIRS IPO, China.

Session two titled "Land Use and WEF Nexus in Southeast Asia" included Integrated water management, experience of 3S watersheds by Matthew McCartney, IWMI, Laos; Challenges and opportunities in operationalizing WEF Nexus in Southeast Asia by Junguo LIU, Southern University of Science and Technology, China; Linking climate, glaciers and land in Monsoon Asia for WEF Nexus analysis by Deliang CHEN, University of Gothenburg, Sweden; Impacts of Various Environmental Factors and Management Strategies on Food Crops in the South and Southeast Asia (SSEA) Region by Dr. Atul Jain, University of Illinois Urbana-Champaign, USA; Food Security and Land Use Dynamics in the Lao PDR - Thateva Sapangthong (Ministry of Agriculture and Forests, Laos). The sessions also included land-cover/land-use change related presentations which included Land-Cover/Land-Use Changes in Laos, Vietnam by Dr. Sanya Praseuth (National Assembly of the Laos PDR, Laos); Arsenic Geochemistry and Human Health Issue in the Mekong River Region by Kyoung-Woong Kim (Gwangju Institute of Science and Technology, South Korea); Remote Sensing and GIS Solutions for Natural Resources and Environment Management in Mekong Delta Region by Prof. Dr. Le Van Trung (Vietnam National University, Thailand); Synergistic Capacity Advancement for the Management of Laguna de Bay: Aquaculture and Food Security by Dr. Mylene G. Cayetano (University of Philippines); Developing and Applying Climate Information for Supporting Adaptation in South East Asia Thailand Case Study: Impact of Projected Climate Change on Rice Production Systems by Attachai Jintrawet (Chiang Mai University, Thailand) and Optimum Planting Window for Corn Based on Rainfall Climatology: A Case Study by Dr. Gay Perez (University of Philippines).

Session three focused on "Land Use, Dams, Hydrology and Society" with the following presentations. WEF Nexus Approach to addressing WEF Nexus challenges in the Lower Mekong Basin by Jiaguo Qi, Michigan State University; Land use, land cover, dams and wetlands - McConnell, MSU; Modeling hydrological processes in the Mekong River Basin by Dave MSU; Social impacts and responses of changing in hydrology, Dan Kramer, MSU; Land tenure issues in Mekong - Apisom Intralawan, Mae Fah Luang University, Thailand; Land Use Land Cover Change of Mun Watershed in Thailand by Sura Pattanakiat, Mahdol University, Thailand; Water Management for Mun-Chi River Basins of Thailand by Thada Sukhapunphan, Thai Royal Irrigation Department, Thailand; Utilization of Biochar in Thailand by Bandit Boonkhao, Deputy Director, Research and Development Institute, Nakhon Phanom University, Thailand; Myanmar progress in remote sensing and land by Zaw Naing, Mandalay Technologies, Myanmar; Cambodia progress in land use and land tenures by Tep Kuntheara, CUIS, Cambodia; Vietnam progress on Lower Mekong ecosystems changes and assessment by Vu Ngoc Ut, Can Tho University, Vietnam; Analysis of Urban Heat Island and Energy Consumption of Big Cities in Thailand using GIS and Remote Sensing by Pariwate Vernakovida, King Mongkutt's University, Thailand; Economic value from utilization of forest in lower Srisongkram Watershed by Adchara Pilert, Srisongkram Industrial and Technology College, Thailand; Thai Kuan: The Adaptation of the Identity toward the Construction of Social Space - Aomthip Maleelai, Nakhonphanom University, Thailand; Linear spectral mixing analysis for forest type

classification in Amnatcharoen province, Thailand by Prat Kongsombut, Mahidol University, Amnatcharoen campus, Thailand; Factors affected food security for children in Asia: Integrative review by Runglawon Eamkusolkit, Research and Development Institute, Nakhon Phanom University, Thailand.

In addition, this session also included presentations on the biochar such as "Technology transfer of biochar to rural communities" by Phusit Sansupa, Mahachaiwittayalai School, Thailand; Design and appropriate technology of Biochar Stove for community applications by Krittatee Snguansak, Faculty of Engineering, Nakhon Phanom University, Thailand; and interdisciplinary presentations such as "A Climate change effect on CO<sub>2</sub> and H<sub>2</sub>O Fluxes in Rubber plantation in Thailand - Chompunut Chayawat, Center of Thai-French Cooperation on Higher Education and Research, Kasetsart University, Thailand", and "Integrated remote sensing and Hydraulic Modeling Approach to Identify Spatial-Temporal Varying Flood Impact on Crop Production - Yong Liu and Huili Chen, Peking University, China".

Each of the above sessions included a panel discussion after the technical presentations. The discussion highlighted the scientific needs and priorities of water-energy-food (WEF) issues in the region.

After the meeting, 3-different workshops have been organized: a) Session one on Interdisciplinary science and LCLUC WEF Nexus Project meeting with regional collaborators, Facilitated by Bill McConnell, MSU; b) Advanced Remote Sensing and GIS Training led by Dr. Krishna Vadrevu and other colleagues (Dr. Albrechtova; Dr. Nita, Prof. Levan and Dr. Sridhar) at National University of Laos; and c) Biochar Demo and Training by Dr. Bundit Boonkhao, Mr. Krittatee Sanguansak and Mr. Phusit Sansupha of Nankhon Phanom University.

### **Advanced Remote Sensing and GIS training (August 18-20th, 2018)**



The inaugural training lecture was delivered by Dr. Garik Gutman (NASA HQ). He welcomed the participants and provided the latest updates on different land remote sensing satellites and their potential for land use/cover change studies. The training was organized by Dr. Krishna Vadrevu (NASA Marshall Space Flight Center, Huntsville, Alabama) supported by four other trainers. 25-participants from South/Southeast Asian countries attended the training at the National University of Laos, Laos. Dr. Vadrevu delivered a hands-on training on the potential of Synthetic Aperture Radar (SAR) remote sensing useful for

agriculture applications; Prof. Trung Levan, Ho Chi Minh University, Vietnam delivered a training on UAV applications for cadastral mapping; Prof. Jana Jana Albrechtová, University of Czech Republic delivered a training on the Hyperspectral remote sensing data and applications; Dr. Mihai Nita, Faculty of Silviculture and Forest Engineering, Universitat Transilvania Brasov, Romania delivered a training on the fundamentals of remote sensing and geometric

corrections and Dr. Sridhar Venkataramana from Virginia Tech, USA delivered training on the Hydrological modeling at a watershed scale.

All training lectures were well received by the attendees and they showed significant interest in learning new tools and techniques. Regional participants stressed the importance of continuing these capacity building and training activities in different countries. It was unanimous that remote sensing and GIS have huge potential in addressing natural resource problems, thus, training activities should focus on advanced remote sensing tools and techniques. Participants also stressed the need for the open source tools as commercial software is expensive. START GOFC-GOLD has been focusing on the same and will continue to promote open source remote sensing and GIS technologies including the NASA datasets for future trainings in the region and elsewhere. All participants thanked the sponsors for organizing a successful training and catering to the needs of the researchers in the region.

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