



Book of Abstracts

ICT-ASIA 2015

25-26 May 2015

SEARCA, Los Baños, Laguna, Philippines



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WELCOME MESSAGES



**Embassy of the Republic of France
to the Philippines**



His Excellency Gilles Garachon
Ambassador

On behalf of the Embassy of France to the Philippines, it is my pleasure to welcome you all to the ICT-ASIA 2015 Workshop.

The French Embassy in Manila, together with the French Delegation for Regional Cooperation, UNESCO Regional Science Bureau, the Southeast Asian Regional Center for Graduate Study and Research in Agriculture, and the University of the Philippines Los Baños, with the International Rice Research Institute, has the honor to organize this regional scientific workshop that aims to strengthen, on the basis of mutual benefits, high-level scientific cooperation with and among emerging and developed Asian countries.

We hope to create and establish more linkages and partnerships to further develop scientific cooperation between French and Asian scientists.

During this two-day workshop, you will be able to share innovative ideas and discussions about *climate change modelling and monitoring, disaster risk reduction, ICT applications to food security, and urban and rural informatics* in the field of information and communication technology. The focus of the workshop is highly related to the issue of climate change and the actions that could be taken to better fight it. The regional cooperation ICT program is also a strong example and inspiration for others to find solutions against climate change.

In December 2015, France will host the 21st Conference of Parties of the United Nations that aims to achieve a universal climate agreement. It will address the challenges of climate change that will enable us to contain global warming within the limit of 2°C and to foster low-carbon development.

Being aware of the climate change issue and the extreme vulnerability of the Philippines, the French Embassy supports different projects on biodiversity and environmental protection, agricultural conservation, and risk modelling in the Philippines.

After three years spent here in the Philippines, I am particularly glad that this workshop is held in Los Baños, valuing the high level quality of research that I personally observed in the country, especially in the field of information and communication technology. This is the reason why I wish to see an increase in the participation of the Philippines scientists in the next ICT program.

I wish all our guest scientists and partners a very fruitful meeting.



**Delegation for Regional
Cooperation – ASEAN**
*Ministry of Foreign Affairs and
International Development, France*

André de Bussy
Regional Counselor for Development in ASEAN



On behalf of the French Regional Delegation for Cooperation – ASEAN, it is my pleasure to welcome you to the ICT-ASIA 2015 Workshop. ICT-Asia is a regional program implemented by the French Ministry of Foreign Affairs and International Development, in partnership with the Ministry of National Education, Higher Education, and Research, French research organizations and higher education institutions, and the UNESCO Regional Science Bureau for Asia and the Pacific. Through this workshop, we want to strengthen cooperation between France and Asian countries and offer a venue for the development of collaborative research projects in ICT.

I extend a special thanks to our guest scientists. Your expertise is essential to better stimulate dialogue, develop networks, and create new growth potential in ICT research. I also would like to underline the role of ICT in addressing the numerous challenges of climate change. France will host the 21st Climate Conference (COP21) from 30 November to 11 December 2015. It is hoped that a universal binding agreement on the reduction of greenhouses gas emissions and resilient societies could be reached during COP21. Scientists would be key actors in offering solutions for the implementation of such an agreement. I hope the ICT-Asia 2015 Call for Projects, to be issued by the end of the Workshop, will help fund collaborative projects set up by Franco-Asian research teams that will offer the solutions we all need.



**UNESCO Regional Science Bureau
for Asia and the Pacific**
*Cluster Office to Brunei Darussalam,
Indonesia, Malaysia, the Philippines,
and Timor Leste*

Shahbaz Khan
Officer-in-Charge



On behalf of the UNESCO Regional Science Bureau for Asia and the Pacific, Cluster Office to Brunei Darussalam, Indonesia, Malaysia, the Philippines, and Timor Leste, I wish all participants to ICT-Asia 2015 Workshop a fruitful meeting. ICT-Asia is one of the main programs implemented in the framework of UNESCO Regional Science Bureau's partnership with the French Ministry of Foreign Affairs and International Development.

The topics on the agenda of this workshop are of utmost importance for the future of the region. Information and communication technologies have a strategic role to play in helping address the challenges faced in the fields of food security, disaster risk reduction, urban and rural issues, and of course, climate change, which impact the daily life of local communities worldwide. It is the mandate of the UNESCO Regional Science Bureau to provide training and expertise to enhance the development of science, technology, and innovation policies, based especially on south-south cooperation, in the region.

In this regard, the UNESCO Regional Science Bureau extends its special thanks to the Southeast Asian Regional Center for Graduate Study and Research in Agriculture, University of the Philippines Los Baños, and International Rice Research Institute for their role in hosting and organizing this important event. I personally hope these two days will pave the way for future collaborations among scientists, but more so among the institutions gathered here, that will contribute to the implementation of sustainable ICT policies in the region.

I wish all the best to ICT in Asia!



**Southeast Asian Regional
Center for Graduate Study
and Research in Agriculture**



Gil C. Saguiguit, Jr.,
Director

A warm, warm welcome to ICT-Asia 2015 partners and participants!

We are highly pleased to host this important regional workshop for the first time in the Philippines on its tenth run in Asia. As a regional organization with a capacity building mandate, SEARCA recognizes the contribution of information and communication technologies (ICTs) in advancing science and technology, practice, policy and higher education toward inclusive and sustainable agricultural and rural development (ISARD), which is SEARCA's focal theme in its current Tenth Five-Year Plan. The four themes of ICT-Asia 2015 on Climate Change Modeling and Monitoring, Disaster Risk Reduction, ICT Applications to Food Security, and Urban and Rural Informatics align neatly with SEARCA's thematic thrusts within this overriding ISARD theme.

The Center thanks France for its friendship and trust and nurtures this strong cooperation with French institutions in furthering agricultural and rural development in ASEAN. We also thank all participating researchers for their eager response to this year's call for abstracts. We salute our partners and participating researchers in this workshop and ICT-Asia program for their commendable and highly interesting showcases, and look forward to a productive synergy on the application of ICT in science and technology toward our shared aspirations for ASEAN and other developing countries.

Mabuhay!



**University of the Philippines
Los Baños**



Fernando C. Sanchez, Jr., PhD
Chancellor

Congratulations to ICT-Asia, especially to our partners: the Republic of France, UNESCO Regional Science Bureau for Asia and the Pacific Region, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), and International Rice Research Institute (IRRI); plus a warm welcome to all the participants!

United with the vision of strengthening the field of information and communication technology (ICT) and high-level scientific cooperation among emerging and developed Asian countries, ICT-Asia could have not chosen a better venue for its regional workshop than the University of the Philippines Los Baños (UPLB) Campus. I am proud to state that UPLB has some of the best minds in ICT and sciences in the country. UPLB researchers have designed applications for climate change modeling and monitoring, disaster risk reduction, food security, and urban and rural informatics. Our researchers' achievements and endeavors are proof of a conducive research atmosphere in the university, where our scientists—students, faculty, and research staff alike—endeavor to develop innovations and solutions for the benefit of the Asian region and the world.

Creating a favorable research environment for our researchers is critical to our commitment to become a globally competitive graduate and research university that aims to achieve inclusive growth in the country while attracting the best graduate students across Southeast Asia and the Pacific. We believe that research and innovation can create opportunities for people and societies to be more efficient, productive, and conscientious.

With this, we would like to thank the French government, UNESCO, SEARCA and our other partners for this opportunity to showcase UPLB's and the rest of Asia's wealth of knowledge. I look forward to the linkages, partnerships and agreements to be borne out of this undertaking.

Again, my heartfelt congratulations!

ICT-ASIA PROGRAM

ICT-Asia is a French initiative directed at Asia in order to strengthen, on the basis of mutual benefits, high-level scientific cooperation with and among Asian countries in the field of information and communication technologies.

It aims to contribute to regional integration by driving a search for excellence and support for scientific communities in Asia, with a strong focus on ASEAN.

ICT-Asia contributes, through an annual Call for Projects, to the funding of research projects involving France and at least two partner countries in Asia. The overall purpose is to support the initiation of new collaborations, to facilitate the building of research networks, and to foster future participation in other regional or multilateral programs.

ICT-Asia Workshop

The ICT-Asia regional workshop is held every year for researchers who have participated in or intend to participate in the program together with the representatives of French and Asian partner organizations. It offers a venue for dialogue between French and Asian scientists, with the objective of promoting further scientific cooperation (building of research teams for application to the Call for Projects, integration of participants to existing cooperation networks, dialogue between potential partners).

Objectives

- Strengthen the network of scientists in ICT research fields for further cooperation, eventually leading to the constitution of trilateral (or more) research teams;
- Offer a venue for open discussion on ICT-Asia program and Call for Projects (priorities and eligible fields, terms of implementation, foreseeable evolutions of the program, and funding schemes, etc.);
- Offer a venue for the promotion of cooperation programs offered by partner institutions.

Intended participants

ICT-Asia workshop is open to

Scientists from France, ASEAN member countries, Timor Leste, China (mainland), Taiwan, Hong Kong, Japan, South Korea, India, Pakistan, Nepal, Bangladesh, and Bhutan, in the relevant fields.

Representatives from:

- French and Asian public and private bodies supporting R&D, regional scientific cooperation, and networking in ICT fields
- Offices in Ministries in charge of R&D and regional cooperation, ASEAN Sectorial bodies, and centers in relevant fields

Expected outputs

- Strengthening of a Franco-regional network in the relevant fields
- Scientists to team up to submit projects under the 2015 ICT-Asia Call for Projects, eventually leading to long-lasting cooperation/international research teams with a capacity to apply to international call for projects

Call for Projects

The yearly call for projects funds mobility, field trips, missions, and joint international workshops related to a collaborative research project in ICT. Applicant teams should consist of at least one researcher from an ASEAN country, one (1) researcher from a second eligible Asian country (ASEAN or other), and (1) French researcher. Additional candidates are welcome.

The amount of the grant awarded by the French Ministry of Foreign Affairs and International Development is a maximum of EUR 40,000 for the two years of the project (or EUR 20,000 per project per year, paid on an annual basis). In addition to this grant, co-funding from French partner institutions involved in a project is mandatory. Co-funding from Asian institutions is an asset.

The grant only funds the costs arising from the international nature of the project (i.e., travel, team missions, and joint workshops). It may not, in any case, fund wages or research equipment.

Terms and conditions are available on the CampusFrance website:

<http://www.campusfrance.org/sites/default/files/stic-asie-uk.pdf>

<p>2015 Call for projects will be issued at the end of ICT-Asia Workshop. Publication on CampusFrance website is expected by the 8 June 2015. Deadline for applications: 31 August 2015. Selection by November 2015.</p>
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Facts and figures

Since the beginning of the Program in 2004, nine ICT-Asia Calls for Projects have been launched, which helped fund 52 projects involving 305 researchers (35% from the ASEAN, 34% French, 9.3% Japanese, 6.75% Chinese for the most represented areas). Except for France, Switzerland is the only non-Asian country which has participated in the projects.

It is estimated that 80 percent of the projects involved the training of PhD students as a key component. Two projects helped the creation of a Joint Research Unit or International Associated Laboratory: the Japanese-French Laboratory for Informatics in Tokyo and the International Laboratory on Future Media and Services (ILLUMINE) in Seoul.

Queries may be addressed to the Secretariat:
c/o Ms. Philoméne Robin at p.robin@unesco.org.

ICT-ASIA 2015 PROGRAM

Day 1 - 25 May 2015 / Monday

08:30

REGISTRATION and COFFEE, SETTING UP OF POSTERS/EXHIBITS

Front Lobby and Umali Auditorium Lobby, SEARCA

10:00

OPENING PROGRAM

SEARCA Umali Auditorium

Messages

Dr. Gil C. Saguiguit, Jr.

Director, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

Dr. Amelia P. Guevara

*Undersecretary for Research and Development
Department of Science and Technology, Philippines*

His Excellency Gilles Garachon

Ambassador of the Republic of France to the Philippines

Dr. Fernando C. Sanchez, Jr.

Chancellor, University of the Philippines Los Baños

Mr. André de Bussy

*Counselor for Regional Cooperation - ASEAN
Ministry of Foreign Affairs and International Development, France*

Prof. Kanchana Kanchanasut

*Vice President for Research
Asian Institute of Technology*

Dr. Luc Le Calvez

*Director, Office for Southeast Asia
Centre National de la Recherche Scientifique (NRS)*

Dr. Jean-Pascal Torreton

*Representative in Vietnam and Regional Coordinator for Asia
Institut de Recherche pour le Développement*

Appreciation and Group Photo

Dr. Maria Celeste H. Cadiz
*Program Head for Knowledge Management, SEARCA
Master of Ceremonies*

11:30

PRESS CONFERENCE (Keynote Speakers and Partner Institutions)

Sam Arng Srinilta Seminar Room, SEARCA

VIEWING OF POSTERS AND EXHIBITS

Umali Auditorium Lobby

12:00

LUNCH

Makiling Executive Lounge, Ground Floor, SEARCA

Day 1 - 25 May 2015 / Monday

PLENARY SESSION 1: Climate Change Modelling and Monitoring

13:30	Integrating Radio-Frequency Identification (RFID) and Geomatics for Modelling and Monitoring Forest Dynamics	Dr. Nathaniel C. Bantayan <i>University of the Philippines Los Baños</i>
13:45	Climate Change Impact Assessment and Agricultural Land Use Decision Making in the Vietnamese Mekong Delta	Dr. Nguyen Hieu Trung <i>Can Tho University, Vietnam</i>
14:00	Assessment of Land Use Change and Climate Variability on Hydrological Processes in the Upper Ma River Basin, Northwest Vietnam for Future Land Use Planning and Water Resources Management	Mr. Ngo Thanh Son <i>Asian Institute of Technology (AIT) and Vietnam National University of Agriculture</i>
14:15	Collaborative Portal Framework for Interdisciplinary Knowledge Capture and Sharing Precision Agriculture	Asst. Prof. Concepcion L. Khan <i>University of the Philippines Los Baños</i>
14:30	PANEL DISCUSSION and Q&A	

15:00 Break / POSTER SESSION : Climate Change Modelling and Monitoring

PLENARY SESSION 2: ICT Applications to Food Security

15:30	Use of ICT to Improve Livelihoods of the Poorest in Rural Areas: e-PADEE Project	Dr. Il Jeong Jeong <i>International Fund for Agricultural Development</i>
15:45	Application of the DSSAT-CERES-Maize Model for Climate Change Impact Assessment and Decision Support in Corn Production	Dr. Orlando F. Balderama <i>Isabela State University, Philippines</i>
16:00	Ensuring Meat Quality and Safety through a Nationwide Pork Traceability System	Prof. Jaderick P. Pabico <i>University of the Philippines Los Baños</i>
16:15	Developing a Smarter Crop Forecasting System in the Philippines	Dr. Felino P. Lansigan <i>University of the Philippines Los Baños</i>
16:30	PANEL DISCUSSION and Q&A	
17:00	POSTER SESSION: ICT Applications to Food Security	

18:00 COCKTAILS AND GALA DINNER *Makiling Lanai and Patio and SEARCA Umali Auditorium*

Day 2 - 26 May 2015 / Tuesday

8:30 **REGISTRATION AND COFFEE**

PLENARY SESSION 3: Disaster Risk Reduction

9:00 Reviving Past Catastrophic Events through Geo-Historical Simulations **Dr. Alexis Drogoul**
Institut de Recherche pour le Développement, Vietnam

9:15 Computer Simulation Games for Disaster Risk Reduction **Dr. Rafael P. Saldaña**
Ateneo de Manila University, Philippines

9:30 Satellite Remote Sensing for Risk Assessments of Volcanic and Other Natural Hazards **Dr. Soo Chin Liew**
National University of Singapore

9:45 Creating a Geohazards Layer for the OpenStreetMap Platform **Ms. Charmaine Marie A. Pabelico**
University of the Philippines Los Baños

10:00 **PANEL DISCUSSION and Q&A**

10:20 **Break / POSTER SESSION: Disaster Risk Reduction**

10:40 Empowering the Communities to Use the Mobile-Based Application for Disaster Risk Reduction in the Face of Climate Change **Mr. Deep Prakash Ayadi**
The Thin Page Pvt. Ltd., Nepal

10:55 An Initiative on Low-Cost Monitoring of Haze Air Quality Disasters in Rural Communities in Thailand and ASEAN **Dr. Apinun Tunpan**
Asian Institute of Technology

11:10 Risk-Level Assessment System on Bengawan Solo's Flood Prone Areas Using AHP and Web GIS **Mr. Haris Rahadianto**
Electronics Engineering Polytechnic Institute of Surabaya, Indonesia

11:25 **PANEL DISCUSSION and Q&A**

11:45 **POSTER SESSION: Disaster Risk Reduction**

12:00 **LUNCH**

Day 2 - 26 May 2015 / Tuesday

PLENARY SESSION 4: Urban and Rural Informatics

13:00	Applying Robotics Technologies to Agriculture— Blueberry Harvesting, Plant-Pot Robot, and Fruit Identification	Dr. Ikuo Mizuuchi <i>Tokyo University of Agriculture and Technology, Japan</i>
13:15	GOALS – Generator of Adaptive Learning Scenarios	Dr. Aarij Mahmood Husaan <i>Iqra University, Pakistan</i>
13:30	Population Mapping using Image Processing and Ancillary Data to Support Risk and Damage Assessment	Mr. Benjur Emmanuel L. Borja <i>University of the Philippines Diliman</i>
13:45	High-Throughput Phenotyping Research in NARO	Dr. Takuji Kiura <i>National Agriculture and Food Research Organization, Japan</i>
14:00	Monitoring of Frail People in Smart Cities	Dr. Nizar Ouarti <i>Image and Pervasive Access Lab (IPAL) Singapore/France</i>
14:15	PANEL DISCUSSION and Q&A	
14:45	Break / POSTER SESSION: Urban and Rural Informatics	
15:00	PANEL DISCUSSION <ul style="list-style-type: none"> • Launch of ICT-Asia Funding Program • Priorities for ICT-Asia • Evolution of the Program 	Dr. Luc Le Calvez <i>Director for Southeast Asia, CNRS</i> Dr. Jean Pascal Torreton <i>Representative for Vietnam and Regional Coordinator for Asia, IRD</i> Prof. Kanchana Kanchanasut <i>Vice President for Research, AIT</i> Dr. Maria Celeste H. Cadiz <i>Program Head-KM, SEARCA</i> Dr. Portia G. Lapitan <i>Vice Chancellor for Academic Affairs, UPLB</i> Ms. Philomene Robin <i>DREG/UNESCO</i> MOFAID Representative
15:50	CLOSING REMARKS	
16:00	Visit to Rice World Museum and International Rice Genebank <i>International Rice Research Institute (IRRI)</i>	

Plenary Session 1

Climate Change Modelling
and Monitoring

Integrating Radio-Frequency Identification (RFID) and Geomatics for Modelling and Monitoring Forest Dynamics

Nathaniel C. Bantayan

College of Forestry and Natural Resources
University of the Philippines Los Baños, Laguna, Philippines
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A prototype model that integrates radio-frequency identification (RFID) and geomatics is described where parameters of forest growth such as diameter, height, and crown size can be collected on a regular basis using an RFID system, trees are geolocated, and the data are stored in a geodatabase. Individual trees are fitted with RFID tags/transponders and read by an RFID scanner/interrogator. The data can be fed into a geodatabase of a GIS application that allows spatially-explicit monitoring and visualization. An application of an existing and operational RFID system being implemented for tree management is illustrated as an example. This pioneering precision forestry system is the first to combine RFID and geomatics. In the proposed system, trees and other flora are monitored for long-term ecological forest growth and dynamics that allow assessment of the impact of climate change and identification of resilient species. The apparent advantages and expected lowering of cost in the near future bode well towards installing an RFID-enabled monitoring system. With continuous advancement of information and communication technology, the application of RFID and geomatics to sustainable forest management and biodiversity conservation is highly feasible. With funding from potential partners, we hope to establish such a system in the Mt. Makiling Forest Reserve, Philippines where at least four two-hectare long-term ecological plots have already been established, and flora have been surveyed and individually plotted in GIS.

***Dr. Nathaniel C. Bantayan** is Director of the Makiling Center for Mountain Ecosystems (MCME) at the University of the Philippines Los Baños College of Forestry and Natural Resources. His work mainly involves generating and strengthening scientific knowledge for the conservation and sustainable development of tropical mountain ecosystems in partnership with mountain communities. He is also a Professor of Forestry at the Institute of Renewable Natural Resources in his college where he earned his Bachelor of Science degree in Forestry. He holds a Master of Science in Tropical Forestry from the Wageningen University, The Netherlands and a PhD in Engineering from the University of Melbourne, Australia. He is a scientist of national renown having written a seminal book on forestry applications of geographic information systems (GIS) and remote sensing; and received an outstanding young scientist award from the Philippines National Academy of Science and Technology. A member of the Gamma Sigma Delta Honor Society of Agriculture, he is an active member of the National Research Council of the Philippines, having chaired its Division on Agriculture and Forestry.*



Climate Change Impact Assessment and Agricultural Land Use Decision Making in the Vietnamese Mekong Delta

Nguyen Hieu Trung,¹ Van Pham Dang Tri,¹ Truong Chi Quang,¹ Huynh Xuan Hiep,² Alexis Drogoul³

¹ College of Environment and Natural Resources (CENRes), Can Tho University, Vietnam

² College of Information and Tele Communication (CITC), Can Tho University, Vietnam

³ IRD, UMI 209, UMMISCO, IRD France Nord, Sorbonne Universités, Paris, France

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Climate change has caused significant changes on the water resources in the Vietnamese Mekong Delta (VMD), leading to negative impacts on the livelihood of local residents, which is projected to be even more serious in the future. Among others, agriculture is one of the most affected sectors due to such changes in water resources. External driving factors could be accounted for the impacts of the mainstream hydropower dams and land cover change in the upstream of Mekong river; while the internal driving factors could be accounted for the development of dykes and sluice systems to control the upstream flood in the upper part of the VMD and to control saline intrusion along the coastal areas. An integrated approach was applied for impact assessment and agricultural land use decision making in the VMD. The approach includes multi stakeholder participation, numerical modelling, and multiple goal liner programming.

Under the support of *Institut de Recherche pour le Développement* (IRD), the Decision-Support Research for Environmental Applications and Models (DREAM) research team was founded in Can Tho University (CTU). The aim of DREAM is to create innovative modelling technologies, especially with respect to the handling of multiple scales; use these technologies to build and integrate novel environmental models; and use those models to improve environmental decision-making in the context of climate change. Parallel with DREAM, CTU and IRD also carried out the Adaptation to Climate Change: Land-use Innovative Models Applied to Environmental Management (ACCLIMATE) project. Besides scientific achievements of these projects, what is of more importance is the CTU capacity building and the IRD-CTU long-term collaboration.



Dr. Nguyen Hieu Trung's research interest is water management in the Mekong Delta, mostly combining sea-level rise and livelihood concerns. He has been the Dean of the College of Environment and Natural Resources since 2007 until now and the Deputy Director of the university's Research Institute for Climate Change (DRAGON Institute) at Can Tho University since 2008 until 2012.

Assessment of Land Use Change and Climate Variability on Hydrological Processes in the Upper Ma River Basin, Northwest Vietnam for Future Land Use Planning and Water Resources Management

Ngo Thanh Son,^{1,2} Nguyen Duy Binh,² Sangam Shrestha,¹ Vo Trong Hoang,³ Nguyen Duc Loc,² Nguyen Anh Tuan,² Nguyen Dinh Cong,^{2,4} Rajendra Prasad Shrestha¹

¹ Asian Institute of Technology, Thailand

² National University of Agriculture, Vietnam

³ Vietnam Academy of Science and Technology, Vietnam

⁴ Mekong River Commission, Cambodia

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Land use change and climate variability are two main factors directly affecting regional hydrologic conditions, and separation of their influences is of great importance in land use planning and water resources management. In this study, remote sensing (RS) and soil and water assessment tools (SWAT) model were used to assess the impacts of land use change and climate variability on water resources for the upper Ma river basin of Vietnam. The sensitivity analysis, model calibration, and validation indicated that SWAT proved to be a powerful tool to simulate the effect of land use and climate change on catchment hydrology. The Nash-Sutcliffe model efficiency (ENS), percent bias (PBIAS), and ratio of root mean square error to measure standard deviation (R^2) were 0.94, 0.96, and 12.27 during the calibration period and 0.74, 0.75, and -6.04 during validation period. Results indicate that deforestation, expansion of agriculture, and climate change had increased the annual stream flow from 10.5 percent to 46.3 percent, respectively. However, climate change had influenced the hydrological processes more strongly than the land use change in the upper Ma river basin. Because of the uncertainty in future water availability trends, adaptive policies are required to increase society's capacity to adapt to both anticipated and unanticipated conditions. Integrated solutions are needed at various spatial scales to assure sustainable future use of resources. In general, deep understanding of hydrological processes from this study provided the experience and techniques which may be applied to other river basins in Vietnam. In addition, it could be of value to managers/decision makers in integrated river basin management as well as in the development of adaptation and mitigation strategies in relation to climate and land use changes.



Mr. Ngo Thanh Son has worked as a lecturer and researcher at Vietnam National University of Agriculture (formerly Hanoi University of Agriculture) for more than 12 years. He has extensive experience in teaching and working in a multicultural environment and wide connection with state administrative units and nongovernment organizations. His field of expertise is soil science and natural resources and environment. He has successfully organized and implemented a number of research projects at various scales in the fields of land use and climate change, project monitoring and evaluation, baseline survey, analysis and evaluation.

Collaborative Portal Framework for Interdisciplinary Knowledge Capture and Sharing in Precision Agriculture

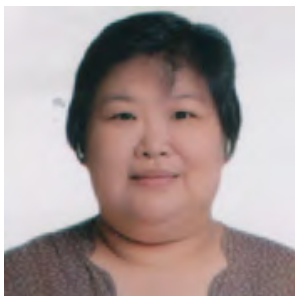
Concepcion L. Khan,¹ Gregson Edd M. Rocafort,¹ Heidi D. Mendoza²

¹ Institute of Computer Science, University of the Philippines Los Baños

² School of Environmental Science and Management, University of the Philippines Los Baños

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The nationwide implementation of the research program Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines (Project SARAI) calls for a development of a comprehensive ICT-based infrastructure, where intelligent systems from multidisciplinary fields can be accessed and managed. We developed a portal framework for integrating knowledge management systems for six major crops in the Philippines. The portal leads to intelligent systems such as decision support systems, real-time monitoring systems, and learning systems for capacity building to empower farmers to improve on-farm decision making. The portal is designed to be a rich and real-time content provider, and a centralized feedback mechanism for efficiency and better service. The main premise in developing the system is to harness and sustain the knowledge generation and knowledge sharing of interdisciplinary experts, policy makers, agricultural officers, and farmers. One of the main targets of the system is to make room for a paradigm shift of farmers from 'react' to 'anticipate'—which means that in the long run, farmers will be able to take advantage of the available information to make informed decisions for their farming practices, and help them optimize their yields in spite of changing climate conditions. We probe the challenges and opportunities of integrating multidisciplinary systems and data from various sources into a portal infrastructure at multiple scales. Lastly, as part of the project's sustainability plans, we are integrating and streamlining these systems into different government and private institutions, which could carry on the systems to larger communities.



Asst. Prof. Concepcion L. Khan teaches at the Institute of Computer Science, College of Arts and Sciences, University of the Philippines Los Baños. She is also the program chair of the Masters of Information Systems program of the University of the Philippines Open University.

Plenary Session 2

ICT Applications
to Food Security

Use of ICT to Improve Livelihoods of the Poorest in Rural Areas: e-PADEE Project

Il Jeong Jeong, Fabrizio Bresciani, Na Eun Choi

International Fund for Agricultural Development (IFAD), Rome, Italy

i.jeong@ifad.org, f.bresciani@ifad.org

This intervention collaborates closely with IFAD's ongoing Project for Agricultural Development and Economic Empowerment (PADEE) in Cambodia, which aims to enhance the livelihoods of its target beneficiaries and overall productivity of rice farming through the use of an Agriculture Expert System. It focuses on generating innovative capacity building technology, making good quality services accessible to farmers, combined with applied training for improved use of technology and access to markets. At the policy level, this intervention will improve overall national extension systems with potential for scaling up across the country.

The model begins by transforming existing commune extension workers (CEW) and farmer business advisors (FBA) in 100 communes in the five target provinces of PADEE to become "rural entrepreneurs" who will be providing small farmers with improved extension services through IT devices. The system will provide direct benefit to at least 20,000 smallholder households. The process starts from capacity building of the entrepreneurs on e-Agriculture model and tools. The entrepreneur then uses a smartphone/tablet handset to feed the system with the demographic details of intended farmer beneficiaries, such as types of crops grown, nutrient soil capacity, and access to irrigation and inputs. At the national level, the system will be maintained by agriculture expert groups at the General Directorate of Agriculture (GDA), Ministry of Agriculture, Forestry, and Fisheries. These expert groups design the content for the electronic platform and develop response content to feed into the system, to which farmers can ask questions for technical advice; and update it annually with new available information (i.e., new crop varieties, new fertilizer recommendations, insect pest and disease prevention and treatment, etc.). Interactions between the entrepreneur and the farmers who run the system are on daily basis through routine follow-up support of the CEW and FBAs provided to target farmers under PADEE arrangement. With this intervention, the farmers will be able to get fast and accurate advice on fertilizers, seeds, and pest and disease management, with reduced or practically no physical communication with the specialists.

The program also includes sharing of lessons learned across countries, and with the Republic of Korea. Korea's agricultural growth has largely been leveraged by farmers' adoption of ICT tools and integration with the food industry—an experience that the program capitalizes on.



Dr. Il Jeong Jeong is a Special Program Officer at the Program Management Department of the International Fund for Agricultural Development (IFAD). He joined IFAD from the Korean Ministry of Agriculture, Food, and Rural Affairs (MAFRA) in 2013. Previously, he was the President of the Food and Agriculture Officials Training Institute under MAFRA. He also served various functions at the Ministry, including Director General of International Cooperation Bureau and International Fisheries Organization Bureau. He was Korean Commissioner to the International Whaling Commission. He also worked at the Trade and Agricultural Directorate of the OECD for three years (2005–2008). He obtained his BA degree from the Economics Department of Seoul National University. He also received his PhD in Economics from the University of Illinois at Urbana-Champaign, specializing in development economics.



Mr. Fabrizio Bresciani is currently working in IFAD as the Regional Economist for the Asia and Pacific Division. His main areas of interest include rural development, food security, and land policy. With the World Bank, he previously served as the Senior Agricultural Economist in Indonesia (2011–2014) and as the Rural Development Economist in the Philippines (2007–2011). Before joining the World Bank, he was at the Agricultural Development Economics Division of the Food and Agriculture Organization of the United Nations in Rome (2001–2007) and at the World Bank's Development Economics Research Group (1998–2001). He holds a PhD in Agricultural and Natural Resource Economics from the University of Maryland, College Park, and a MSc in Environmental and Natural Resource Economics from the Universidad de Los Andes, Colombia.

Application of the DSSAT-CERES-Maize Model for Climate Change Impact Assessment and Decision Support in Corn Production

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This study aimed to contribute to increased crop productivity by at least 30 percent through ICT application for corn farming in the Philippines using combinations of simulation and climate modelling, integration of automated weather station for real-time weather data inputs, and SMS as decision support to government workers and farmers. Specifically, it aimed to develop a localized corn model using DSSAT-CERES Maize, assess future corn production under climate change scenarios, and develop a decision support system for corn production.

The DSSAT-CERES Maize model developed is mainly a function of the genetic coefficients which are fundamental parameters to establish the potential performance of the crop given the limitations of environmental factors (soil, weather, and crop management).

This first step was to develop a local DSSAT-CERES Maize model that would be used for climate change assessments and development of decision support for corn farmers. Field experiments were conducted for two cropping seasons in various agro-ecological zones, namely: floodplains, rolling, and hilly croplands, as well as for irrigated and non-irrigated treatments. The model was able to predict the observed data on yield and timing of phenological events from the actual experiments with high goodness of fit ranging from 91 percent to 98 percent for the calibration and 86 percent to 97 percent for the validation process. Moreover, applications of the model for climate change assessments indicated that corn yield would be reduced by up to 44 percent in 2020 and 35 percent in 2050 due to change in rainfall amount and rise in temperature, both of which are indicators of climate change.

The next phase is the model's automation to provide quick answers to farmers' operational decision making and crop and weather advisories for strategic and policy decision support by government agencies in the Philippines; and for future upscaling in Asian countries.

***Dr. Orlando F. Balderama** is an agricultural engineer by profession, an academic scientist, and a consultant in the fields of agricultural engineering, water resources, river basin, hydropower, and climate change. A full professor at the College of Engineering and University Research Director of the Isabela State University at Echague, Isabela, Philippines, he has published more than 100 publications in scientific journals, books, and conference proceedings; and is a recipient of national and regional awards such as Outstanding Agricultural Scientist, Outstanding Research Manager, Outstanding Agricultural Engineer, Outstanding Government Employee, and Outstanding Alumnus. He represented the Philippines in the UNESCO climate change and hydrology program, ASEAN academic network on water-related disaster management, and ASEAN committee on agricultural research and development.*

Ensuring Meat Quality and Safety through a Nationwide Pork Traceability System

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One of the meat production processes to ensure meat quality and safety involves tracking live animals and their respective meat cuts along the full length of the supply chain “from pen to plate,” tracing the sources of meat cuts from the distribution center back to any point along the production chain, and verifying the truthfulness of meat packaging labels. A traceability system is an ICT-based system that allows for the real-time tracking of animals and tracing of meat cuts, augmented by a DNA-based verification system. This paper presents the ICT-based design of a nationwide pork traceability system (NPTS) aimed to be one of the vital computer-based infrastructure in the country’s preparation for the ASEAN Free Trade Area (AFTA) in 2015. The NPTS exploits the current and planned ICT infrastructure in the Philippines and employs recent advances in digital-based data communication. With the NPTS, the swine industry in the Philippines is posed to lead AFTA in meat-based export product quality, not only because it is the only foot-and-mouth disease (FMD)- and avian flu-free country in the region, but also because the NPTS was designed to be responsive to international standards. Through the NPTS, consumers from countries that import pork from the Philippines are given the capability to trace the sources of meat cuts they bought through Internet-connected communication devices which provides them assurance that the product is safe and of high quality. Similarly, Filipino consumers will be given verifiable information that the meat cuts they bought came from a Filipino farm, minimizing the sale of mislabelled and smuggled meat cuts of questionable quality.



Prof. Jaderick P. Pabico is a Professor at the Institute of Computer Science, University of the Philippines Los Baños. His collaborative research activities, among many others, include developing robust scheduling and load balancing algorithms for high-performance computing, applying computational intelligence heuristics to optimize various engineering systems, and developing advanced intelligent systems for automating agricultural and food production processes and monitoring environmental quality. So far, he has authored 30 scientific articles published in refereed archival publications and about 80 technical papers published in peer-reviewed conference proceedings. He is one of the 2008 Ten Outstanding Young Scientists of the Philippines.

Developing a Smarter Crop Forecasting System in the Philippines

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Food security assessment and monitoring requires a crop forecasting system (CFS) that can provide reliable and timely estimates of crop production. Crop forecasting in the Philippines is based on the quarterly Rice and Corn Production Survey (RCPS) involving enumeration and interviews of a large number of farmers regarding planting intentions, area cropped, and yield. These surveys are time-consuming, and crop estimates are subject to measurement errors. Science and technology have paved the way for developing a smarter CFS which is more reliable and efficient involving the use of process-based crop simulation model for rice and corn, remote sensing for estimation of area cropped, and downscaled seasonal climate forecasts. Genetic coefficients for major varieties of rice (e.g., PSB Rc 14) and corn (e.g., IPB 911) based on CERES-Rice and CERES-Maize models were generated and validated for selected representative sites. Estimates of area planted using remote sensing were validated. Different statistical downscaling procedures for seasonal climate forecasts given regional climate outlook were used.

Application of smarter CFS in Isabela province, the Philippines' leading rice and corn producer, shows that crop forecasts are reliable and timely. Estimates of area cropped are less subject to measurement errors. Moreover, the smarter CFS can be used to assess crop production under an anticipated climate scenario. The implementation of CFS is a component activity being piloted under the DOST-UPLB Project SARAI (Smarter Approaches to Re-invigorate Agriculture as an Industry) involving a multi-disciplinary team of research scientists and network of academic institutions and state universities. The study will benefit much from cooperation with Asian and French research units in the analysis of remote sensing data from satellite photos, downscaling of seasonal climate forecasts using statistical and dynamical approaches, and more reliable crop models. Smarter CFS is potentially a useful tool for assessing food security and developing early warning systems.



Dr. Felino P. Lansigan is a Professor of Statistics and of Environmental Science at the University of the Philippines Los Baños (UPLB), and currently Dean of the UPLB College of Arts and Sciences. He co-chairs the UPLB Climate Risk Studies Center, serves as member of the technical panel of experts of the Philippines Climate Change Commission, and also as Principal Investigator on Crop Model Development and Crop Forecasting System of the UPLB Program on Smart Agriculture. He is Coordinating Lead Author of the recent book entitled *Changing Philippine Climate: Impacts on Agriculture and Natural Resources* published by UP Press in 2014.

Plenary Session 3

Disaster Risk Reduction

Reviving Past Catastrophic Events through Geo-historical Simulations

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It is now widely accepted that the adaptation of communities to natural hazards is based, in a large part, on a better understanding of past catastrophic events and how affected groups adapted to them. However, this activity requires that relevant information can be extracted from the archived data available on these events, that coherent narratives can be reconstructed from these information, and that they can be later transmitted in a way understandable by a contemporary audience. It is especially crucial in former colonized countries like Vietnam, Cambodia, Laos, Myanmar, Indonesia, or the Philippines, where a good proportion of the archived data is only available in the language of the colonizers (French, English, Dutch, and Spanish, respectively), and as such are restricted to certain experts.

The French-Vietnamese research project ARCHIVES was launched in 2013 as a collaboration among EFEO, the National Archives Center, Institute of Information Technology (IOIT), University of Science and Technology of Hanoi (USTH), and several French and Vietnamese universities. It aimed to design a methodology that could support this process in a systematic way, from the automated analysis of documents to the design of realistic geo-historical computer models, within which users can visualize what happened, and at the same time explore what could have happened in hypothetical scenarios. This approach is based on the design of virtual "historical fictions." It couples advances in digital humanities and computational modelling and seeks to provide historians with a novel methodology for synthesizing large corpuses of documents at the same time providing communities with an innovative medium for interactive learning of potentially useful lessons from past events.

Based on the presentation of a specific case study, this talk will primarily stimulate discussion on the relevance of such a project for other participants of the ICT-Asia forum (especially, but not exclusively, from the aforementioned countries), and whether or not it could be generalized to other contexts, potentially paving the way for an international collaborative research effort on this subject.



Dr. Alexis Drogoul received his PhD from the University of Paris 06 in 1993. Recruited in 1995 as Associate Professor, he became full Professor in 2000 and joined IRD as a senior researcher in 2004. He works on agent-based simulation of complex systems, mainly by developing the GAMA platform (<http://gama-platform.googlecode.com>). Since 2007, he has been working in Vietnam to enhance the research capacity of Vietnamese teams (MSI-IFI, DREAM-CTU, ICTLab-USTH) on the design of models for environmental decision-support and adaptation to climate change in urban areas, in the framework of several international research projects.

Computer Simulation Games for Disaster Risk Reduction

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The Philippines is one of the most hazard-prone countries in the world. This is due mainly to its geographic and geologic location and physical characteristics. The country is situated in the “Pacific Ring of Fire,” between two tectonic plates (Eurasian and Pacific), an area encircling the Pacific Ocean where frequent earthquakes and volcanic activity result from the movements of said tectonic plates. Recent statistics show that worldwide, the Philippines has one of the highest number of people affected by natural disasters and has one of the highest disaster risk index. The country is exposed to a variety of hazards such as floods, earthquakes, typhoons, storm surges, tsunamis, volcanic eruptions, landslides, droughts, etc.

To increase awareness on tsunamis and other natural hazards in the Philippines and to promote disaster preparedness, and risk reduction and management we conducted a study among young people in the country using computer simulation games developed by the United Nations/International Strategy for Disaster Risk Reduction. Called “Stop Disasters!,” this online game features five natural hazards: tsunami, hurricane, wildfire, earthquake, and flood. The subjects of this study are mainly teenagers from public and private high schools, college level students from public and private universities, and young professionals. The study assessed the benefits of using computer simulation games in disaster risk reduction and the Filipino youth’s perception of the disaster simulation game. After each game, the respondents were asked the following questions: (1) Do you think that computer simulation games can be beneficial in disaster preparedness and risk reduction and management? (2) What do like best in the game “Stop Disasters!?” (3) What don’t you like in the game “Stop Disasters!?” (4) Would you recommend the game “Stop Disasters!” to your friends or relatives? Why or Why not? (5) Did the game “Stop Disasters!” increase your understanding of disaster preparedness and risk reduction and management? (6) Give suggestions/recommendations on how to improve the game “Stop Disasters!” Results of the study show that young people find the use of computer simulation games beneficial in improving their understanding of disaster preparedness, risk reduction and management. Recommendations on how to improve the simulation game “Stop Disasters!” to suit local situations/conditions in the Philippines are given. Cloud computing as a tool for disaster simulation games is also explored.

Computer simulation games for disaster risk reduction is an important application of ICT that have potential benefits for both French and Asian partner institutions.



Dr. Rafael P. Saldaña is an Associate Professor of Applied Mathematics and Computing at the Department of Mathematics, School of Science and Engineering, Ateneo de Manila University. He obtained his PhD in Computational Physics from Monash University, Australia in 1998. He is also a member of the Technical Panel on Information and Communications Technologies (ICT) of the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD), Department of Science and Technology. He has undergone special training on supercomputing and high-performance computing. His research interests include mathematical modelling and computer simulation of complex systems, including agent-based modelling of natural and man-made disasters.

Satellite Remote Sensing for Risk Assessments of Volcanic and Other Natural Hazards

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Southeast Asia is a region prone to natural hazards. In our collaborative work started in 2007, established through a STIC Asia project in 2009–2010, we focused on applying remote sensing techniques in the assessment of volcanic eruptions, volcanic hazards and risk, and other natural hazards in Southeast Asia, in particular in Indonesia and nearby countries. Optical and radar imagers are used for mapping geology, landforms, and tracking deposits produced by recent eruptions from active volcanoes in Indonesia. Very high resolution satellite images enable detailed mapping of volcanic features. Interferometric synthetic aperture radar (InSAR) techniques are used to map land deformation.

In this presentation, we will introduce our previous work and present preliminary results on the use of persistent-scatterer interferometric SAR (PS-InSAR) in monitoring the surface deformation of Mt. Merapi from 2007 to early 2011, which is shortly after the 2006 eruption to post 2010 eruption. Sixteen L-band ALOS PALSAR images (HH polarized, level 1.1 single look complex data) acquired from June 2007 to February 2011 are used. We selected the master image by minimizing the perpendicular and temporal baseline and formed 15 interferograms. L-band is chosen for the long wavelength which improves the coherence over vegetated regions compared to shorter X or C-band. Large deformation of a few decimetres is observed on the south to west flank of the volcano, with clear subsidence and erosion nearer to the crater. We also observe at the south of the summit periodic cycles of small uplift and subsidence from 2007 to 2008 and a significant increase in the inflation rate during the eruption.

The collaboration has produced several journal articles and has helped one student from Indonesia (Center of Volcanology and Geologic Hazards, Bandung) who carried out his MSc thesis in 2009 and recently completed his PhD thesis in Clermont.



Dr. Soo Chin Liew is a principal research scientist and head of research at the Center for Remote Imaging, Sensing, and Processing, National University of Singapore. He graduated with a PhD degree in physics from the University of Arizona in 1989. He has many years of research experience in satellite remote sensing, with expertise in hyperspectral imaging, ocean optics, atmospheric aerosols, forest fires, land cover change, and hazards mapping. He is an associate editor of the SPIE Journal of Applied Remote Sensing.

Creating a Geohazards Layer for the OpenStreetMap Platform

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The study was conducted to create a web-enabled geographic information system layer using OpenStreetMap data and OpenLayers mapping API that can interactively depict the geohazards present in a local government unit. Los Baños, Laguna, Philippines was chosen as the initial government unit to implement the layer wherein even non-technical administrators, people who are not familiar with usual mapping tools, can specify geohazard areas using points, lines, or polygon vectors.

This system can equip local government disaster and risk reduction management teams to identify geohazards and communicate disaster evacuation plans using open and free software tools.



***Ms. Charmaine Marie A. Pabelico** is an undergraduate senior taking BS Computer Science at the Institute of Computer Science, UPLB. Her research interests include web applications in development and geographic information systems.*

Empowering Communities to Use Mobile Based Application for Disaster Risk Reduction in the Face of Climate Change

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All stakeholders working in climate change and disaster management are struggling to disseminate updated information and knowledge to communities. Most of the technological tools that can ease understanding are focused on the urban centers, and rural communities are left behind. All disaster-related information that are generated at the community level are not reflected to the same level as urban-focused information. Information on disasters is available at the center; but dissemination of such information to the communities is lacking. The first tool to strengthen communities towards adaptation to climate change could be information itself.

The overall concept is to enhance information-sharing by promoting mobile-based applications and empowering adaptation activities (Samarajiva and Waidyanatha 2009). Data-specific applications will be developed during the project, which will be tested and piloted in Padampur Village Development Committee in Nepal. Here, community people will be trained to feed and retrieve climate change adaptation and disaster risk reduction-related data via handheld communication devices. Focus group discussions and participatory rural appraisal will be conducted in the Village Development Committee to identify major climate change and disaster-related information required by the communities. Secondary information on weather and disaster data will be acquired without cost from the Department of Hydrology and Meteorology, Government of Nepal and the National Society for Earthquake Technology archive. The local government will be consulted during the process for localization of the mobile application.

This project seeks technical support to strengthen the concept and to expand the ideas all over Nepal. Similar kinds of projects are in place in different regions, so this project seeks a learning and sharing platform. This project will contribute to climate change adaptation and disaster risk reduction by developing mobile applications to increase access to such information at the local level (Troy et al. 2009). This study is expected to improve disaster risk reduction using mobile applications and leverage the explosive diffusion of the technology even among the poor in developing countries (Yap 2011). The project will be case specific with future possibilities to transfer in new areas with localized climate change and disaster-related issues.



***Mr. Deep Prakash Ayadi** is the Founder and CEO of The Thin Page Pvt. Ltd, an institution that aims to offer high quality, knowledge-based research, development, consulting, and capacity building services to private and public sectors on issues related to environmental management in Nepal. Prior to this, he was the Senior Program Officer in the Climate Adaptation Program of the Himalayan Climate Initiative. He strongly feels the need to integrate environmental concerns in development activities and is passionate about working to find solutions to climate change adaptation and mitigation and incorporating current development interventions with climate-smart development. He obtained his BS and MSc in Environmental Science from the Tribhuvan University, Nepal.*

An Initiative on Low-Cost Monitoring of Haze Air Quality Disasters in Rural Communities in Thailand and ASEAN

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In Thailand, haze air quality disasters caused by forest fires and agricultural-related burns occur every year, especially during drought periods. Haze disaster affects the health and well-being of people living in a very large area. Government weather stations that report haze conditions are costly and are usually located near large urban cities. As a result, rural citizens and farmers still lack access to timely information regarding haze air quality disasters.

The Internet Education and Research Laboratory (intERLab) at the Asian Institute of Technology (AIT) in Thailand has deployed a small number of rural community wireless mesh network testbeds in Tak and Chiang Rai provinces which are located in northern Thailand. The School of Environment, Resources and Development (SERD) at AIT has also conducted research related to haze monitoring, satellite detection of haze, and meteorology.

New and emerging low-cost wireless sensor network (WSN) technologies may soon enable us to detect, monitor, and control haze air quality disasters more effectively in many more locations which were not possible before, especially in rural communities.

LIP6 (France) and AIT (Thailand) are inviting French, ASEAN, and interested partners to join a collaborative project that aims to conceptualize and deploy low-cost particulate matter (PM) and other haze-relevant readings (e.g., carbon dioxide or CO) targeted for a rural community's haze monitoring. The community's haze monitoring WSN is aimed to be more decentralized, operated and maintained by rural citizens than traditional government-run meteorological stations. To achieve this goal, researchers from LIP6 and AIT, as well as those who wish to join this initiative, will together design, develop, calibrate, and field test the low-cost but practical haze-detection and monitoring technology. The WSN can later on be linked among several communities to provide more robust and reliable haze disaster risk detection and monitoring. With the development of proper wide data fusion among our haze monitoring WSN and other monitoring technologies such as satellite imaging, we expect that the resulting system can benefit not only rural but also urban citizens of Thailand and ASEAN.

AIT's past participation in ICT-ASIA was in the area of disaster emergency communication, with a project called "Digital Ubiquitous Mobile Broadband OLSR" or DUMBO.



Dr. Apinun Tunpan received his PhD (2002) and MS (1997) in Computer Science from the University of Maryland College Park, USA. He earned his B.Eng. in Computer Engineering from Chulalongkorn University in 1993. After his graduation, Apinun worked in various sectors, including telecommunication, business, finance, and the academe. Apinun was once involved in the deployment of a disaster early warning system for the Thai government. He is now Senior Research Specialist at the Internet Education and Research Laboratory (intERLab), AIT, working in the areas of the internet of things, wireless sensor networks, and community wireless mesh networks.

Risk-Level Assessment System on Bengawan Solo's Flood Prone Areas using AHP and Web GIS

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Indonesia has the geographical conditions which make it particularly vulnerable to disasters, especially floods and climate change. Indonesia has 5,590 main rivers, 600 of which have the potential to cause flooding. One of these is the Bengawan Solo River, which is the longest river in Java. The floods that hit the area have resulted in risks to public health, disrupted economic activity, and damaged urban infrastructure. The public's lack of understanding of the characteristics of the hazards, continuous degradation of natural resources, and lack of early warning information, causes unpreparedness and inability in the face of danger caused by floods along the Bengawan Solo River banks. The purpose of this project is to create an information system that can assess risk in the Bengawan Solo's flood-prone areas, by building a web-based information system that includes information on threats, vulnerabilities, and capacities. These will be summarized in the disaster risk analysis, which will be integrated with geographic information system further map areas with high levels of risk. The result of this project is a map with marked regions divided into three levels of risk (high, medium, low) calculated using analytical hierarchy process. It will also provide the risk-level for the regions, assess the impact and damage that may hit the risky area, and recommend ways to increase the preparedness to reduce damage from floods.



Mr. Harris Rahadianto is currently finishing his final project in the university. Since entering the university in 2011, he has shown great interest in disaster risk reduction and disaster management. In 2013, he represented at the an annual national-level seminar with the theme "Encouraging Student's Strategic Role in Indonesia's Disaster Management System." A year later, he served as the keynote speaker in the same seminar following his success in building and revitalizing new student organizations that can assist in disaster management systems.

Plenary Session 4

Urban and Rural Informatics

Applying Robotics Technologies to Agriculture— Blueberry Harvesting, Plant-Pot Robot, and Fruit Identification

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This presentation will introduce three works on applying robotics technologies to agriculture. The first one is the blueberry harvesting robot, which judges ripeness of each fruit based on three judgement criteria: color, softness, and ease of being picked. Ripeness of blueberries cannot be judge just the appearance, thus, farmers judge it by touching the fruit. Our harvesting robot is a wheeled robot with an arm. The end-effector attached to the arm can measure softness and ease of being picked. The picking mechanism uses slightly negative pressure to control the pressure of the pipe in the end-effector.

Plantroid is a robot that carries a plant pot. We proposed a control method so that each Plantroid can move toward a sunny area without colliding with its surroundings. In the method, artificial potential fields are generated based on the ceiling camera view. We developed two types of real-life Plantroids that have sensors and wheels and performed a preliminary experiment. Our proposed control method can be applied not only to a plant factory but also to a plant pot in our own houses.

The third one is a fruit identification method for growth management systems. We proposed a method to identify each fruit based on the branch structure analysis of a fruit tree, by using a 3D camera and point cloud library. By our method, each fruit can be identified without attaching tags. We also performed experiments using a multi-copter in a real fruit farm.



***Dr. Ikuo Mizuuchi** has been an Associate Professor of the Division of Advanced Mechanical Systems Engineering at Tokyo University of Agriculture and Technology since 2009. He received his B.E. in Mechanical Engineering from Waseda University in 1995, MEng. and PhD both in Mechano-Informatics from The University of Tokyo in 1998 and 2002, respectively. He was appointed as a Research Fellow of the Japan Society of the Promotion of Science in 2000, a Project Assistant Professor in the Graduate School of Information Science and Technology at the University of Tokyo in 2002, and a Senior Assistant Professor in the Department of Mechano-Informatics at the University of Tokyo in 2006. His researches include musculoskeletal humanoid robots, home robots, agricultural robots, and so on.*

GOALS – Generator of Adaptive Learning Scenarios

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In an online adaptive teaching system, the domain expert is not necessarily aware of the target audiences' knowledge levels. Indeed, there could be a gap between what the domain expert thinks is the right way to organize the domain knowledge and how the domain knowledge should be organized to maximize the learners' learning. In this context, we present a novel approach to fill this gap by the semi-automatic reorganization of the domain knowledge in a way that can potentially maximize students' learning. We have developed the GOALS (Generator of Adaptive Learning Scenarios) platform that records the learners' activities in the form of interaction traces. In this paper, we are interested in updating knowledge domain and learner profiles from the interaction traces. The results of the updating process are then presented to the domain expert who can approve or disapprove them accordingly. We will look for two kinds of update, namely: (1) the detection of new concepts in the domain model and (2) the detection of new links between the domain concepts and the pedagogical resources. We apply mining algorithms to classify different students according to their responses and then perform the analysis. We present our approach's formalization and some validations.



Mr. Aarij Mahmood Hussaan is working as an Assistant Professor in the Computer Science department of IQRA University, Karachi, Pakistan. His research areas, in general, focuses on intelligent systems for learning/education and serious games in particular. He is also interested in the analysis of behaviors using data mining. He is also involved in supervising many research thesis on intelligent tutoring systems and serious games. He also works with undergraduate students on their final year projects.

Population Mapping Using Image Processing and Ancillary Data to Support Risk and Damage Assessment

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Spatial distribution of population has become an important field of research which provides information on socio-economic and environmental factors. Studies that approximate population on different scales have been made which may assist on resource distribution, healthcare services, and urban planning. In cases of developing countries, where detailed land use and population data are usually lacking, other geographic data can be utilized to approximate population at a smaller scale. For example, a study redistributed the sublocation level population distribution of a small area in western Kenya using very high resolution (VHR) satellite imagery and ancillary data (roads, rivers/streams, markets, schools, and slope) to correct the uniform distribution of population and the unrealistic changes in population between sublocation levels. This paper reports our attempt to redistribute the population of certain areas in Tacloban City to understand how knowing the approximate population distribution may have helped mitigate risks and damage brought by disasters.

We demonstrate an image processing algorithm that classifies aerial images into residential and non-residential areas using Minkowski functionals. This technique converts images into grayscale, which are then binarized at varying thresholds. The area, perimeter, and Euler number are then measured. The plots of these metrics versus the thresholds are then analyzed for classification. The procedure provides quick and simple operations that can identify households from commercial and vegetation areas. Ancillary geographic and urban data are also utilized to support the classification technique.

The classified locations, along with the ancillary data, are then used as weighing factors to redistribute the available barangay level census data more distinctively. This shows that the available data in the Philippines can provide a suitable means of implementing smaller scale population distribution models. This information can then be used as weighing factors to analyze which areas are more susceptible to damage.



***Mr. Benjur Emmanuel L. Borja** is a BS Applied Physics (2013) graduate of the National Institute of Physics, University of the Philippines, Diliman Campus. He is currently taking his Masters in Physics degree at the same institute. He is member of the Instrumentation Physics Lab, Video and Image Processing Group, and majors in instrumentation physics, focusing on complex systems in his undergraduate research and image processing for his graduate research. He is currently working as a Senior Research Assistant in the DOST-funded project "Coral Reef Assessment and Visualization Tools (CRAVAT)."*

High-Throughput Phenotyping Research in NARO

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High-throughput DNA sequencers produce massive data everyday and data science makes it possible to analyze such large-scale data. Unfortunately, plant phenotype data are not enough to analyze with genomic data. NARO approaches this issue using ICT. Field Server¹ is a highly customizable sensor network node for agriculture. It is a web server with many sensors and can observe air temperature, relative humidity, solar radiation, water level, soil moisture, and crop images, etc. Some crop community characteristics (e.g., crop coverage, average leaf color, average plant height, etc.) can be monitored using images taken by unmanned aerial vehicles, but precision should be improved.

MetXML² [2] is a meteorological data web service, using a virtual meteorological data moderator called MetBroker, which provides weather data, including average and forecast data for agricultural researchers. A weather data generator service is under development using MetXML and existing weather data generators. Wrapping web services for existing agricultural model implementations are also under development. These experiences could be applied to virtual data integrations and services for phenotype data. Japan also starts to make ICT standards for agriculture, (i.e., vocabularies, ontologies, data formats, and Web APIs) to ensure interoperability and realize a Japanese version of smart agriculture.³

NARO plays a key role in this movement and might contribute to establish international standards for agriculture. The French National Institute for Agricultural Research has advantages in high-throughput phenotyping platforms to measure individual plants in plant factories and data management and analyses systems. The International Rice Research Institute has been leading a Global Rice Phenotyping Network. These complementary research can be forerunners of a Global Plant Phenotyping Network and contribute to the next generation of crop breeding.

¹ Field Server <http://model.job.affrc.go.jp/FieldServer/FieldServerEN/default.htm>

² MetXML (in Japanese), <http://pc105.narc.affrc.go.jp/metbroker/xml/>

³ Yoshida, T. 2015. "An Approach to Smart Agriculture with Integrated Information Systems for Agriculture." https://www-ik.apan.net/meetings/Fukuoka2015/Sessions/7/20150304APAN39th_TYoshida.pdf



***Dr. Takuji Kiura** is interested in internet application in agriculture and works on virtual data integration, sensor network, and web services in agriculture. As a board member of the Japanese Society of Agricultural informatics, he leads ICT application research for agriculture in Japan. He co-chairs the Agriculture Working Group, Asia Pacific Advance Network and Agriculture Communication Group of the World Wide Web Consortium.*

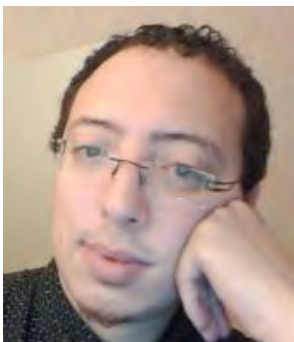
Monitoring of Frail People in Smart Cities

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Nowadays, smartphones are taking an increasingly important role in the life of the citizens of the cities. They are very commonly used when people are in transit between different places, such as work and home. Would it be possible to monitor the behavior of citizens in a city and learn more about their movements and their preferences using information from their smartphone (e.g., inertial sensors and camera). Research is being conducted at the Image and Pervasive Access Lab (IPAL), in the context of smart cities, to better understand these needs. Refining our understanding of human behavior will help the City's develop policy that will contribute to building a more harmonious and accessible environment, adapted to the city's different populations. An important part of these studies is focused particularly on frail population groups such as disabled or aging people. On the technical side, our approach combines visual processing, and inertial computation together with semantic reasoning. With the consent of individuals, smartphone sensing combined with reasoning will help shape better cities.



***Dr. Nizar Ouarti** has a Master of ENS in Cognitive Sciences and a PhD from Collège de France in collaboration with a French car manufacturer (PSA). He was granted a postdoctoral fellowship in INRIA after which he was appointed Associate Professor at the University Pierre and Marie Curie, Paris. He started to work in IPAL (Singapore) in 2015. He is currently involved in different projects in Astar and NUS. His main topics of interest are motion perception and bio-inspired algorithms for haptics and vision. Recently he targets more specialized hardware such as embedded processors, GPU, and FPGA.*

Poster Presentations

Climate Change Modelling
and Monitoring

UP EMS Fuses ICT with Results-Oriented M&E: A Management Tool for Climate Change and Disasters

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The paper will illustrate the development of a comprehensive environmental management system (EMS) for the University of the Philippines (UP). It is based on a UP-funded project titled *The Greening of the Philippines Starts @ UP: A Proposal for Environmental Management System in the University of the Philippines*. The study methodology consists of the following: (1) organization of the knowledge-basis for the formulation, institutionalization, and operation of EMS; (2) drafting of broad environmental policy that serves as the guiding principle behind the EMS; and (3) construction and operation of EMS, a development roadmap for wide-ranging environmental management in the whole UP system.

The roadmap ties in climate change with other areas of environmental management (such as disaster risk reduction, waste management, and power and water conservation) into one unified platform. It includes procedures and built-in mechanisms for results-based monitoring and evaluation, which identify standards, set targets, measure performance, and sustain the system. A parallel development of an information management subsystem (IMS) using advanced ICT, is a main component that serves as common 'reservoir' for feeding data and information to the whole system.

UP's initiatives in dealing with the environment are fragmented and far dispersed to achieve an effective implementation. The absence of unified and implementable mechanisms for environmental management in its own sphere puts UP in an awkward position, if it were to demand the same from the government. However, UP can achieve much if it demonstrates sound management of its own environment. It may help the Philippines stand out as 'champion' of environmental protection by making this management tool a model of the country's EMS.

The EMS is in its critical stage of development. Cooperation between the proponents and Asian or French researchers can lead toward its full realization and for better understanding and management of the environment.



Dr. Romeo B. Santos is a professor at the University of the Philippines Diliman. He serves as Executive Director of WorkLand M&E Institute, Inc., a non-profit monitoring and evaluation think tank that provides training in research, organizational development, and results-based M&E to various sectors in the Philippines and Asia. He was a 2008 World Bank scholar for international development evaluation at Carleton University, Canada and a Fulbright Fellow and Visiting Professor in Florida, USA in 2009. He was chosen as Aspen Institute/NatGeo Environment scholar in 2011. He finished his PhD, specializing in Project Management and Economics (1995), in Japan.

A Cloud-Based Tool for Collaborative Crop Modelling

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Mechanistic crop models are an important aspect of agronomic studies. In the context of climate change research, these are used to forecast crop responses to variable weather patterns. To use crop models, we rely on the implementation of crop modelling systems which cater to input of user data, processing of model calculations, and gathering of results. To address several issues with traditional implementations, we created a generic cloud-based crop modelling platform that facilitates web-based crop modelling, particularly highlighting collaboration through user-account based content access in terms of data and models and a high degree of flexibility with model management. The design of our tool makes use of accessible web development technologies such as PHP, mysql, and javascript, to ensure that the platform remains open-source and will be accessible for further development. We differ from traditional implementations by making the platform cloud-based: there will be no stand-alone installations, it will free end-users from having to meet certain computer specification requirements, and help alleviate the learning curve of using crop modelling systems. We successfully used the platform to implement two mechanistic rice models, one dealing with phenology, and the other yield; the results were the same as those of the traditional implementations of both models. Although the simulations will be understandably slower with the network transportation overhead, we are assured that data is consistent, which is important for collaborative work, and securely backed up with the cloud. At its current state, it can be deployed on a small scale for instructional purposes, but there is further development to be done before it becomes a true alternative to desktop modelling. Partnering with different institutions will help in understanding the varying needs of different crop modellers and slowly incorporate solutions into the platform.



Mr. Richard M. Pasco is a Master of Information Technology student at the University of the Philippines Los Baños. He also holds a full-time position as a software engineer at the International Rice Research Institute's Crop and Environmental Sciences Division focusing on the development of crop modelling systems.

Study on Shoreline Changers and Climate Change Impacts by GIS and Remote Sensing in Sri Lanka

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Due to climate change and sea-level rise, coasts will be exposed to increasing risks, including coastal erosion, over the coming decades. The Sri Lankan coast area is the most important zone of the island country and more vulnerable to climate change and its impacts. The objective of this study was to investigate the shoreline changes due to different factors during the past 15 years in the Kalpitiya peninsula in the western region of Sri Lanka. Both remote sensing and visual interpretation techniques were used to identify direct and indirect coastal shoreline changers. Shoreline changers directly impact on the variation in coastal groundwater quality.

Groundwater quality in the site was continuously monitored in monthly intervals from August 2013 to April 2015. The result revealed that groundwater quality changers are directly affected by shoreline changers in coastal areas. Shoreline vector data method was used in the Digital Shoreline Analysis System (DSAS) of ArcGIS10.1 to estimate the change in shoreline (positive or negative). R 2.14.0 was used to calculate the relationship between time and sand deposition/erosion in the Kandakuliya area. In this ongoing study, temporally shoreline changes of the Kalpitiya peninsula is investigated using ArcGIS 10 and the DSAS tool to determine maximum and minimum shoreline change rate as well as shoreline erosion rate in the Kandakuliya area. The maximum sand accumulation rates (meters/year) for each study period (1988–2004, 2005–2010, 2011–2013, 2014–latest data) were calculated using the GIS and remote sensing methods. The study revealed that serious shoreline erosions were recorded in 2014 (6.9 meters/year). This shows that the changes in the shoreline in the northwest coast of Sri Lanka is mainly due to climate change. The study showed that coastal erosion and water quality variations are very important to understand the impact of climate change on Asia and other coastal areas.



Dr. Ranjana U.K. Piyadasa is presently working at the Department of Geography, Colombo University, Sri Lanka as a Senior lecturer in Hydrogeology. He obtained his MSc and PhD in Hydrogeology from Moscow State Geological Prospecting Academy, Russia. He has participated in more than 40 international conferences in Sri Lanka and abroad and published more than 100 International and local journal publications. He is a visiting professor/academic in three leading Sri Lankan universities supervising national and international postgraduate students. He has been involved in various studies in the areas of disaster management, climate change, groundwater quality, and water management research. He also serves as Coordinator of the Disaster Risk Management Certificate Course at University of Colombo, Sri Lanka.

Poster Presentations

ICT Applications
to Food Security

Rice Crop Manager: A Web-Based Service Providing Personalized Farming Advice

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Rice, the main staple food in Asia, is largely grown in small landholdings with diverse production systems across varied environments. The best adapted varieties and management practices for growing rice can differ within small distances among fields and farmers. Farmers consequently need farming advice personalized for their specific needs and conditions. We developed *Rice Crop Manager* (RCM) as an HTML5, web-based, country-specific, decision-making tool. Agriculture extension workers, crop advisers, service providers, input dealers, private entrepreneurs, and farmer leaders can use RCM to interview a farmer using a personal computer or smartphone. The RCM uses the information collected in the farmer interview to automatically generate a crop and nutrient management recommendation adjusted to field-specific farming conditions, which is intended to increase the farmer's income. Each personalized recommendation is provided to a farmer as a one-page printout at the start of the cropping season. RCM has been developed, evaluated, and released through national agricultural research systems (NARS) in the Philippines, Indonesia, and Bangladesh (<http://cropmanager.irri.org>). It is under field evaluation prior to release in the Indian states of Bihar and Odisha and in Vietnam. Field trials with NARS across the countries have shown increased yields and farmers' income with RCM recommendations. The Philippine Department of Agriculture has taken up and supported wide-scale dissemination of RCM with local governments. About 290,000 one-page recommendations reached farmers in the Philippines in 2014. Dissemination continues in 2015 together with initiatives to monitor farmer uptake of recommended practices, to assess benefits to farmers, and to reinforce recommendations with personalized SMS to farmers. The RCM is being enhanced to include wheat in rotation with rice in Bihar. A complementary Maize Crop Manager is being developed in Bangladesh and the Philippines. The RCM provides the foundation for an ICT platform with services able to accelerate the reach and increase the cost effectiveness of extension services.



Ms. Rowena Castillo has an MSc in soil science from the University of the Philippines Los Baños (UPLB), and she is employed as an Associate Scientist at the International Rice Research Institute in the Philippines. She works on the development and deployment of web- and mobile phone-based applications, which provide farmers with improved crop and nutrient management practices in rice-based production systems of South and Southeast Asia. She previously worked as an Instructor in the College of Agriculture at UPLB and at the University of Southeastern Philippines in Tagum City, Davao del Norte, Philippines.

Satellite-aided Customs Procedure for Logistics Rush Handling and Rapid Rebuilding of Communication Infrastructure during Indonesian Disasters

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Customs administrators have the sole ability to make wide area surveillance as part of their national border control functions. Automatic Identification System (AIS) payload at Lapan A-2 is required during inspection of ships crossing the border. Having a single window allows traders to fulfill all import, export and transit-related regulatory requirements through one interface. This reduces time and cost requirements for exporting and importing, and improves collaboration between border agencies, allowing them to coordinate and conduct joint inspections and making possible efficient tracking of cargo. With improved control and monitoring of the international movement of goods, customs administrators will be able to provide increased security within the national supply chain and thereby contribute to socio-economic development through revenue collection and trade facilitation. Application of information and communication technology (ICT) to facilitate rush logistics flow during emergencies after a disaster, and also to rebuild communication infrastructure, are important in order to save more lives.

The national territory of Indonesia spreads around the equator and includes 13.487 islands connected by sea. The Indonesian National Institute of Aeronautics and Space has successfully developed a micro satellite which was sent on 24 April 2014 to Sriharikota-India as auxiliary payload of the ASTROSAT mission launch. The coverage offered by its 650 km circumference at inclination of 80 orbit of Lapan A-2, which piggy backs on the Meghatropiques satellite, includes the equatorial landscape. The low inclination of its orbit makes the satellite pass Indonesia 14 times in 24 hours, just as much as the SSO orbit (600 km) passes the north/south pole. Patrol intensity of this satellite AIS is expected to facilitate border control and reduce revenue loss. Since all international ships of more than 300 tons and all passengers vessels, irrespective of size, are mandated by the International Convention for the Safety of Lives at Sea to carry transponders that broadcast their position, course, and speed as a collision avoidance system, customs authorities may utilize ships' AIS in conjunction with radar.

NB: The mission of Lapan A-2 potentially helps search-and-rescue teams in downstream fields, while rush handling procedure flow logistics is used upstream. The method of customs rush handling facilities was obtained by the researcher from his volunteer-on-the-job training in customs administration; while workflow of Lapan A-2 Satellite system was obtained during his field trip to its assembly house.



***Mr. Fahmi Hakim** was raised by middle school teacher family in Bandung, West Java, Indonesia. After finishing his studies in 5 Bandung SHS, he went to National Accountancy Institute and took courses in Military Academy and Telecommunication Engineering at Telkom University. After graduating from STAN (National Accountancy Institute), he worked for West Java Customs Administration under Ministry of Finance Indonesian Republic as Internal Obedience staff.*

Deciphering Corporate Governance and Environmental Commitments among Southeast Asian Transnationals with Network Analyses

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Besides the traditional giants of the agri-food sector, known as the ABCD traders (Archer Daniels Midland, Bunge, Cargill, Louis Dreyfus), the emergence of new big agribusiness corporations throughout the world, is setting new rules of operation in agriculture sectors. They are connecting remote resources and localities to address the growing demand caused by urban growth in emerging countries, throughout the globe.

Big agribusiness corporations have become necessary stakeholders that every NGO or research center now engage, be it in Asia, Africa, or Latin America, when tackling the issues of land grabbing and food security. Some of these multinationals and transnationals deliberately avoid to take the journey of sustainability. Some embrace certification schemes, round tables, and get the help of NGOs and consultants to improve their practices and invest in sustainability. Some suddenly divest or change their strategy. This diversity of behaviours, can puzzle observers. An abundance of literature discusses what determines the behavior of Asian corporations, with particular emphasis on cultural factors.

We investigated how financial factors, such as ownership structure, may also have a fundamental role. We analyzed the audited accounts of four major Asian agribusiness transnationals. Using network analysis and Cytoscape software, we interpreted network metrics into their economic and financial meanings, and we deciphered how the 931 companies relate to each other and determine the behavior of the transnationals to which they belong.

We find that ownership structures reflect differences in flexibility, control, and transaction costs, but not in ethnicities. Capital and its control, ownership structure, and flexibility explain 97 percent of the environmental behavior. It means that existing market-based tools to promote environmental sustainability do not engage transnationals at the scale where most of their behavior is determined. For the first time, the inner mechanisms of corporate governance are unraveled in agricultural and forest sustainability. New implications such as the convergence of environmental sustainability with family business sustainability emerged.

This work is done within a close partnership between a French institution (CIRAD), two Malaysian institutions (UPM and FRIM), and one CGIAR center (CIFOR), under a common project, which is the base of capacity building in Malaysia and Indonesia with Phd students, training, seminars, conferences, and publications. The French ANR project SPOP "Sustainable Palm Oil Production" and the CGIAR RP6 funded the action.

Network analysis is a promising tool to understand the strategies of big corporations in agroforest sector. The method is able to visualize, quantify, and qualify the complex pattern of cross-shareholding and group them into categories of business strategies. A major implication is that this methodology helps to be more precise and quantitatively measure how their strategy and behavior is determined by their structure.



Ms. Norfaryanti Kamaruddin is a research officer and a PhD candidate at the Institute of Tropical Forestry and Forest Products (INTROP), Universiti Putra Malaysia. She graduated with a degree in Bioindustry majoring in agriculture economics and MSc in Agribusiness from Universiti Putra Malaysia. She is undertaking a joint research project between CIRAD, France and UPM focusing on corporate governance in the agroforestry sector.

Poster Presentations

Disaster Risk Reduction

Municipal Disaster Risk Reduction Management System of Daet, Camarines Norte

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Effective planning and preparation against disasters, either man-made or brought about by natural calamities, is relative to the effective use of information to monitor and identify possible risks to life, economy, agriculture, and others. The mitigation of disaster and instruments to control and measure the degree of population at risk in the different communities, involves to a certain degree the use of technological tools and software that handle community monitoring (in terms of profile and information). The study designed and developed a Municipal Disaster Risk Reduction Management System (MDRRMS) for Daet, Camarines Norte. It focused on identifying, enumerating, and discussing the information requirement of a system as well as its business rules and features.

The Rational Unified Process (RUP) methodology was used in the design and development of the MDRRMS. The key informants of this study were the MDRRMO Administrative Officer, Assistant Civil Defense Officer, and those who are responsible for disaster planning and management, rescue and evacuation, and warning operations.

With proper cooperation from international sources, this research is expected to lead the development of a platform capable of using public information toward disaster prevention, management, and proper supervision directed at improving the basic services of the Disaster Management Offices. Likewise, this shall serve as the foundation for other applications that may use community profiles in improving services to the community.

It was concluded that the information generated by the study helped in understanding MDRRMO protocols and standards. Likewise, the business rules provided information to control the structure and operation of the MDRRMS system and the features focused on community profiling, rapid disaster assessment and needs analysis, volunteer identification, SMS notification, SMS text blast notification, and viewing maps.



Mr. Edgar Bryan B. Nicart is a native of Daet, Camarines Norte working as an Instructor and Research Coordinator of the Camarines Norte State College. He finished his Master in Information Technology from the University of the Cordilleras and Bachelor of Science in Computer Science from Mabini Colleges. He is a freelance writer and researcher and currently writing innovative research and inventions in the areas of engineering, information technology, and computer science.

High Resolution Mapping of Human Settlements for Disaster Risk Reduction and Management

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The Philippines is considered a disaster-prone country due to its geographic location. Aside from being situated in the Pacific Ring of Fire, the country is also visited by 20 tropical cyclones every year. Accurate information on human settlement will play an important role in disaster risk reduction and the management plan for any part of the country. High-resolution GIS-based maps of human settlement areas can provide rapid and precise estimation of possible affected individuals enabling risk reduction managers and other stakeholders to deploy site-specific disaster risk reduction management measures. Light detection and ranging (LiDAR) technology when used together with other high-resolution satellite imagery (i.e., orthophoto) can provide high quality land cover maps, which include human settlement areas. This study will showcase high resolution mapping of human settlements for six municipalities (i.e., Los Baños, Bay, Victoria, Pila, Pagsangjan, and Sta. Cruz) in the province of Laguna, Philippines using object based image analysis combining orthophoto and LiDAR datasets. Such methodology can be replicated not only to other parts of the country but also in other disaster-prone countries in Southeast Asia.



Mr. Arnold R. Salvacion teaches at the Department of Community and Environmental Resource Planning, College of Human Ecology, University of the Philippines Los Baños. His research interests include application of GIS, climate variability and change, risk assessment, simulation and modelling, open-source data analysis and visualization, and reproducible research.

Post-Disaster Facilitation Platform Through Wireless Emergency Networks Using Disruption Tolerant Networks (DTNs)

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One of the most widely shared characteristics of all disasters is the failure of communication infrastructure, which often hampers the rescue operations. Lack of communication directly contributes to low levels of situational awareness, and therefore causes delays in disaster relief efforts. A survey conducted by InterNews Europe supported by the organization Communicating with Disaster Affected Communities (CDAC), states that one-third of the respondents who received information were able to save their lives, 75 percent obtained food and water, and 43 percent found shelter. Hence, the primary technological challenge after a disaster is rapidly establishing and maintaining communication among decision makers, relief workers, informal responders, and the public. This can help in improving situational awareness and based on this information coming from different regions or rescue workers visiting different sites, efficient decisions regarding distribution of resources can be made. This project seeks to develop a Post-Disaster Facilitation Platform through wireless emergency networks using disruption tolerant networks (DTNs). Protocols will be proposed for efficient communication in such cases and a user-friendly application will be developed for rescue personnel. The system may be deployed on a real test-bed consisting of some handheld GPS-capable devices.



Dr. Amir Qayyum obtained his PhD from Université de Paris-Sud, France in 2000. He worked with INRIA Rocquencourt, France for research on Mobile Ad hoc Networks (MANETs), from 1996 to 2000. He is Head of the Center of Research in Networks and Telecom (CoReNeT) at M.A. Jinnah University, Islamabad, Pakistan and has 19 years of research, academic, and industrial experience in the domain of wired and wireless networks. Prof. Qayyum has led many national- and internationally-funded projects, and was also the group leader of the STIC-ASIE project on “Road/Environment Condition Warning System using Vehicular Ad Hoc Networks (VANETs).”

Poster Presentations

Urban and Rural Informatics

Soil and Terrain Database for Improved Agricultural Land Use Planning in a Small Catchment, Northwest Vietnam

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The study aims to (1) develop a method based on the SOTER approach to build up a SOTER database for a small catchment area in Chieng Khoi, Northwest Vietnam and (2) use the database to carry out land suitability analysis and provide tools for agricultural land use planning. Soil transect and catena approaches were used to explore soils. The SOTER concept was applied to manage data on soil and terrain. FAO/ITC-Ghent method was used to evaluate cultivated land for maize, cassava, paddy rice, and mango.

The Chieng Khoi SOTER database consists of 46 different soil components within seven different terrain units. Climate ratings show the following sequence (mango > rice > maize > cassava) in the study area. Soil index shows that high variability existed at all levels of the SOTER database. The index reached the maximum value in terrain unit of L3 for maize, rice, and mango and S1 for cassava. It gets a minimum value in T1 for maize and in L1 for cassava, rice, and mango.

The results show that the SOTER approach is effective in the management of both spatial and attribute data on natural resources. Modifications on database structure and new selection of criteria are necessary and useful at large scale. The transect approach and the catena approach are efficient tools for soil and terrain survey to establish the database. The SOTER database is an efficient tool for land evaluation and provides useful tools to manage land resources and future sustainable land use planning.

The study's approaches could be applied to climate change impact assessment of various crops. These can also help identify vulnerable areas and adaptation options to climate change. Potential benefits from cooperation with French or Asian research units include improving the study framework for climate change impact assessment and scaling up of the study.



Dr. Nguyen Dinh Cong is working at the Mekong River Commission as a Programme Officer of the Agriculture and Irrigation Programme. He also served as a lecturer at Faculty of Land Resources Management, Vietnam National University of Agriculture, Vietnam for over 15 years. He has a PhD in Agricultural Science from University of Hohenheim, Germany. He is interested in a broad range of subjects such as natural resources databases, land evaluation, crop modelling, agricultural land use monitoring, and climate change impacts on food security.

Sustainability of Tropical Dairy Farming in Indonesia: Monitoring the Changes of Heat Stress on Tropical Dairy Cattle as an Impact of Climate Change

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In the last decade, worldwide temperature is increasing as a consequence of climate change, which affect livestock in tropical areas, especially dairy cattle. In the short term, it influences milk production as the main product of dairy cattle. In the long-term, productivity will decrease. Temperature is a prominent indicator of the physiological status of tropical dairy cattle. The changes in heat emitted from the animal's body may be used as presumption of heat stress. Monitoring the alteration of body temperature in animals is highly significant because it is directly connected to milk production. In Indonesia, most dairy farms are smallholder farming systems especially in Java Island with different management systems (low altitude to high altitude). Monitoring heat stress in dairy cattle will be conducted by using a thermograph, an infrared temperature portion tool, which is able to measure body temperatures of animal. The heat released from cattle will be directly recorded by the thermograph. The observation of temperature changes in the animals will (1) analyze the change in heat transferred from cattle and determine its relationship with the environment conditions; (2) analyze the effect this might have in the change of temperature; (3) analyze the impact of heat stress from dairy cattle in tropical areas vis-a-vis environment integrity, social equity, and economic vitality for sustainability of tropical dairy farming; and (4) formulate the simulation model to predict temperature change in the following years.



***Ms. Windi Al Zahra** is a young lecturer in the Laboratory of Dairy Cattle Production, Faculty of Animal Science, Bogor Agricultural University, Indonesia. She obtained her MSc degree from Ibaraki University, Japan in 2013. She also pursued her Master's degree in Bogor Agriculture University, major in Animal Science in 2013 and MSc in Environment Management in 2012.*

Crime Mapping in Metropolitan Areas Using Social Media

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People who live in metropolitan areas are used to crime news reported on the television and radio and in online newspapers. Major crimes are usually reported to the police, however the minor crimes (such as theft) are often not reported. With the popularity of social media, however, people can directly send messages about a crime that happens in their neighborhood. The messages in the social media (e.g., Twitter) can be analyzed and used for crime prevention in an area. Twitter data can be analyzed by identifying the crime types and the crime locations that appear in the messages. The messages can then be classified automatically based on the crime types. The location information in the messages can then be used to identify the area where the crimes happen. The result of the research can be used to improve areas that have high criminality such as increasing the number of policemen, increasing neighborhood watch activities, and adding surveillance cameras. We hope to collaborate with colleagues from ASEAN and French universities, which can open the possibility of student and faculty exchanges for research and education. We hope to maintain previous research collaboration with French universities in this new study.



***Ms. Mirna Adriani** is a faculty member of the Faculty of Computer Science, University of Indonesia. She has been working in information retrieval fields and has been involved in various research international forums. She has an interest in developing linguistic tools for Indonesian text processing and multimedia data such as Indonesian speech and traditional music processing.*

Column-Oriented Database Management System for Cloodle

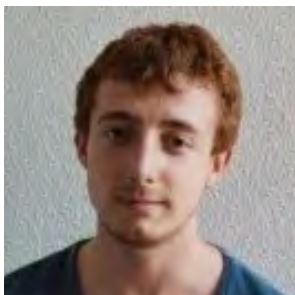
Lylian Blaud,¹ Sin Cheak Ooi,² Laurent d’Orazio,¹ Yeow Wei Choong²

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Cloud computing provides access to “infinite” storage and computing resources, offering promising perspectives for many applications, particularly e-learning. Academic institutions are offering courses using e-learning leading to the increase in the usage of the innovation. Data generated from these e-learning applications demand larger storage and computing resources, which cloud computing is able to provide. Thus, institutions that use these applications are taking advantage of these data by analyzing built-in and proprietary analytical reports to assist in decision making and improvement of the courses that are offered. However this new paradigm requires rethinking of database management principles in order to allow deployment on scalable and easy to access infrastructure. Optimization techniques such as materialized view and query rewriting can improve data management in the cloud. Most e-learning applications are not cloud compliant especially the underlying database management systems (DBMS) which are mainly row-oriented. As more applications including e-learning are beginning to incorporate column-oriented DBMS, there is a need to evaluate whether column-oriented DBMS are more effective in analytical performance. This paper aims to provide a performance analysis of a case study by comparing result return times with and without optimization techniques such as materialized views and query rewriting in row-oriented and column-oriented DBMS.



Mr. Lylian Blaud is a researcher at the Université Blaise Pascal, France. Currently he is conducting his research with HELP University in Malaysia. His areas of research interest include data mining, data warehousing, and OLAP within open source platforms.

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- As Cluster Office, UNESCO-Jakarta covers all UNESCO mandates: education, sciences, culture, communication, and information. It is responsible for the implementation of related programmes in Brunei Darussalam, Indonesia, Malaysia, the Philippines, and Timor Leste.
- UNESCO-Jakarta and French MOFAID signed a memorandum of understanding in 2014 to jointly implement regional scientific projects and programs. Under this partnership, the Secretariat of BIO-Asia is posted at UNESCO-Jakarta.
- <http://www.unesco.org/new/en/jakarta/home/>



S E A M E O
SEARCA

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) is the Center of Excellence in Agriculture of the Southeast Asian Ministers of Education Organization (SEAMEO) Founded on 27 November 1966, SEARCA is mandated to strengthen institutional capacities in agricultural and rural development in Southeast Asia through graduate education and institutional development, research and development, and knowledge management. It serves the 11 SEAMEO member countries, namely: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor- Leste, and Vietnam. SEARCA is hosted by the Government of the Philippines on the campus of the University of the Philippines Los Baños (UPLB) in Laguna, Philippines. It is supported by donations from SEAMEO member and associate member countries, other governments, and various international donor agencies.

www.searca.org



The University of the Philippines Los Baños (UPLB) is one of the seven autonomous units of the University of the Philippines (UP) System. UPLB is the country's leading higher educational institution specializing in instruction, research and extension in agriculture, forestry, natural resources, and allied fields.

Committed to address complex development and environmental concerns, UPLB pursues multidisciplinary academic programs and collaborative research in climate change and disaster risk reduction, natural resource conservation, renewable energy, and nanotechnology, among others.

As a national and public university, UPLB maintains a service orientation through curricular and research activities that seek to contribute to inclusive growth and development.

www.uplb.edu.ph



The International Rice Research Institute (IRRI) is the world's premier research organization dedicated to reducing poverty and hunger through rice science, improving the health and welfare of rice farmers and consumers, and protecting the rice-growing environment for future generations. IRRI is an independent, nonprofit research and educational institute, founded in 1960 by the Ford and Rockefeller Foundations with support from the Philippine government. The institute, headquartered in Los Baños, Laguna, has offices in 17 rice-growing countries and about 1,400 staff members representing 36 nationalities.

Working with in-country partners, IRRI breeds and introduces advanced rice varieties that yield more grain and better withstand pests and disease as well as flooding, drought, and other harmful effects of climate change. An estimated 50 percent of Asian rice area is planted to IRRI-bred varieties or their progenies. The Institute develops new and improved methods and technologies that enable farmers to manage their farms profitably and sustainably, and recommends rice varieties and agricultural practices suitable to particular farm conditions as well as consumer preferences. IRRI is a member of the CGIAR consortium, committed to a food-secure future. The Institute is also the lead center of the CGIAR Research Program on Rice.

www.irri.org

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