2nd Mekong Climate Change Forum
Adaptation to Climate Change in the Transboundary Context

6-8 October 2014
Siem Reap, Cambodia

Forum Book of Abstracts

FORUM BRIEF

Home to about 60 million people, the Lower Mekong River Basin (LMB) has experienced rapid development, urbanisation and population growth which have adverse effects on the Mekong resources and populations who depend on them. Climate change has increasingly placed burdens on the environment and the people. For example, rising temperatures and unpredictable rainfall are bringing drought to some areas and flooding to others. The Mekong Delta is experiencing sea level rise and increasing saltwater intrusion to its ecosystems and farmland. Extreme weather events such as typhoons are increasing in frequency and severity, destroying homes, infrastructure, livestock and crops.

Adaptation measures can help vulnerable communities and governments to better deal with such changing climate conditions and thus reduce consequences on people's livelihoods, ecosystems and the economy.

The Mekong River Commission (MRC) is holding a three-day forum for all stakeholders, including government officials, academics, experts, representatives from river basin organisations, the Development Partners of the MRC, development agencies, civil society and the private sector, to share and exchange their knowledge, experience and progress in undertaking measures to adapt to changing climate. This is the second MRC regional platform on climate change following the first forum held in February 2009 in Bangkok, Thailand.

This 2nd Mekong Climate Change Forum will explore the following topics:

- State of knowledge on climate change and climate change impacts and vulnerability in the Lower Mekong Basin;
- Climate change adaptationin the Lower Mekong Basin: Policies, strategies and actions on the ground;
- Transboundary adaptation needs and approaches in the Lower Mekong Basin; and,
- A synergy between the national and transboundary adaptation.

The Forum aims to achieve the following results:

1. Enhanced understanding on up-to-date approaches and actions to address transboundary impacts of climate change in the Lower Mekong Basin;
2. Increased dialogue, exchange of knowledge and experience within the Mekong and with other transboundary river basins;

3. Input to the preparation of the 1st Report on Status of Climate Change and Adaptation in the Lower Mekong Basin;
4. Input to the preparation of the Mekong Adaptation Strategy and Action Plan; and,
5. A forum proceeding which summarises knowledge and experiences discussed and shared during the Forum.

Accordingly, the first day of the Forum, 6th October, after setting the scene with the introduction on topics of climate change adaptation (CCA) at international and regional scales, up-to-date findings related to climate change and adaptation in Asia and the LMB will be presented. In the afternoon, the focus lies on climate change impacts, vulnerabilities and adaptation in water-related sectors in the Lower Mekong Basin, in which the parallel sessions highlight topics related to flood and drought, agriculture and fisheries, and ecosystems and biodiversity. The last plenary session of the day will define principles of cross-sector adaptation and transboundary adaptation with concrete examples from the Danube Basin and the Iberian Peninsula.

The second day, Tuesday 7th October, is opening with the presentation of national and transboundary adaptation strategies and action plans in the LMB, which will provide foundation for further discussions in the following panel session on synergies between the national and transboundary levels with regard to adaptation strategies and action plans. The focus of the parallel sessions is on approaches, methodology and good practices related to flood and drought, agriculture and fisheries, and ecosystems and biodiversity. The last parallel sessions will present various good practices and lessons learnt in LMB, regarding (i) mainstreaming adaptation into development, (ii) adaptation in practice and (iii) replication and upscalling.

The third day, 8th October, is closing the event with the plenary panel on ways towards the Mekong Adaptation Strategy and Action Plan.

We hope you enjoy the forum and have a pleasant stay in Siem Reap, the town with the land of wonder of the Angkor Complex and the memorable culture and tradition of Cambodian people.

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FORUM MODERATOR AND FACILITATOR

Forum Moderator: Dr Kai Gerlinger, Director, HYDRON Consulting and Engineering, Germany

Dr Kai Gerlinger has over 20 years of experience on a wide range of water and climate change projects, including the development, programming and application of hydrological models for flood forecasting and climate change simulations in national and international contexts. Since 2008, he works as director of HYDRON Consulting and Engineering in Germany. Since 2013, he is working as a consultant to support MRC with respect to technical aspects of flood management and climate change modeling. Furthermore, he conducted on behalf of MRC and ICPR, respectively, literature reviews to distil currently available knowledge on the impacts of climate change on the water environment of the Rhine and Lower Mekong Basins.

Forum Facilitator: Mr Prasong Jantakad, Programme Coordinator for Agriculture and Irrigation Programme, Mekong River Commission Secretariat, Cambodia

Mr Prasong Jantakad has been Programme Coordinator for Agriculture and Irrigation Programme of the MRC Secretariat since August 2011. He graduated a Master's degree on Agricultural Science from Central Luzon State University, the Philippines and a Bachelor's Degree on Crop Science (Agronomy) from Maejo University, Chiang Mai, Thailand.

Prasong has worked for various international development organizations such as GIZ, UNDP, UNCDF, UNOPS, and UNFDP. He has more than 20 years of work experience in the field of integrated rural development projects in Southeast Asia particularly in Thailand, Laos, Vietnam and Myanmar.

Forum Facilitator: Dr Kien Tran-Mai, Senior Programme Officer, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR

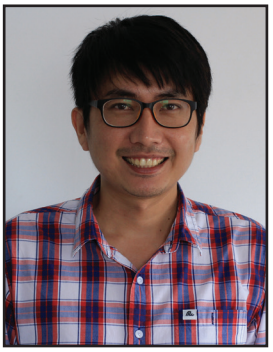
Dr Kien Tran-Mai is currently a Senior Climate Change Programme Officer of the Mekong River Commission's Climate Change and Adaptation Initiative (CCAI). With 17-years of research and practical experiences in the field of environmental and climate change, his fields of expertise range from climate change adaptation and mitigation, climate policy and advocacy, disaster risk reduction to environmental management and public health.

Dr. Kien holds a Degree in Medical Science and Public Health and completed his PhD (on environmental change and public health) in 2000 in the Russian Federation's Academy of Science, Moscow, Russia. In 2007, he has been awarded a Post-Doctoral fellowship in Kyoto University (climate change and disaster impacts on public health) and has served as university lecturer, resource person and presenter/facilitator in many international conferences and workshops. Prior to joining the MRC in 2008, Dr. Kien has been working as senior researcher in the Vietnam National Institute of Meteorology, Hydrology and Climate Change (IMHEN) and has contributed to the development and finalization of the "National Target Program to Respond to Climate Change" (NTP.RCC) and "Viet Nam National Strategy on Clean Development Mechanism".

Forum Facilitator: Dr Ly Thim, Socio-economic Specialist, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR

Dr Ly Thim is a socio-economic specialist at the Climate Change and Adaptation Initiative (CCAI) of the Mekong River Commission (MRC) Secretariat. He joined the Secretariat in 2011 as a social science specialist attached to Environment Programme before moving to CCAI in 2014. He has over 19 years of work experience with various international organisations in a variety of fields of development including more than 12 years working in water resources management in the Mekong Region. He holds a PhD degree in development studies from the University of Bonn, Germany. His research interest lies in water resources management and climate change.

Forum Facilitator: Dr Thanapon Piman, Water and Climate Change Specialist, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR



Dr Thanapon Piman is Water and Climate Change Specialist under Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR. He graduated a Doctoral degree in Water Resource Engineering and Management at the Asian Institute of Technology, Thailand. His current work with the MRC focuses on historical climate change analysis, climate change projection and modelling, basin-wide assessment of climate change impacts on hydrology and drought developing basin-wide monitoring and reporting system on climate change and adaptation and developing database for supporting Lower Mekong Countries (Cambodia, Lao PDR, Thailand and Viet Nam) in climate change adaptation planning.

Forum Facilitator: Ms Tatirose Vijitpan, Programme Officer, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR

Ms Vijitpan has joined the Mekong River Commission's Climate Change and Adaptation Initiative since 2011. Her roles and responsibilities are related to stakeholder engagement, capacity building, climate change adaptation planning and CCAI's local demonstration projects.

Previously, she worked with the Stockholm Environment Institute (SEI) Asia Centre under the Sustainable Mekong Research Network (SUMERNET) and the Regional Climate Change Adaptation Knowledge Platform for Asia; and WWF Thailand's Energy and Climate Change Unit. Ms Vijitpan holds a Master of Science on Environmental Sciences, Policy and Management, an Erasmus Mundus masters course from the Central European University (Hungary), the University of the Aegean (Greece), Lund University (Sweden) and the University of Manchester (UK).

DAY 1

6th October 2014

SESSION 1: OPENING PLENARY

Remarks from MRC Development Partners

Dr Philipp Magiera, Programme Coordinator, MRC – GIZ Cooperation Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Laos PDR

Dr Magiera currently manages the German technical cooperation programme with the Mekong River Commission in Vientiane, Lao PDR, on behalf of the German Ministry for Economic Cooperation and Development and the Ministry for the Environment. He has been with Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ) for 13 years, working as an adviser at the Jordanian Ministry of Water and Irrigation and the Jordan Valley Authority, as well as a senior manager in the water sector at GIZ head office in Germany before moving to Laos. Previously, he had worked as researcher in state geological administrations in Germany. A hydrologist trained in Freiburg, Germany, and Portland, Oregon/USA, he received his PhD in hydrogeology from the Technical University of Braunschweig, Germany. His areas of professional interest include transboundary water management, climate change, flood risk management and sustainable hydropower issues.

KEYNOTE 1: Adaptation to climate change in a transboundary context - Setting the scene "Lessons for Practical Adaptation Management Planning"

Dr Eugene Z. Stakhiv, Lecturer and Researcher at Johns Hopkins University, Visiting Scholar at Corps' Institute for Water Resources, USA

Abstract Climate adaptation is a complex undertaking because of many uncertainties associated with future scenarios – not only of climate change, but also socioeconomic development. It is made more complex because it is embedded within an evolving integrated water resources management (IWRM) framework, which is the management platform for implementing Sustainable Development Goals – both of which are difficult to implement at the national level. Multinational transboundary river basin management, combined with IWRM requirements and climate uncertainties amplify all these complexities.

Fortunately, the MRC already has many of the prerequisite foundational management components in place: willingness to cooperate; a river basin management framework; numerous models and basin management plans, along with national climate adaptation strategies. There are many benefits to transboundary cooperation, especially in dealing with the unknowns of climate change.

There are many 'top-down' adaptation measures, at the basin level, that complement those taken at the national and local levels. A transboundary water allocation and water quality agreement would be an important step, in a hierarchy of adaptation measures. It might be more practical, though, to start from the 'bottom-up', with a wider range of national adaptation and adaptive management actions that would comprise the prerequisites for basin-level agreements. There are numerous examples of each approach.

Climate adaptation is inherently an exercise in risk management: reducing risks from floods and droughts, while providing basic water-based services for growing populations and economies. But the future, like climate, is not static – it is a confluence of many dynamic forces, including globalization and trade policies, which must be taken into account in future adaptation planning. For example,

current climate adaptation strategies focus on sustaining a subsistence-based economy. With increased urbanization and economic development, and greater demands for improved quality of life in the basin, this may not be sustainable, nor even desirable 50 years hence.

Dr Eugene Z. Stakhiv is currently a lecturer and researcher at Johns Hopkins University, Department of Geography and Environmental Engineering, and Visiting Scholar at the Corps' Institute for Water Resources.

Prior to retirement from the Corps of Engineers in 2012, he served for 12 years as US Director, International Great Lakes Study, developing and implementing climate adaptation management plans for the International Joint Commission. Concurrently, he was Director of UNESCO International Center for Integrated Water Resources Management (ICIWaRM) and was Science Advisor to the U.S. Ambassador to UNESCO. He served as co-chair and lead author for the first three UN IPCC reports, for which he shares a Nobel Prize. He has extensive international experience, serving as advisor to the water ministries of Iraq, Bangladesh, Ukraine, Armenia, Afghanistan and the Aral Sea Basin countries. He has a doctorate in water resources engineering from Johns Hopkins University, and authored 70 published papers and 150 technical reports.

KEYNOTE 2: Adaptation to climate change in the context of the Lower Mekong Basin

Mr Hans Guttman, Chief Executive Officer (CEO), Mekong River Commission Secretariat (MRCS)

Abstract Decision makers at all levels in the LMB need better information, evidences and knowledge of climate change and its implications (current and future status, impacts and vulnerability, adaptation and resilience etc.) for better planning and actions. Comprehensive scientific information and research results will help them to improve confidence to plan, manage and possibly put extra money into climate proofing of development and to take adaptive actions.

On the other hand, the burning question is how to make use of the vast amount of information from global and regional researches on climate change, some of which comprise high uncertainty, how to translate that down to the scale of the Mekong Basin – to the national and provincial planners, to each individual catchment, the affected settlements and vulnerable people. At those scales we need to know how people's livelihood is changing and how it is affected by climate change; and to work out what we can do about it. How could people adapt to climate change and develop at the same time? Should adaptation be responding to change now or anticipating future change - these are not easy questions.

In order to address this need and answer those questions, over the last three years the MRC Climate Change and Adaptation Initiative (CCAI) is working hard to produce important information and results from the local demonstration projects, from the basin-wide assessments on climate change impacts on flow regime (2nd assessment), food security, ecosystem and biodiversity, flood and drought, hydropower as well as socio-economic systems. This information will serve as important scientific and knowledge base to produce the Report on Status of Climate change and Adaptation in the LMB and to establish the Mekong Adaptation Strategy and Action Plan (MASAP).

This will also contribute to the global efforts to deal with climate change which was once again emphasized in the recent UN Climate Summit on 23 Sep 2014 in New York, towards the drafting of a new universal agreement under the United Nations Framework Convention on Climate Change (UNFCCC) at COP-20 in Lima, in December 2014 and its ratification at COP-21, in Paris in 2015.

This key note will highlight the importance of knowledge, experiences and actions in adaptation to climate change in the Lower Mekong Basin (LMB) and discuss a vision toward a Mekong Adaptation Strategy and Action Plan (MASAP) and active regional cooperation to face the transboundary impacts of climate change and improve resilience and livelihood of communities in the four Member Countries.

Mr Hans Guttman is a Swedish national who has spent most of his professional career in Southeast Asia. Guttman was interested in water and environment from an early age and his undergraduate is in Marine Biology/ Geography from James Cook University in Australia. He has spent most of his adult life in an international setting, gaining his MSc from the Asian Institute of Technology (AIT), Thailand, and worked for 10 years with the AIT Aqua Outreach Programme promoting aquatic resources management and rural development in mainland Southeast Asia.

In 2001 he joined the MRC Environment Programme as coordinator, after having been central in establishing the new programme on conjunction with the reorganization of the MRC Secretariat in 2000, and spent the next six years with the MRC Secretariat both in Phnom Penh, Cambodia; and in Vientiane, Lao PDR. Heading the Environment Programme provided him with a thorough understanding of the MRC cooperation as well as the challenges. In late 2007 Guttman left the Secretariat to take up the position as coordinator for the Wetlands Alliance, a network of some 30 agencies working on rural poverty in Cambodia, Laos, Thailand and Viet Nam. He became CEO of the MRCS in November 2011.

SESSION 2: PLENARY SESSION

2.1 Status of climate change and adaptation in Asia from the IPCCS 5th Assessment Report

Prof. Dr Juan Magboo Pulhin, Dean of the College of Forestry and Natural Resources, University of the Philippines Los Baños, the Philippines

Abstract This presentation highlights the status of climate change and adaptation in Asia based on the key findings of the IPCC 5th Assessment Report. Warming trends and increasing temperature extremes have been observed across most of the Asian region over the past centurywhile precipitation trends including extremes are characterized by strong variability in different parts and seasons of the region. Water scarcity will be a major challenge for most of the region due to increased water demand and lack of good management. Climate change impacts on food production and food security will vary with many areas to experience a decline in productivity. Terrestrial systems in many parts of Asia have responded to recent climate change with shifts in the phenologies, growth rates, and the distributions of plant species, and permafrost degradation, and the projected changes in climate during the 21st Century will increase these impacts. Coastal and marine systems are under increasing stress from both climatic and non-climatic drivers. Extreme climate events will have an increasing impact on human health, security, livelihoods, and poverty, with the type and magnitude of impact varying across the region. Adaptation and risk management options in Asia largely vary depending on the key risks and nature of climatic drivers involved which may include among others, disaster preparedness, planning, and technological innovation. In general, the level of risk is reduced with high adaptation in the present, near-term (2030-2040) and long-term (2080-2100 with global mean temperature increase from 2-4 0C above pre-industrial level) era of climate options. However, higher levels of climate change impacts generally become less amenable to adaptation. The presentation also cites the Lower Mekong River Basin as a case study used in the Asia Chapter of the IPCC 5th Assessment Report to illustrate the potential and challenges of transboundary adaptation planning and management to comprehensively addressing the perils of climate change in a transboundary context.

Dr Juan M. Pulhin is full-time Professor and the current Dean of the College of Forestry and Natural Resources, University of the Philippines Los Baños. He also holds the title of Scientist III, the highest rank given under the University of the Philippines Scientific Productivity System, in recognition of his scholarly work and international scientific standing. He has been a Visiting Professor at The University of Tokyo for two times in 2007 and 2010. He has more than 10 years of experience in climate change assessment and research and has co-authored/co-edited four books and numerous publications on climate change and disaster risk reduction. He was a Lead Author of the adaptation chapter of the 2007 IPCC Working Group II Contribution to the Fourth Assessment Report and a Coordinating Lead Author of the Human Security Chapter of the IPCC Fifth Assessment Report.He earned his PhD degree in Geographical Sciences from The Australian National University.

2.2 Status of Climate Change and Adaptation in the Lower Mekong Basin: A preliminary finding from Researches and Studies of the MRC Climate Change and Adaptation Initiative

Dr Nguyen Huong Thuy Phan, Programme Coordinator, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR

Abstract Status of Climate Change and Adaptation in the Lower Mekong Basin (LMB) is the first status report of its kind of the Mekong River Commission (MRC) Secretariat that describes the status of climate change, the impacts and vulnerability, and challenges of the adaptation facing water resources and sustainable development in the LMB. The report is based on the information drawn from various sources, including the MRC's Climate Change and Adaptation Initiative's (CCAI) basin-wide climate change and adaptation monitoring and reporting system; CCAI literature review conducted in 2013 on the effects of climate change on the water environment in the LMB; and other basin-wide studies of the MRC.

The report exhibits information such as past and future temperature, precipitation and tropical storms. The analysis showed increased temperature between 0.14oC and 0.36oC per decade and featured more frequently increases in total annual precipitation with increased cyclone frequency and intensity.

The report analyses the impacts and vulnerability of climate change on various sectors including on river flow and flood, drought, forestry and land cover, biodiversity and ecosystems, fisheries, sea level, saline intrusion, sediment and erosion, agriculture and irrigation, aquaculture, food security, hydropower, navigation, infrastructure, human health, poverty, well-being, and employment and income. The analysis showed that climate change is expected to slow down economic growth and make poverty reduction more difficult. For instance, projection of food security under climate change and population growths implies that food shortages could occur, if no countermeasures are taken.

For the adaptation, the report analyses current adaptation policy and institutions, implementation of adaptation, and LMB adaptation strategy. The analysis

showed a large variety of adaptation options exists including hard, soft and eco-system based options. However, adaptation is site and context specific which requires a comprehensive assessment to develop an adaptation strategy. Since climate change adaptation is cross-cutting issues with far-reaching linkages to development, it should be mainstreamed to development policy.

Currently, the MRC is formulating the Mekong Adaptation Strategy and Action Plan (MASAP) which will set out strategic adaptation priorities and actions in line with the national strategies for transboundary climate change adaptation in the LMB. The formulation of MASAP is expected to be completed by 2015. The report on Status of Climate Change and Adaptation in the Lower Mekong Basin (LMB) will be part of the knowledge base contributing to the formulation of the MASAP.

Phan Nguyen is a specialist in water and environmental management. By training she has a Doctor of Engineering in Water Resource Development. Phan is a hydrodynamic and morphological modeler and environmental researcher with more than 25 years of combined experiences in hydropower development projects in the South of Vietnam, coastal engineering projects in the Gulf of Thailand, and climate change risk assessment projects in the Vietnam's Red River Delta and the Lower Mekong Basin.

Prior to joining MRCS Phan worked for the Asian Institute of Technology in Vietnam during 2002-2011 as a water and environment specialist and lecturer. She led many education and consultancy projects in environmental governance, climate change responses, disaster mitigation and management and renewable energy development. She was a research scientist at the University of Twente, the Netherlands during 2000-2002; a research engineer at the Asian Institute of Technology in 1994-2000; a water resource engineer at Vietnam Ministry of Energy in 1986-1992; and Board of Construction – Vietnam Institute of Hygiene, in 1984-1986.

SESSION 3: PARALLEL SESSION "Climate change impacts, vulnerability and adaptation in water-related sectors in the Lower Mekong Basin"

Parallel Session 3.1: Flood and Drought

3.1.1: Vulnerability and impacts of floods and droughts in the riverine rural communities of the Lower Mekong Basin, Cambodia

Dr Serey Sok, Lecturer and Researcher, Royal University of Phnom Penh, Cambodia

Abstract The Lower Mekong Basin (LMB) in Cambodia represents 86% of the country's territory and is home of 4.3 million people which make up to 32.3% of its national population. This research accordingly focuses upon the vulnerability and impacts of floods and droughts on the livelihoods of the villagers in the past 10 years (2001-2010) and over the next 10 years (2011-2020). The research discovered three main findings: (1) it was apparent that resources, infrastructure and the villagers' general knowledge were insufficient to deal with extreme and unusual events. During some years, both floods and droughts occur at the same time and in the same provinces. Between 2001 and 2010, natural hazards caused approximately US$391 million worth of damage, flooding US$353 million, and drought US$38 million; floods affected 4.3 million people and claimed approximately 167 deaths. (2) Water discharge from the Mekong River will slightly decrease in the rainy season; but, it will increase to some extent in the dry season. In wet seasons, the average water discharges usually decrease; but, they noticeably increase in August, September and October. In contrast, the average water discharges in dry seasons are likely to increase significantly in April and May. (3) The small changes in the water quantity of the Mekong River during the wet and dry seasons may not be a problem of water shortage. However, they may impact on its streams, small rivers, and lakes that have low

capacity to distribute sufficient water for paddy rice. Some other indicators will also be influenced by water shortages, i.e., an increase in cultivation areas, lack of infrastructure; and, impacts by hydropower development. Improved physical infrastructure, such as irrigation systems will enhance water sufficiency especially in the dry season.

Dr Serey Sok earned his PhD from Hong Kong Baptist University (Hong Kong) in 2013 and MSc from School of Environment, Resources and Development of the Asian Institute of Technology (Thailand) in 2005.

Serey has been working as lecturer/researcher at the Resource Management and Development Department at the Royal University of Phnom Penh since 2008. Between April and July 2014, he was a Visiting Professor at the University of Washington, Seattle, USA. He also served as a Teaching Assistant at Department of Geography of Hong Kong Baptist University for three years.

Since 2001, Serey has worked with various national and international organizations including UNHCR-The UN Refugee Agency, UN-ESCAP Building (Bangkok). Between 2007 and 2010, Serey was an M&E Specialist at the Planning, Monitoring Evaluation and Research Department of National AIDS Authority under UNAIDS Project. For this position, Serey was involved in preparing Costing for the National Strategic Plan, Review of Progress Made Towards Cambodia's Universal Access Targets, National AIDS Spending Assessment (NASA), and M&E Systems Strengthening Tool.

In these recent years, Serey has many significant academic publications at several international journals. His papers have been published by Singapore Journal of Tropical Geography; Forum for Development Studies; Journal of Asian Public Policy, and Advances in Global Change Research.

3.1.2 Vulnerability of livelihoods in flood-prone areas: A case study in Kandal of Cambodia and An Giang of Vietnam

Assoc. Prof. Dr Nguyen Duy Can, Dean Cantho University, Viet Nam

Abstract Along the Cambodia-Vietnam border of Kandal and An Giang provinces, people are very vulnerable to flood. This is due to more serious flood and people are not clearly understood flood situations and management from flood damage, as well as current management interventions remain a challenging task for decision makers. In addition, development activities that proceed ignore the reality of people livelihoods lead to more vulnerable to flood and poverty. This study develops a systematic understanding of flood situations and the livelihoods of the people in these areas as a basis for exploring opportunities to cope with flood situations, as well as to improve farmers' livelihoods through diverse livelihoods activities and proper measures management practices. Sustainable Livelihood conceptual with combination of various methods (including PRA tools) and social surveys using structured questionnaire of 480 households were conducted in four villages in Kandal and An Giang to assess the livelihood assets of different social groups. Through PRA, the flood situations and their impacts, as well as options for adaptation to flood of local people were identified. Results from study show huge damages by serious floods in both countries. Livelihoods of many households who live in the flood-prone areas have suffered, particularly Kandal had greater vulnerability to floods than An Giang in this case study. In both sites, vulnerability of households varied amongst social groups, with poor households suffering more from floods as the poorer had insufficient resources to cope with floods. A number of practices and several lessons were learned from this research that could be shared between two countries.

Dr Nguyen Duy Can is currently Associate Professor and Dean of the College of Rural Development, Cantho University, Vietnam. Prior to this position, Dr Nguyen Duy Can worked for over twenty years in the Mekong Delta Development Research Institute as a Senior lecturer and Deputy Director.

Dr Can has a Bachelor degree on Engineer of Agriculture at Cantho University, Master of Science in Agricultural Systems at Asian Institute of Technology, Thailand, and Doctorate in Agriculture at Kyushu University, Japan. Dr Can has several experiences in working with research projects, from 2002-2010 he worked as Project Coordinator (Mekong Delta Agricultural Extension Project); in 2009 as Coordinator of Research project on 'Improving institutions for flood damage reduction' (SUMERNET Project); and in 2011 as Project Coordinator of 'Vulnerability assessment of livelihoods in Lower Mekong Basin' (SUMERNET Project). His most current publication is "Vulnerability of Livelihoods in Flood-prone Areas along the Cambodia-Vietnam Border" - a book-chapter in Climate Risks, Regional Integration, anh Sustainability in the Mekong Region

3.1.3 Vulnerability assessment and adaptation to climate change induced disasters in the Mekong Delta

Prof. Dr Kazuya Yasuhara, Ibaraki University, Japan

Abstract Climate change related disasters along riverside and coastal areas of the Mekong Delta are caused by land subsidence, sea-level rise (SLR), and magnified typhoons. Sometimes, combinations of two or three such events can induce more extreme damage. The current presentation explains erosion, which is regarded as a severe natural disaster affecting riverside and coastal areas. Erosion in waterfront areas, exacerbated by land subsidence, sea-level rise (SLR), and magnified typhoons, is divisible into two categories: coastal erosion, whereby sand beaches disappear because of SLR and less soil supplied from upstream; and dyke erosion, by which dykes are collapsed because of the events described above. To adapt to severe erosion, it is necessary to do the following.

i) Grasp past and present situations and predict future trends based on information collated through the proper organizations, scientists, and engineers using reliable forecasting tools.
ii) Eliminate factors influencing severe erosion such as lack of sediments, perhaps utilizing sediments from industries, and other resources.
iii) Execute adaptive measures using software and hardware following recommendations in recent IPCC reports, while evaluating their suitability to the situation, circumstances, and environments in the objective areas.

Based on the above, attempts were made to conduct perception surveys of local citizens and field surveys of erosion using Uncrewed Aerial Vehicles (UAVs). In addition, a proposal was made to conduct pilot field tests at the coast in SocTrang Province for reinforcing coastal dykes using geosynthetics combined with traditional techniques. That project is planned in conjunction with Water Resources University in Ho Chi Minh City, Viet Nam.

Dr Kazuya Yasuhara graduated from Department of Civil Engineering, School of Engineering of Kyushu University, Japan, in 1968 and then was awarded Ph. D at Kyushu University in 1978. Currently, he is Professor Emeritus of Ibaraki University, Japan and he has been working as International Project Coordinator, Institute for Global Chang Adaptation Science (ICAS), Ibaraki University, Japan. At the same time he has served as Review Editor for IPCC AR5 (Ch. 29 and Technical Summary).

He has got many awards, such as American Society of Civil Engineers Best Paper Award in 1999, Japan Geotechnical Society Award for the Best Research Achievement in 2004 and JGS Meritorious Research Award for Ground Environment in 2008.

Dr Yasuhara had experiences of sabbatical leaves taken during work and study periods in 1979–1981as visiting Professor at University of Illinois at Urbana–Champaign, Ill., USA and in 1986–1987 as Research Fellow at Norwegian Geotechnical Institute, Oslo, Norway.

His current research themes of the issue are: (1) climate change-induced compound geo-disasters in Asia–Pacific regions and their adaptation and (2) countermeasures against earthquake-induced liquefaction and settlements of infrastructure and residences.

3.1.4 Impacts of climate change on the hydrological processes in the Mekong River

Assoc. Prof. Dr Hui Lu, Center for Earth System Science, Tsinghua University, China

Abstract In this study, we built a geomorphology based hydrological model in Mekong River Basin with public available free data at 5km resolution to simulate the whole hydrology cycle of the basin at daily scale. As the first step, the model was driven by grid rainfall data from TRMM 3B42 and calibrated against the observed discharges, in order to make the model capable to be driven by the grid data from GCM outputs.

Afterwards, the newest released CIMP 5 data from five representative GCMs was used to drive the hydrological model to project the future trends of runoff in the year 2011-2040, 2061-2070 and 2090-2099 at 4 different RCPs. Through the analysis of temperature and precipitation in the basin, it`s clearly that the average of temperature in the basin will increase for all five GCMs and 4 RCPs. But for the precipitation, the GCMs shows great disagreement from each other: the MIROC and NorESM show bigger increase than others while the HadGEM is always the lowest. Consequently, the hydrological model`s simulation demonstrated that for the different GCMs, the projected runoff behaved inconsistently as the projected precipitation`s performance. For most GCMs and RCPs, the runoff will gradually increase as the time goes by, and on the RCP4.5 and RCP8.5, the runoff increase more than RCP2.6 and RCP6.0 for most GCMs. Furthermore, the runoff will experience bigger annual fluctuation and seasonal misdistribution, which means more extreme floods or droughts may happen in Mekong in a warming situation. In addition, the result also indicates that the upper Mekong would be more vulnerable to climate change. Our study demonstrates that, the future runoff trends rely heavily on the project rainfall trends, which need more work to get most GCMs consistent. And the results imply that climate change and variability place additional pressure on Mekong water resources.

Dr Hui Lu currently is an associate Professor in the Center for Earth System Science of Tsinghua University, Beijing, China. He received the B.E and M.S. in hydrologic science from Tsinghua university in 2000 and 2003, respectively, and the PhD degree from the University of Tokyo in 2006. His research interests mainly focus on the global water cycle simulation and monitoring, especially the integration of remote sensing techniques, land surface models, and distributed hydrological models into the climate change assessment.

SESSION 3: PARALLEL SESSION "Climate change impacts, vulnerability and adaptation in water-related sectors in the Lower Mekong Basin"

Parallel Session 3.2: Agriculture and Fisheries

3.2.1 Climate Change Impacts on Agriculture Water Use in the LMB

Dr Koji Kitamura, Technical Advisor, Agriculture and Irrigation Programme, Mekong River Commission Secretariat, Cambodia

Abstract Agriculture is commonly the first point of intervention in raising living standards, improving livelihoods and mitigation poverty.

The Natural flow regimes of the Mekong River and its tributaries result in high water levels in the wet season and low levels in the dry season. Rainfed cropping is the dominant form of cultivation in NE Thailand, Lao PDR and Cambodia, principally one rice crop per year, due to high rainfall in the wet season. Water storage is required to allow irrigation in the dry season and dry season irrigation areas are substantially smaller than wet season ones.

Population growth rates are still high, and demographic changes are taking place and more are expected in terms of migration away from rural areas. Domestic food demand will increase and problems in food security occur due to flooding. One key factor to raise food production is the water resources, infrastructure and management capacity for dry season irrigation. In order to enhance agricultural production to achieve food security and alleviate poverty, Member Countries of the MRC are pursuing irrigation development to expand irrigable area.

Climate change impact modeling for the scenario assessment has been undertaken by MRCS to simulate the climatic and hydrological responses.

Greater drought risk combined with the increased incidence of long term flood inundation will potentially lead to greater crop losses and lower food security. The predicted rise in temperature will also affect crop water demands and reduce rice yields, potentially substantially unless new varieties are introduced which are more resistant to water stress.

This study provides hydrological impacts assessment of the climate change on agricultural water use, and analyzes the impacts of water supply changes on rice production in the LMB.

Dr Koji Kitamura is Technical Advisor to Agriculture and Irrigation Programme, Mekong River Commission Secretariat (MRCS), which he joined in July 2014. He obtained Doctor Degree in irrigation engineering from the University of Tokyo. He has been working as an irrigation engineer for more than 20 years at the Ministry of Agriculture, Forestry and Fisheries of Japan. He was working as a water resources engineer at Asian Development Bank in 2003 – 2006, and was in charge of agriculture and irrigation projects in Central Asia such as Kyrgyz Republic, Uzbekistan and Kazakhstan. He was also a JICA (Japan International Cooperation Agency) Expert as a policy advisor to Ministry of Water Resources and Irrigation of Egypt in 2009 – 2012, and was involved in agricultural water use from River Nile in Egypt.

3.2.2 Potential Impacts of Climate Change on Fisheries Resources in the Lower Mekong Basin

Mr Ngor Peng Bun, Capture Fisheries Specialist, Fisheries Programme, Mekong River Commission Secretariat, Cambodia

Abstract Climate change impacting on fisheries sector is becoming increasingly visible as indicated by a number of research studies. Various climate change models suggest that countries in Lower Mekong Basin (LMB) will be affected most notably by changes in the seasonal patterns of rainfall, temperature and sea level rise. It is probable that there will be greater extremes of rainfall and drought conditions in LMB as well as changes in sea level (Mekong Delta), increased storms air temperatures. These changes are likely to cause significant impact on aquatic ecosystems including inland fisheries in the region. Any changes in flooding patterns, for instance, will affect the extent of the flooded forest and the connectivity of aquatic habitats. These will potentially impact on fishery productivity and fish catch composition. Extreme temperatures may cause change to water quality and, thus, may reduce primary productivity which ultimately decreases food supplies for fish. This may have implications in reduction in wild fish stocks and fish yield. Uncertain changes in rainfalls and water levels may impact on fish spawning and breeding ability, and, thus, may lead to reduction in fish larvae (recruitment) which finally have a negative effect on fish stocks.

Extreme events such as storms, floods and droughts could affect people's ability to engage in fish farming as levels of risks increase. Increased rainfalls in some areas could increase production from aquaculture; droughts in other areas could decrease its productivity. These extreme events could also cause losses of aquaculture stocks, and damage fishing and aquaculture infrastructure etc. In the coastal area (Mekong Delta), increased sea level is likely to inundate coastal lands, displacing coastal villages, changing the nature of coastal wetlands and affecting coastal aquaculture and wild fish catch composition as well as its seasonality. The boundaries of some fish species are likely to change making some fish species inaccessible in Mekong Delta waters of Cambodia and Viet Nam while other species may prosper taking advantage from conditions triggered by climate change. There are many other impacts that we do not know about yet!

This paper intends to provide a review on the potential impacts of climate change on capture fisheries and aquaculture in LMB and how these impacts may affect food security of the people in the region. It will also propose some adaption options using lessons learnt from LMB and other regions in the world.

Peng Bun is the Capture Fisheries specialist to MRC Fisheries Programme. He was the head of Monitoring and Evaluation Division of the Cambodia Fisheries Administration before joining MRC in 2011. Peng Bun was also involved in various capture fisheries projects notably Project for the Management of Capture Fisheries (1997-2002), Assessment of Mekong Capture Fisheries (2003-2005), Natural Resource Management and Livelihoods Programme (Danida/NZaid/DFID) and Regional Fisheries Livelihoods Programmes (FAO) etc. Peng Bun has two master's degrees, one in environmental management and development from the Australian National University in Canberra and the other in information management from Asian Institute of Technologies, Bangkok. He earned his bachelor degree in fisheries science at Royal University of Agriculture, Phnom Penh Cambodia.

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

Dr Somkhit Boulidam, Acting Head of Department of Geography, Department of Geography, Faculty of Social Sciences, National University of Laos, Lao PDR

Abstract Lowland paddy rice in Laos is the main crop grown during the rainy season. Climate change is considered as one of the main environmental problems of the current century and it affects directly crop growing conditions such as for rice. This study focus on two objectives which are 1) to estimate the impacts of climate change on rice production in a rice growing region of Savannakhet province and 2) to explore adaption options of local farmers to climate change.

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

The results show that rice yield (of the same selected cultivar) under all six climate change scenarios will increase between +6.8% and +12.8% compared with observation years (1995 to 2009), mainly determined by increasing temperatures from currently sub-optimum level for the simulated cultivar TDK 1. However, if comparison between the three simulated periods, the second period (2035 to 2065) will reach the highest yields and in the third period (2070 to 2100) yields will not further increase. According to the results the rice growing period of the same cultivar will be shortened by approximately 5 to 14 days to between 134 and 143 days in average by the end of the 21st century. Adaptation in rice farming practices may include cultivar change, soil preparing, sowing and transplanting date, weeding, timing and amount of fertilization. Farm technologies and cultivar breeding supporting local rice farming will be further challenges beyond the farm level to ensure or further increase rice production for future climate change conditions

Dr Somkhit Boulidam is lecturer and researcher at the Department of Geography, Faculty of Social Sciences, National University of Laos. She gets a PhD in Land and Water Management. She has some experiences in teaching and research. She is a research assistant for SouthEast Asia SysTem for Analysis Research and Training Regional Centre (SEA START RC) for climate risk, climate vulnerable and adaptation in the Lower Mekong Basin (Laos, Thailand and Vietnam). She has some research experiences which is related with impact of climate vulnerability, climate change and adaptation, natural resources management; There are four books and five journals related to climate variability, climate change and adaptation and some related to natural resources management already published.

In addition she has some experiences with local consultant such as Socio-economic Specialist on project Reduce Emissions from Deforestation and Forest Degradation, and local consultant of Climate Impact and Adaptation Sectoral Strategy for Rural Infrastructure in Laos. She also worked for coordinator of ZUB ZUB project and Sida/SARECT project of faculty of Social Sciences.

3.2.4 Experience of CCAI Demonstration Site Project in Prey Veng Province, Cambodia

Dr Heng Chan Thoeun, Deputy Director of Climate Change Department, Ministry of Environment, Cambodia

Abstract Historical and PRECIS data suggests the Prey Veng province climate of Cambodia is changing. In the last 26 years, it is clear that temperature has increased and rainfall based on the analysis under two emission scenarios, SRESA2 and SRESB2, is decreasing up to 0.2% of the current condition rainfall in 2015. Regarding the rice yield the impact of climate change on rice production in Prey Veng province was estimated by multiplying the yield with the expected cultivated area. In 2010, it was shown that rice production in this province was insufficient to meet the demand. While under changing climate, rice production of this province will exceed the demand from 2025 to 2099.

In this context the CCAI demonstration site project was structured as an information exchange between the stakeholders and the scientific project team. It set definitions of climate change adaptation, adaptation measures, and to increase the capacity of stakeholders to understand climate hazard and climatic impacts for agriculture, especially on rice production.

The findings on adaptation options for short term and medium term programs for improvement of climate risk management, community livelihood and rice productivity were (i) Improvement and development of new high yielding varieties; (ii) Improvement of crop management and traditional cultural practices; (iii) Development of capacity to adapt to current extreme climate such as development of early warning system to extreme climate, development maps showing the provinces of rice growing areas prone to flood and drought; (iv) implementing adaptation measures and agricultural strategies which also contribute to emission reduction such as introduction of technology that increase water use efficiency for agricultural activities; (v) Development of irrigation system in many parts of low land areas; and (vi) Increasing planting index in suitable areas in province. For long term: (i) institutionalizing the use of climate information in agriculture management and development (ii) prioritizing structural intervention programs be in place to minimize the impact of increasing climate risk such as constructing dam, irrigation system, and (iii) developing and implementing long term research on climate modeling and adaptation technologies.

Dr Heng Chan Thoeun is Deputy Director of the Climate Change Department at the Ministry of Environment. His background is in climate change, forestry, economics and business administration.

During his career he has been involved in climate change activities in Cambodia since 1999 to present, including preparation of the National Adaptation Programme of Action to Climate Change and the Vulnerability and Adaptation Assessment under the Second National Communication to the UNFCCC. Others include (i) the Preparation of a Strategic Pilot Program for Climate Resilience (PPCR) Phase I in Cambodia; (ii) Cambodia Climate Change Alliance (CCCA) Trust Fund team leader: Call for Proposals adaptation project focus on Agriculture, Forestry, Fisheries, Water resources, Meteorology, Health and Infrastructure; (iii) Team Leader for Conducting Field Survey at Provincial Level on Vulnerability and Adaptation Assessment to climate change, Prey Veng, Kampot and Battambang Provinces; (iv) Capacity Building Technical Assistant for Capacity Building for the Clean Development Mechanism (CD4CDM) Project; (v) Farm Conservation and Sustainable Use of Cereals Diversity through Participatory Plant Breeding and Securing Local Seed Systems in Climate Vulnerable Provinces of Cambodia; (vi) Climate Risk and Impact Assessment for Forest-Based Adaptation Planning in Cambodia "Historical Climate and Future Climate Projections and many more.

SESSION 3: PARALLEL SESSION "Climate change impacts, vulnerability and adaptation in water-related sectors in the Lower Mekong Basin"

Parallel Session 3.3: Ecosystems and Biodiversity

3.3.1 Introduction of the Delta Study of Viet Nam with respect to climate change impacts assessment

[Speaker to be confirmed]

3.3.2 New Approach for Assessment of Climate Change Vulnerability for Wetlands in the Mekong Basin

Dr Chavalit Vidthayanon, Senior Aquatic Ecology Specialist, Environment Programme, Mekong River Commission Secretariat, Lao PDR (Co-authored by: Mr Nguyen Van Duyen, Programme Coordinator, Environment Programme, Mekong River Commission Secretariat, Lao PDR)

Abstract This presentation builds upon a case study conducted at seven different sites in the Lower Mekong Basin in 2011-12 on vulnerability and adaptation of wetlands to climate change. A key output has been the development of a methodology and adaptation guidance allowing planners to assess the vulnerability of habitats and species that make up wetlands. The study will outline the species and habitat vulnerability assessment to natural wetland units within the Lower Mekong Basin (LMB). This downscaled hydro-climatic, basin's infrastructure and ecological information was then coupled with rapid field and desk assessments of case study wetlands where an understanding of how the wetlands work and how the habitats, species, ecosystem services and local livelihoods are sensitive to climate change was developed. The vulnerabilities of species and wetland habitats have then been upscalled back to the basin

wide level to identify both the distribution of the wetland types that are most at risk from climate change within the basin. The actual vulnerability assessment at habitat and species level is a key feature of the methodology. Focus areas are exposure to climate change, the sensitivity, and the adaptive capacity. The results were synthesized into adaptation and management strategy and plan for wetlands from site to regional levels.

Chavalit Vidthayanon is biodiversity specialist and holds a position of Senior Aquatic Ecology Specialist for Environment Programme at the Mekong River Commission Secretariat. His main duty is to support the Environment Programme managing ecological health monitoring, biodiversity indicator, and wetland management in the context of environmental assessment and monitoring. He has over 25 years working experiences in biodiversity field including inventory survey, habitat and species conservation and relevant to climate change impact.

Nguyen Van Duyen is environmental governance specialist and holding a position of Environmental Programme Coordinator at the Mekong River Commission Secretariat. His main duty is to lead the Environment Programme managing a budget of 11 mio USD (2011-2015). The EP has several components such as water quality monitoring, social impact monitoring and vulnerability assessment, transboundary environment impact assessment, environment risk assessment, ecological health monitoring, biodiversity indicator, and wetland management in the context of climate change. He has over 20 years working experiences in various field including more than 15 years working in legal development and environment areas in different positions.

3.3.3 Potential impacts of the Super Sea Dyke at Rach Gia Bay on the value of mangroves in Kien Giang province, Mekong Delta, Viet Nam

Dr Long Thi Trinh, Director, Center for Environment Science Technology and Ecology, Southern Institute of Water Resources Research, Vietnam

Abstract The Mekong Delta of Vietnam is facing impacts from climate change and sea level rise. Two extreme weather conditions – draught and flood – have occurred much more often recently. Faced with the challenges of draught, the government of Vietnam has an idea of constructing a super sea dyke (SSD)/ barrage at Rach Gia Bay – Kien Giang province to create fresh water lake that will provide water to water scarce regions in the Long Xuyen Quadrangle (LXQ) and especially, Ca Mau Peninsula (CMP). Three options for the SSD have been proposed: (1) Option I: short route, 30 km, creating a small lake with the surface water area of 357 km^2 and the volume of 609 Million m3; (2) Option II: short route track, 31.8 km, creating a lake with the surface water area of 425 km^2 and the volume of 795 Million m3; (3) Option III: long route, 47.5 km, forms a large lake with the surface water area of 823 km^2, 2.58 billion m3 in volume. Furthermore, each option includes at least a sluice gate and a navigation lock. This paper presents the research results about freshening abilities as the sea dikes have been built and its impacts on the values of mangrove forest, especially aquaculture production of Kien Giang province. By using mathematical model of one-dimensional (MIKE 11) and two-dimensional (MIKE 21) for simulation scenarios, the results have shown that the ability of freshening water in the entire lake is very high, it takes only about 2 months with big floods, and 5-9 months with small floods. However, this freshening water will break aquaculture planning of the province, altering ecosystems and natural conditions, lost food providing, place of birth, nurturing nursery for juvenile fish and species of coastal fish due to the loss of mangrove forest, affecting the structure of aquaculture.

Ms Trinh Thi Long, after getting a Bachelor's Degree from Soviet Union, she has come to work for Southern Institute of Water Resources Research (SIWRR) since 1987 and now is the Director of Center for Environment Science Technology and Ecology (CESTE). She has got MSc degree on environmental sanitation from the University of Gent in 1998, PhD degree on soil and water environment in 2009 and participated in post-doctoral fellowship programme on Climate Change Adaptation in the Mekong River basin in UNESCO-IHE Institute for Water Education in Delft, the Netherlands in 2010 – 2011. She has involved in many national and international projects and has gained remarkable experiences in the Mekong Delta areas, which much supporting her as climate change adaptation research actor, because many of them related to climate change and sea level rise.

3.3.4 Sustainable Forest Management for Climate Change Adaptation

Mr Shambhu Prasad Dangal, Forest Management and Silviculture Specialist, Fauna and Flora International, Cambodia

Abstract A number of evidences indicated that the impact of the climate change is inevitable which vary with time and the ability of different societal and environmental systems to adopt to the change. The IPCC has forecasted a serious impact in Asian countries including Central, South and South East Asian especially to the rural poor on food security and health due to increase flooding and drought.

Forest contributes to the global economy (118.5 billion$) and employment to 10 million people (FAO, 2010). In addition, its contribution to sustaining the livelihood of the rural poor is beyond the estimate. A recent assessment in Cambodia shows that a community, where 90% households are very poor, fulfil their dilatory need equivalent to 20,000US$/year (wild vegetables, mushroom, honey) and similar amount of pole and firewood from the nearby community forests for their subsistence use. A number of such communities can't think their life without forests. The availability of these products has been increased after the initiation of community forest which was down trend before. Now, villagers have considered CF is the best option to secure right to the management and use of forest resources. Yield from the forests can be increased substantially through the application of scientific forest management. A pilot silviculture in young forests demonstrated that the community can receive annually around 500 US$ from the sale of pole and have used to enhance the rural access. Various similar cases prove that scientific forest management of community forest reduce the vulnerability of rural poor by continuously supplying timber and NTFPs for subsistence use and increase the adaptive capacity by generating employment and income through the sale of surplus products which they can use to increase access of food, clean water, shelter and health services.

Dr Shambhu Prasad Dangal has over 25 years' work experience in the areas of Forestry, NRM, CC Adaptation and Mitigation, enterprise development and Livelihood in Nepal, Cambodia, Sri Lanka and North Korea with Government, Bilateral Projects, International Non-Government Organisation and Private Sectors. Currently he works as Forest Management and Silviculture Specialist for Cambodia HARVEST Project on behalf of Fauna and Flora International-Cambodia Programme.

The core expertise includes knowledge management (capacity need assessment; designing capacity building programme and delivery; documentation; designing and conducting research/survey and dissemination;) project designing, management and evaluation; facilitate in community development, enterprise development and natural resources planning and implementation; and in policy development.

Recent publication Training Manual for REDD+ for Master Trainer; Community Training Manual on REDD+; Training Manual on Community Forestry for CC Adaptation; CC Vulnerability Mapping; REDD+ MRV Framework for Sub National Level; Climate and Energy Plan at Sub National Level; and Forestry Sector Plans at Subnational Level.

SESSION 4: PLENARY SESSION "Addressing cross-sector and transboundary issues in adaptation to climate change"

4.1 Transboundary and cross-sector adaptation: Experience from the Danube basin

Mr Miodrag Milovanović, Assistant Director, Jaroslav ČCerni Insitute for the Development of Water Resources, Serbia (Co-authored by: Mr Raimund Mair)

Abstract The Danube River Basin (DRB) occupies 800,000 km^2 of land and is Europe's second largest river basin, but also the world's most international river basin as it is shared by 19 countries. DRB is home to 83 million people with a diversity of cultures, languages and historical backgrounds. Human impacts, pressures and pollution from agriculture, industry and households affect various water uses, as well as opportunities for transportation, tourism and fishing. Potential adverse climate change (CC) impacts on already threatened water resources can be considerable.

The 1994 Danube River Protection Convention addressed DRB water use and protection and called for the establishment of a joint body to support water management in the DRB—the International Commission for the Protection of the Danube River (ICPDR), headquartered in Vienna.

DRB countries, with ICPDR support, relying on the fundamental piece of European Union water-related legislation—the Water Framework Directive—developed the 2009 Danube River Basin Management Plan, which does address CC but largely in principle.

Hence, at the 2010 Ministerial Meeting, ICPDR was asked to develop a CC adaptation strategy for the entire DRB by 2012. In 2011, the Danube Climate Adaptation Study (DCAS) was prepared, financed by the German Delegation. DCAS summarizes potential impacts and adaptation measures from various international and national projects and studies. In March 2012, a Climate Adaptation Workshop

was held in Munich, where broad-ranging discussions between countries and stakeholders took place, resulting in basin-wide acceptance of DCAS outcomes.

The ICPDR Strategy on Adaptation to Climate Change (ISACC) was formulated before the year end, with ICPDR expert groups support, and adopted at the December 2012 Ordinary Meeting of the Parties.

ISACC mandated ICPDR expert groups to incorporate CC adaptation into water management planning, using the IWRM approach to integrate different levels of management (DRB/national/sub-basin) and intersectoral cooperation.

Mr Miodrag Milovanović, Dipl. Ing., graduated from the University of Belgrade, Faculty of Civil Engineering/ Hydraulic Engineering Department in 1986. He began his career at Jaroslav Černi Institute (JCI). From 1987 to 2003, he was involved in various design projects for dams, reservoirs, and water management systems, and played an active role in water management planning. As of 2003, he has been the Assistant Director General of JCI. He is co-author of Water Management Strategy of Serbia (draft). As author and co-author, he has presented more than 50 scientific and technical papers in international and domestic journals and at conferences. He is currently representing Serbia in water management expert groups at the International Commission for the Protection of the Danube River (ICPDR) and the International Sava River Basin Commission (ISRBC). Areas of Expertise: integrated water management, engineering of water management systems.

4.2 Addressing cross-sector and transboundary issues in climate change adaptation: the case of Portugal and Spain

Prof. Dr Filipe Duarte Santos, Director of Research Center CCIAM-SIM, University of Lisbon, Portugal

Abstract The presentation begins by discussing briefly the various conceptual frameworks for impacts, vulnerabilities and adaptation to climate change. The main methodological approaches to adaptation are presented.

The advantages of using a cross-sectoral approach for transboundary water management and adaptation are highlighted. Environmental, technical, financial, institutional, social and participatory processes in climate change adaptation in international river basins are discussed.

In the Iberian Peninsula 264 560 km2 of a total of 581 000 km2 are river basins shared by Portugal and Spain. The Albufeira Convention on the Cooperation for the Protection and Sustainable Development of Water Use in the International Iberian River Basins was signed in 1998. Its implementation is based on the Commission for the Follow-up and Development of the Convention (CADC) and in the Conference of the Parties (COP). A brief assessment of the achievements and shortcomings of the CADC and COP works is presented. The problems of interbasin water transfer, in particular between the Tagus and Segura basins, are discussed in the context of climate change.

Although both Portugal and Spain have adopted national climate change adaptation strategies there are no transboundary adaptation plans for the international rivers. Research projects have addressed the adaptation options in the international river basins, especially for the Tagus and Guadiana rivers, but only at national level. Furthermore the EU funded projects ADAPT and MEDIATION also addressed this question.

Finally the presentation reports on the EU project IMPRESSIONS currently addressing the socio-ecological resilience to high-end climate change scenarios in the Guadiana and Tagus river basins. The approach will assess changes in institutional practices and the information needed by national and local decision-makers to cope with high-end climate change. The modelling work will simulate the interrelationships and feedbacks between key processes in hydrology, water management, forestry, agriculture, land use, population change and migration.

Filipe Duarte Santos is professor of Physics and Environmental Sciences at the University of Lisbon and Director of the Research Center SIM - Systems, Instrumentation and Modeling in Environmental and Space Sciences and Technology (www.sim.ul.pt). Mr Santos holds an MSc in Geophysics by the University of Lisbon and a PhD in Theoretical Physics by the University of London. He published more than 150 scientific papers in the areas of Physics, Environment and Climate Change.

He has been visiting researcher or professor at the Universities of Wisconsin, North Carolina, Indiana, Stanford and Harvard in the USA, Munich in Germany, Surrey in the UK and Vrije University in the Netherlands, among others.

Mr Santos is Vice-President of the UN Commission on the Peaceful Uses of Outer Space and delegate to the UNFCCC since 1999. He was Coordinator for Sustainable Development, Global Change and Ecosystems in the Ibero-American Program CYTED (www.cyted.org) from 2007 to 2011 and was Review Editor for the 5th Assessment Report of the IPCC published in 2014.

DAY 2

7th October 2014

SESSION 5: PLENARY SESSION "National and transboundary adaptation strategies and action plans in the Lower Mekong Basin"

Plenary 5.1 Cambodia

H.E. Mr Vathana Kol, Deputy Secretary General and CCAI National Coordinator, Cambodian National Mekong Committee, Cambodia

Abstract The Cambodia Climate Change Strategic Plan 2014 – 2023 (CCCSP) is well designed to fill the policy gap, complement on-going efforts and meet the emerging challenges of development, environment and climate change issues. The CCCSP's vision: Cambodia develops towards a green, low-carbon, climate-resilient, equitable, sustainable and knowledge-based society. Mission: Creating a national framework for engaging the public, private sector, civil society organizations and development partners in a participatory process for responding to climate change to support sustainable development; and Goals: Reducing vulnerability to climate change impacts of people, in particular the mostvulnerable, and critical systems (natural and societal); Shifting towards a green development path by promoting low-carbon development and technologies; and Promoting public awareness and participation in climate change response actions.

Supporting Adaptation Initiatives of the Royal Government of Cambodia: Climate change is a strategic challenge to development, requiring urgent and joint attention. This challenge requires us to urgently create an appropriate climate policy that responds to local, regional and global levels (Samdech Prime Minister, 2013). As well as strongly believe that addressing climate change is the only way to ensure our survival and prosperity. We believe that we can turn the climate change crisis into a new opportunity for a greener, low carbon, resilient, equitable, sustainable and knowledge-based development (MoE, 2013).

To achieve the vision, mission and goals, the Royal Government of Cambodia (RGC) has identified eight strategic objectives: (i) Promote climate resilience through improving food, water and energy security; (ii) Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts; (iii) Ensure climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal

ecosystems, highlands, etc.), biodiversity, protected areas and cultural heritage sites; (iv) Promote low-carbon planning and technologies to support sustainable development; (v) Improve capacities, knowledge and awareness for climate change responses; (vi) Promote adaptive social protection and participatory approaches in reducing loss and damage due to climate change; (vii) Strengthen institutions and coordination frameworks for national climate change responses; and (viii) Strengthen collaboration and active participation in regional and global climate change processes.

Road Map for Advancing Cambodia's National Adaptation Plan Process: The framework of NAP process for Cambodia has several building blocks already in place that can be enhanced to meet these two objectives. These include the Cambodia Climate Change Strategic Plan (CCCSP), climate change financing framework and several climate mainstreaming initiatives at the sub-national levels. The NAP process is focused main area intervention: (i) Inter-sectoral coordinated implementation; (ii) Data systems and analyses; (iii) Support financing systematically; (iv) Capacity development and vertical mainstreaming linking national and sub-national levels; (v) Overall steering of implementation and evaluating effectiveness (M&E); and (vi) Qualitative mainstreaming. The road-map is divided into three work-streams which occur in parallel over the time frame 2014-2019 covering (i) Planning, establishing and steering the NAP process; (ii) Implementing the NAP process /the CCCSP and Sector CCAPs; and (iii) Reviewing and learning.

H.E. Mr Vathana Kol studied forestry at the Royal University of Agriculture in Phnom Penh, Cambodia and has a master's degree with major in soil science from the University of Gent, Belgium. Since 2003, he has been working as the Deputy Secretary General of the Cambodian National Mekong Committee of the Mekong River Commission. Besides, he holds the position of the CCAI National Coordinator for Cambodia; Head of Procedures for Notification and Prior Consultation Agreement of the Joint Committee Working Group for Cambodia; and Head of the Technical Body for Water Quality for Cambodia for the MRC.

Previously, his work was among other assignments at the Ministry of Forestry and Fishery (Department of Forestry and Wildlife) and at the Ministry of Environment (Department of Nature Conservation and Protection).

Plenary 5.2 Lao PDR

Mr. Vanxay Bouttanavong, Director Division of Climate Change Adaptation Division, Department of Disaster Management and Climate Change, Lao PDR

Mr Vanxay Bouttanavong holds a degree in agriculture and a degree in business administration. For the past 6 years he has been working in the field of environmental impact assessment and another 5 years in various climate change issues. Previously, he contributed to formulation of (a) the climate change strategy of Lao PDR, (b) ecosystem-based adaptation guideline for Laos and (c) climate change action plan for 2013 until 2020.

His international experience includes the participation in the international conference on the United Nations Framework Conference on Climate Change (UNFCCC) and the Conference of Parties 15 in Copenhagen, Denmark and COP 19 in Warsaw, Poland.

Plenary 5.3 Thailand

Dr Pattarachit Choompol Gozzoli, Environmentalist, Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, Thailand

Abstract Thailand's development over the past five decade indicates clearly imbalanced development. Meanwhile, the widening income gap, increased poverty, and natural resources and environmental deterioration have contributed to increased social conflict. Thus, Thailand has concerned on the sustainable development which be balanced development in terms of economic, social and natural resources and environmental development since 1990s when the country joined the United Nation Framework on Climate Change (UNFCCC). Besides, Thailand's have put issues of natural resources and environmental management to be a part of the sustainable development in international plans. With this respect, Thailand's vision for the next 20 years (from 2002) was set up to focus on sustainable development and well-being for all Thai people.

Moreover, since the Ninth National Economic and Social Development Plan (2002-2006) adopted the philosophy of sufficiency economy bestowed by His Majesty the King Bhumipol to be a leading guideline for the national development. The Sufficiency Economy is able to apply to ways of life at individual, family, and community levels. At the national level, the philosophy is consistent with a balanced development strategy that would reduce the vulnerability of the nation to impacts and excesses that may arise as a result of globalization.

Besides, Office of Natural Resources and Environmental Policies and Planning (ONEP), Ministry of Natural Resources and Environment (MONRE) has developed Thailand's climate change master plan (2013-2050). The master plan is a long-term plan for climate change management which comprises 3 main strategies, (1) adaptation, (2) mitigation and (3) capacity building. As for the short-term and mid-term plan, there is the Action Plan for Driving Climate Change Strategies. The action plan emphasizes on eradicating poverty, building competitiveness, and maintaining security on food, energy and ecosystem. All Plans on Climate Change developed by ONEP have passed the people participation process which creates mutual understanding and agreement in the climate change management.

As for the adaption project, Thailand has initiated a trans-border adaptation project with neighboring countries to perform a comparative and comprehensive study among local communities at the borderline and to find similar or different adaptation practices of adjacent communities from different political and socio-economic attributes. The expected outcome of this study is to find comparative lessons learnt and best practices which border communities from different countries can exchange and pursue for better adaptation. In the MRC region, we have chosen two areas to undertake the project, the first site is located in Aranyaprathet district which shares borderline with Cambodia's Poipet. The other site is located in Chiang Kong, Chiangrai province which shares close relationship with and Lao PDR's Huayxai city of Bokeo province. For Lao-Thai site, Chiangrai-Bokeo provincial joint committee for climate adaptation collaboration is planned to be established at the end of project.

Dr Pattarachit Choompol Gozzoli studied economic development from the University of Birmingham, England and conducted the thesis on well-being development which was partly related to sustainable development in Thailand. She had worked for the National Economic and Social Development Board (NESDB), Office of the Prime Minister Office in which she helped the NESDB's evaluation office developed the sustainable development index.

Then, she transferred to the Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment. She is currently working for the Climate Change Management and Coordination Office as a UNFCCC Focal point. Her main interested issues involved well-being development and indicators, Sustainable development, adaptation, good governance, and demand-side and supply-side on various issues.

Plenary 5.4: Viet Nam

Dr Mai Van Khiem, Director, Reseach Center for Meteorology and Climatology, Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment, Viet Nam

Abstract Vietnam is considered one of the countries worst affected by climate change. It is recorded that frequency and intensity of natural disasters are on the rise, causing losses on humans, assets, and adverse impacts on economic, cultural, social and environmental infrastructure. Climate change threatens food security and agricultural development: agricultural land shrinks down, especially in the Mekong Delta, Red River Delta and coastal low-lying delta due to saline intrusion resulted from sea level rise; affecting productivity, crop seasons, diseases on plants and husbandry. Addressing climatic challenges to our country requires efforts from all walks of life; initiative thinking and viewpoints; and breakthrough solutions to cope with climate change.

This preseatation will provide an overview of climate change adaptation policies and activities in vietnam, including National Strategy on Climate Change and Action Plan on response to Climate Change.

Dr Mai Van Khiem has been working at the Institute of Meteorology, Hydrology and Climate Change (IMHEN) since 2001 and currently holds the position of Director at Reseach Center for Meteorology and Climatology, IMHEN, Vietnam. He completed his Ph.D. degree in environmental Engineering at the University of Tokyo, Japan in 2010. Dr. Khiem has many years of experience in research in the fields of climate and meteorology. His research is presently focused on climate change and variability, natural hazards, tropical cyclones, climate prediction.

Plenary 5.5: Mekong Adaptation Strategy and Action Plan: Objectives and Roadmap for Formulation

Dr Thim Ly, Socio-economic Specialist, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR (Co-authored by: Dr Nguyen Huong Thuy Phan, Programme Coordinator, Climate Change and Adaptation Initiative, Mekong River Commission Secretariat, Lao PDR)

Abstract Mekong Adaption Strategy and Action (MASAP) is a general plan of action for guidance and addressing the impacts of climate change in the Lower Mekong Basin (LMB). The Mekong River Commission's (MRC) Climate Change and Adaptation Initiative (CCAI) is tasked to assist the Member Countries in formulating the MASAP aiming at supporting the Member Countries (MCs) to enhance their capacity to adapt through planning for addressing transboundary impacts of climate change and needs for transboundary adaptation. The strategy is expected to complete and adopted by the MCs at the end of 2015.

To formulate the strategy a review of international experiences on formulation of transboundary adaptation strategies was conducted. The review recommended the strategy to be formulated based on a comprehensive climate change impacts and vulnerability assessment and climate change scenarios for 30, 60 and 100 years. In addition, it should be in line with national climate change adaptation strategies of the MCs and allow for updating of the development plan.

Based on the review a roadmap was prepared, discussed and agreed by the MCs in March 2014. The roadmap describes process, approach, mechanism, and milestones and timeframe to gather information and to draft the MASAP as well as to facilitate consultation, discussion and agreement among the MCs.

The process to formulate the MASAP will include four steps including scoping of the strategy, climate change impact and vulnerability assessment, identification of adaptation options, and development of the adaptation strategy and action plan. The approach of the formulation will ensure stakeholder engagement, capacity building and decentralization of core functions. The mechanism will include engagement of stakeholders, active involvement of all MRC Programmes, especially the Basin Development Planning (BDP), Regional Technical Working Group, national consultations, MRC Informal Donor Meeting and Donor

Consultative Group, MRC Joint Committee, and MRC Council. As for the milestone and timeframe, the first draft of MASAP will be ready by June 2015 and the adoption of the MASAP by the MRC Council by December 2015.

Dr Ly Thim is a socio-economic specialist at the Climate Change and Adaptation Initiative (CCAI) of the Mekong River Commission (MRC) Secretariat. He joined the Secretariat in 2011 as a social science specialist attached to Environment Programme before moving to CCAI in 2014. He has over 19 years of work experience with various international organisations in a variety of fields of development including more than 12 years working in water resources management in the Mekong Region. He holds a PhD degree in development studies from the University of Bonn, Germany. His research interest lies in water resources management and climate change.

Dr Phan Nguyen is a specialist in water and environmental management. By training she has a Doctor of Engineering in Water Resource Development. Phan is a hydrodynamic and morphological modeler and environmental researcher with more than 25 years of combined experiences in hydropower development projects in the South of Vietnam, coastal engineering projects in the Gulf of Thailand, and climate change risk assessment projects in the Vietnam's Red River Delta and the Lower Mekong Basin.

Prior to joining MRCS Phan worked for the Asian Institute of Technology in Vietnam during 2002-2011 as a water and environment specialist and lecturer. She led many education and consultancy projects in environmental governance, climate change responses, disaster mitigation and management and renewable energy development. She was a research scientist at the University of Twente, the Netherlands during 2000-2002; a research engineer at the Asian Institute of Technology in 1994-2000; a water resource engineer at Vietnam Ministry of Energy in 1986-1992; and Board of Construction – Vietnam Institute of Hygiene, in 1984-1986.

SESSION 6: PARALLEL SESSION "A synergy between national and transboundary adaptation strategies and action plans: Approach, methodology and good practice"

Parallel 6.1 Flood and Drought

6.1.1 Climate change impacts, vulnerability and adaptation in drought severity in the Lower Mekong Basin

Mr Ix Hour, Programme Coordinator, Drought Management Programme, Mekong River Commission Secretariat, Cambodia

Abstract In the LMB, drought notion is divided into six different definitions, namely meteorological, hydrological, agriculture, social economic, water resource management, and land use related droughts. Droughts give negative impacts on three main sectors including social, economic, and environment.

Hydrological drought in upstream areas might have significant influence on drown stream areas especially for agricultural activities during low flow period. Since drought takes relatively long period, climate change projection on future scenarios of potential risk and vulnerability in drought severity occurrence is significantly important for planners and policy makers to be well prepared for adaptation options and mitigation technique to reduce the impacts.

My presentation will emphasize on climate change impacts and vulnerability on drought severity occurrence in the LMB, how droughts have impacted on social, economic and environment in the past and present, and adaptation options and mitigation strategy applied in the Region to mitigate the drought impacts.

Mr Ix Hour completed his Bachelor's degree in Agricultural Science (Land Management) in 1995 at the University of Hanoi agriculture in Vietnam. He conducted his Master's Degree in Bio-production Environmental Sciences at Kyushu University in Japan from 2005 to 2007.

He started working for MRC Secretariat in February 2010 as a Drought Management Expert. He later became Programme Coordinator of Drought Management Programme in June 2012.

6.1.2 Assessment of Climate Change Impacts on Flood Behaviour

Ms Bantitha Khantisidhi, Project Manager, Flood Management and Mitigation Programme, Mekong River Commission Secretariat, Cambodia

Abstract To formulate Integration Flood Risk Management Plans and Strategic Directions of the Lower Mekong Basin (LMB), the impact assessment of future climate change on short and long-term flood behaviours are necessary to incorporate with other factors that will affect future flooding behaviours in the LMB such as dams, the future construction of potentially flood-impeding infrastructures, population growth and land-uses change in the flood-prone. Moreover, for the trans-boundary floodplains of Cambodia and Viet Nam, the sea level-rise needs to be considered.

Under FMMP 2014-2015, the "Initial Studies to Demonstrate the Formulation of Strategic Directions to Manage Existing Future and Residual Flood Risks" is under implementation. The three flood risk focal areas: the Nam Mae Kok basin of north-east Thailand, the Xe Bang Fai basin of central Lao PDR and a joint trans-boundary area of the southern Cambodian floodplains and a northern area of the Cuu Long Delta of Viet Nam; are selected for the Initial Studies. One of the tasks is "Adaptation Pilot Projects under Climate Change to Reduce Existing and Future Flood Vulnerability through Adaptation Measures". The methodologies to tackle two of the main challenges, climate change and flooding, are developed within this framework.

Outputs of the Initial Studies will be reported across a variety of spatial scales from flood focal areas, demonstration project study areas, adaptation pilot project areas (district level) to hotspots (commune level).

Bantitha is the Project Manager of Flood Management and Mitigation Programme, Mekong River Commission. She had gained multifaceted background from working at Panya Consultants Co., Ltd., a well-known integrated and interdisciplinary service for a number of years. Over 20 years of experience, Bantitha has professionally encompassed preliminary study, master plan, feasibility study, and detailed design in water resources projects. On top of that, she has managed a broad range of water resources development including irrigation, flood management, coastal erosion control, and climate change impact assessment. Examples of the development projects are Climate Change Impact and Adaptation Study for Bangkok Metropolitan Region Project, Hydro-Agronomic-Economic Model for Mekong River Basin and Local Adaptation in Thailand Project.

Bantitha holds a Bachelor's degree and a Master's in Engineering from Department of Water Resources Engineering, Kasetsart University, Thailand.

Parallel 6.2 Agriculture and Fisheries

6.2.1 Experiences on an Integrated Approach to Climate Change Adaptation: NAPA Follow-Up Project

Mr Pinreak Suos, National Project Advisor, United Nation Development Programme, Cambodia

Abstract Approximately 70 percent of the Cambodian population derives their income from agriculture sector. Water plays a critical role in agricultural productivity which is largely dependent on rainfall and water extraction from the Mekong River, the monsoon rain and natural floods/recession of the Tonle Sap River and Lake. Despite agriculture being the mainstay of livelihoods for most rural Cambodians, a majority of arable lands are rain-fed and thus extremely vulnerable to variations in the amount and arrival time of rainfall. Climate change is likely to have a considerable impact on these processes and the ability of the Cambodian farmers to produce crops and other agricultural products.

To reduce the impacts of climate change, the Government of Cambodia embarked on a project in 2009 with financing support from the Global Environment Facility's Least Developed Countries Fund (LDCF). The project responds to Cambodia's National Adaptation Programme of Action (NAPA) published in 2006. It targeted in two provinces – PreahVihear and Kracheh which have been plagued with droughts and floods, respectively. In 2013, the Government of Canada agreed to build on and scale up the results emerging form the LDCF project, and initiated the second phase to other districts in the provinces.

The following actions are being implemented: 1). Improving the understanding impacts and risks of climate change among local communities, and strengthening a community-based information system to facilitate resilient-agriculture; and 2). Establishing resilient livelihood methods, expanding irrigated agricultural areas, constructing community water supply infrastructure and strengthening women's capacity to manage this infrastructure.

The presentation will highlight the approach and a summary of hand-on experiences from the field which include climate change mainstreaming into local planning processes, community based early warning system, technologies that improve access to water for domestic uses, resilient irrigation system, farmer groups on rice seed purification and integrated farming system.

Mr Suos is National Project Advisor for the Environment and Energy Cluster, UNDP Cambodia. He provides technical and management support to the management team (government counterpart) in the overall implementation of the projects. He plays key roles in providing advisory and capacity building support, coordinating with stakeholders and promoting knowledge sharing among key partners on climate change mainstreaming and climate change adaptation.

Mr Suos has over 15 years of experience in providing capacity building and coordination support in the management and implementation of SIDA, DANIDA and UNDP Natural Resources and Environment Management Programmes through the government decentralization and deconcentration reform structures.

He has a strong working relationship with relevant line-ministries such the Ministry of Agriculture, Environment, Women Affairs, Water Resources and the National Committee for Democratic Development at Sub-national level. He received a B.A. in Forestry Science from Royal University of Agriculture and a Master in Development Study from the Norton University, Cambodia.

6.2.2. The Coastal Adaptation to Climate Resilience Planning in Preah Sihanuk and Koh Kong province, Cambodia

Mr Heng Pech Romnea, Deputy Director of General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, Cambodia

Abstract The Demonstration activity 1 is implementing an Integrated Farming Training Programme for Agricultural Extension Staff and Farmers under the Coastal Adaption Resilience Planning Component (CARP) in multi-scale climate change adaptation strategies and integrated farming at 8 target communities in Prey Nob of Preah Sihanouk province and Mondul Seima District of Koh Kong provinces. The activities undertaken during January 2013 to January 2014 are among others: (i) continuing farmer field schools and organizing farmer field day for farmer field schools, (ii) on-farm demonstrations, (iii) study tour/exchange visits for field extension workers and model farmers (iv) meetings with farmer groups in target villages for saving group development. Demonstration Activity 1- Integrated farming training and climate change of CARP has significant tangible results and outputs including the following:

- 8 Commune Agro-ecosystem Analysis (CAEAs) were completed and CAEAs were highlighted the impact of climate change on farming and livelihoods in coastal areas.
- Integrated farming Training and Climate Change Adaptation(CCA) is established as a Model to integrate agricultural activities which enables the diversification of livelihoods to achieve profitable and resilience farm business.
- Building up and improved extension services for coastal zones.
- 12 training modules were identified and developed for integrated farming and climate adaptation in costal zones and 6 training modules including rice and vegetable productions, chicken, pigs and fish farming and saving group development for improved farm business and farm production in coastal zones.
- Improved capacity and skills 1,450 farmers including 761 women as direct beneficiaries, who attending both sessions of 31 FFSs (852 farmers including 393 women) and 20 on-farm demonstrations (600 farmers including 323 women).

- 31 saving groups were established and carried out the community micro-projects for assisting and support poor smallholder farmers such as providing credit for saving member for improved and resilience farm businesses.

The model of the Integrated Farming Systems and CCA has been integrated in Commune Development and Commune Investment Plans including.

Mr Pech Romnea has been in the position of Deputy Director of Rice Crop Department, General Directorate of Agriculture (GDA), Ministry of Agriculture, Forestry and Fisheries (MAFF) of Cambodia since 2008. Prior to the current position, he worked with various departments under MAFF, including Department of Agronomy in Takeo province, Department of Agricultural Extension, and Department of Agronomy and Agricultural Land Improvement. Mr. Romnea holds a master's degree from University of the Philippines Los Baños, Los Baños, the Philippines, in the field of farming system research and extension.

Parallel 6.3 Ecosystems and Biodiversity

6.3.1 Designing climate change adaptation strategies that preserve ecosystem services and reconcile human development and conservation needs

Mr Simon Mahood, Technical Advisor for Tonle Sap, Cambodian Programme, Wildlife Conservation Society, Cambodia

Abstract Human modification of natural landscapes reduces ecosystem services and threatens biodiversity. Climate change is widely predicted to exacerbate these processes. The Mekong and its tributaries supply the majority of animal protein for people of the region. Nutrient-rich floodwater in the Tonle Sap Basin supports a rice and fish based economy of more than 2 million people. The system is also of global importance for freshwater fish, waterbirds and reptile biodiversity. At the same time the Mekong Basin is experiencing a rapid increase in human population and a high rate of economic growth. This is facilitated by infrastructure development including the construction of hydropower dams for electricity generation, roads and urban centers; and changes in land-use as countries move from subsistence and small-holder farming based agricultural models to large-scale industrial crop production. The application of decision science tools makes it possible to reconcile seemingly disparate conservation and development aspirations, within the context of climate change adaptation. The strength of these methods is that they don't simply examine the impacts of climate change on a particular species or ecosystem service, but they integrate information on human use of the landscape and how that is likely to change over time.

The first stage is understanding and spatially representing different land uses, such as road-building projects, protected sites and community fisheries. Published development plans, trends in agricultural commodities and climate change predictions are then incorporated into the model to develop a series of future scenarios. These scenarios are used to examine the likely impacts of climate change on conservation areas, land use and infrastructure development directly, and to evaluate ways in which human reactions to these processes will be shaped by climate change. These alternative climate-change adaptation strategies are then used in consultation with stakeholders to evaluate preferences and optimize national and regional land use planning.

Simon Mahood has lived and worked in the Mekong Basin since 2008. Since 2011 he has been working at Wildlife Conservation Society Cambodia Program (WCS) as the Technical Advisor for the Tonle Sap projects. His focus has been on designing and improving solutions to conservation issues that impact some of the regions most threatened birds within environments heavily impacted by human use. At WCS is he privileged to work alongside an experienced team of national and international staff on some of the best-designed conservation projects in the region. However, with the region experiencing rapid change there is a need to ensure that conservation gains are maintained and ecosystem services secured. Simon has published on the impacts of land-use change on the birds of the region, and described a new bird species from the Mekong floodplain in 2013.

SESSION 7: PARALLEL SESSION "Good practices and lessons learned in climate change and adaptation in the Lower Mekong Basin"

Parallel 7.1: Mainstreaming Adaptation into Development

7.1.1 International Legal Framework of Utilization of Mekong River and Adaptation to Climate Change

Assist. Prof. Eiji Hatano, Assistant Professor at Nagoya University, Japan, currently Visiting Scholar at University of Yangon, Myanmar

Abstract This research indicates several features for increasing resilience to climate change and mainstreaming adaptation from recent development of international water law.

From the perspective of discussion in global level, most international agreements on international watercourses fails to include adequate mechanisms for addressing climate change. While 1997 UN Water Convention and 1995 Mekong Agreement are not exceptional, the 2004 Berlin rules on Water Resources, adopted by ILA mentions that the prospect of global climate change could worsen the dispute among neighboring water users dramatically. As this require states to undertake compliance review on "promotion of appropriate responses by States involved to climate change", current international water treaty could be improved to create and implement legal mechanisms for better cooperative management.

It is also notable that enhancing accommodation between global and regional platforms has potential for increasing resilience. As confirmed in Rio+20, international environmental governance has trend toward strengthening synergies among existing mechanisms. Alongside of the UNFCCC NAPA, CND NBSAP and UNCCD NAP, intergovernmental forum like IPCC and IPBES would provide foundation for exchanging necessary information. While some MEAs repeatedly adopted resolutions/decisions to address adaptation to climate change, regional institution leaves room for developing methods and tools of MEAs for adaptation activities.

Toward an optimal management of international river basin coincide with adaptation strategy, "participation" is core issues. 1995 Mekong River Agreement was entry into force in 1995 by current 4 member countries, while two upstream countries was joined as observer subsequently. In international dialogue, we witnessed that basin countries are strongly suggested to participate in collaboration for increasing resilience to climate change. In this regard, some precedence would be referable for flexible participation, like setting up a task force separate from commission, while "principle of equitable utilization" could be interpreted as tool for participation by riparian.

Eiji HATANO is Assistant Professor of Nagoya University Law Department and Visiting Assistant Professor of the University of Yangon. Mr Hatano gained his first work experience in Institute for Global Environmental Strategy (IGES), after his research in PhD course in Yokohama National University. As a researcher of the Fresh Water Project, he managed Water Environmental Partnership in Asia (WEPA), and engaged in research on Adaptation to Climate Change. From 2011 to 2013, Mr. Hatano worked for the Global Environmental Division of Ministry of Foreign Affairs (MOFA), Japan. Including assignment of Primary National Focal Point for the Convention of Biological Diversity (CBD), he participated in several COPs, international conferences and dialogues on environmental issues as a delegation of the Government of Japan. During his engagement in the establishment of IPBES, Mr. Hatano coordinated Asian countries on behalf of the Bureau of the region. He takes up his current post since August 2013.

7.1.2 Floodplain Development and Climate Change - Planning for Change and Adaptation on Mekong Floodplains

Dr Anthony Green, Director, Mekong Modelling Associates, Cambodia

Abstract The effect of the storage on the Mekong floodplain and the area of the Great Lake is to massively attenuate the flood wave passing through the delta to the sea and peak flows typically halve between Kratie and Vietnam border. As the flow slowly drains out later in the year there is an essential supply of water used for irrigation and control of salinity. The beneficial effects of the floodplain, however, are coming under increasing pressure from 3 main drivers: Urbanisation and Infrastructure; Flood control for Agricultural development (including adaptation for food security and drought); Changing flow and higher extremes from the changing climate.

The paper will illustrate the relative magnitude of these issues currently and in the future using results from current studies for the Mekong River Commission. We will also show how transboundary flood risk management should be a key part of future development plans for development, adaptation and disaster mitigation.

Anthony is the Managing Director of Mekong Modelling Associates based in Phnom Penh. He graduated from Imperial College London, UK, in Civil Engineering in 1983 and gained a PhD in Geography on river channel morphology at the University of Nottingham, UK, in 2006.

He has over 31 years' specialist experience of the use of hydraulic models in the UK and Asia gained with HR Wallingford, MWH, Halcrowand JBA. He has worked on major rivers, irrigation, water supply and water resource projects in Argentina, Bangladesh, Cambodia, Laos, India, Pakistan, Philippines and Vietnam. In the UK he has managed and been Project Manager or modeller on numerous flood risk management projects, catchment planning and hydraulic analysis for design of works. He has specialist environmental skills and interests including geomorphology/sediment modelling and understanding how the changing climate will affect people and ecosystems.

From 2009-2012 he worked for the Mekong River Commission as Senior Modelling Advisor and in 2013 as Chief Technical Advisor for the Climate Change and Adaptation Initiative.

7.1.3 Strategy and Action Plan on Water Resources and Meteorology

Mr Yin Savuth, Deputy Director, Department of Hydrology and River Works Ministry of Water Resources and Meteorology

Abstract Most of Cambodian people face a shortage of water during the dry season, and also during the "small dry season" in the wet season, but in the rainy season they face too much water by floods from the Mekong mainstream and flash flood. Irrigation infrastructure is insufficient, old and run-down, which has a severe impact on the water storage for agricultural production and other use.

Climate change poses immense threats, and new opportunities for development of water resources in Cambodia. In this regards, government of Cambodia has highly considered that climate change impacts as an urgent and critical issues. The climate change could negatively impact on Cambodia's society and natural resources including natural ecosystems.

The Ministry of Water Resources Management and Meteorology (MOWRAM) has committed itself to overcome the impacts of climate change introducing law on water resources management, national water resources management policy and strategy and many more guidelines and regulations for better climate change adapted management and development. The Ministry has considered that Farmer Water User Committee development as the most among the many immediate tasks because the farmers are the very direct vulnerable groups to climate change impacts. The main strategy for MOWRAM are water resources management and development, flood and drought management, promote the draft of Laws, and regulation for sustainable water management, water resources and meteorology Information Management, and Improving Administration management and human resources development. This strategic plan and climate change strategic plan for Water Resources and Meteorology would contribute to the country socio-economic development while adapting as much as possible.

Yin Savuth is a hydraulic engineer from Institute of Technology of Cambodia in 1997. Then, He is working at Department of Hydrology and River of Ministry of Water Resources and Meteorology. He had experience with the Ingénieur Sans Frontire (ISF) for the topographical survey and installation of Banchmarks and Staff gauge in the whole Srey Santhor district of Kampong Cham province. He worked with JICA study team as counterpart for hydrology, working as part time with the modelling team of WUP-FIN/MRCS project and a member of the national case study of the modelling team of CNMC. He is in-charge of hydrological works such as installation of the station, data collection, discharge measurement, sediment sampling and flood forecasting. In cooperation with MRCS, he is a manager of the Mekong HYCOS project, and Discharge and Sediment Monitoring project.

Parallel 7.2: Adaptation in Practice

7.2.1 Promotion of Rice Resilience and Other Crops in ASEAN: The ASEAN Climate Resilient Network

Dr Ouk Makara, Director, Cambodian Agricultural Research and Development Institute (CARDI), Ministry of Agriculture, Forestry and Fisheries, Cambodia

Abstract Food security has been a longstanding agenda for ASEAN, in particular with the increasing threat of climate change as South East Asia is identified as one of the most vulnerable regions in the world. ASEAN addresses food security, amidst climate change, through the ASEAN Integrated Food Security Framework (AIFS) and the ASEAN Multi-Sectoral Framework on Climate Change (AFCC): Agriculture and Forestry towards Food Security.

This presentation will share the experiences of the Climate Resilient Network (CRN), a group created within the structures of ASEAN in support of the proposal of the ASEAN Technical Working Group on Agriculture and Research Development (ATWGARD) which aims to promote the climate resiliency of rice and other major crops. This particular proposal by Thailand was passed by ATWGARD and supported by the Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ) GmbH through the ASEAN-German Programme on Response to Climate Change (GAP-CC) programme.

The presentation aims to share the findings from the review and development of the adaptive capacity of ASEAN Member States, which includes successful practices and policies for tackling climate change related threats that can be promoted and up-scaled. Through the CRN, the project also identifies common concerns and capacity needs, and propose regional support strategies and instruments to address these in a coherent manner.

The presentation will share the highlights of the 7 national studies coordinated by the Southeast Asian Regional Center for Graduate Study and Research in

Agriculture (SEARCA The CRN also links policy makers to scientific institutions (universities, national research institutions in agriculture (CARDI, NAFRI, IPSARD, etc) and international (IRRI).

The content and the process of this initiative is a formidable example of regional effort to review adaptation efforts and to gather institutional support for south-south exchange and upscaling of these practices.

Dr Ouk Makara is the Director of the Cambodian Agricultural Research and Development Institute (CARDI) of the Ministry of Agriculture, Forestry and Fisheries since 2009, after 5 years position of Deputy Director for Research and Technology Development of CARDI. In 1990, Dr Ouk Makara completed Master degree on Agricultural Science at the Czech University of Agricultural Prague, Czech Republic with honours. Since 1991, he worked as a senior rice breeder for the Cambodia-IRRI-Australia Project of the Department of Agriculture and then CARDI. In 1999, he continued study in the University of Queensland, Australia and obtained Doctoral degree on Agricultural Science with majority in plant breeding and physiology in 2002.

Since 1991, Dr Ouk Makara, as a plant breeder, and his breeding team have released 39 rice varieties and 10 varieties of mung bean, maize, tomato, water melon for farmer's use. He is a care editor of the Cambodian Agricultural Journal and a member of several steering committees such as Policy Advisory Council of ACIAR, Council for Partnership on Rice Research in Asia (CORRA), and Consortium for Unfavourable Environment (CURE).

7.2.2 Climate change adaptation for livelihoods of rural women project: Building climate resilient livelihood of rural women in Stung Treng and Oddar Meanchey provinces

Mr Pisith Sok, Chief of Policies and Member of Gender and Climate Change Committee (GCCC), Ministry of Women's Affairs, Cambodia

Abstract The climate change adaptation for Livelihoods of Rural Women (CCALW) is a project implemented by Gender and Climate Change Committee (GCCC) of the Ministry of Women's Affairs (MoWA) with support from Cambodia Climate Change Alliance (CCCA) Trust Fund of the Ministry of Environment (MoE). The duration of the project is 15 months (Jan 2013-Mar 2014) with the cost of 300,000 USD located in Stung Treng and Oddar Meanchey provinces. The project has achived two main outputs: 1) Public sector staff gained skills and knowledge about gender & climate change. 2) The vulnerability of rural women in target areas is reduced through improved adaptive capacity, improved access to safe water and livelihoods diversification.

Through these, the project positively influenced the following areas:

- Living condition (economic status): Substantial economic benefits from home garden and food processing.
- Attitude and practice (social status): Attributed to social benefits from being a better organized communities and women group.
- Policies/local planning: The project has influenced to Neary Rattanak IV (2014-2018) which is the five-year strategic plan of the ministry that is climate change is one of the pillars. Moreover, the project influenced to local authority planning (commune investment plan) by constructing a road in Bak Nim village of Oddar Meanchey province.

The important achievements include:

1) Effectiveness of understanding on cause and effect of CC and gender for government officers.
2) Effectiveness of applied knowledge on home gardening.
3) Effectiveness of practicing water sanitation and basic healthcare.
4) Effectiveness of applied knowledge on food processing.

The important lessons learnt are:

1) Home garden linking to food nutrition
2) Water user group committee
3) Learning by doing approach
4) Cooperation or complementary to with other Provincial Departments or NGOs in the area

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Mr Pisith Sok is the chief office of Policies Unit and member of gender and climate change committee (GCCC) of the Ministry of Women's Affairs (MoWA). He finishes master degree in International Environmental and Agricultural Science (IEAS) at Tokyo University of Agriculture and Technology (TUAT), Japan. He had worked as project coordinator in Climate change adaptation for livelihoods of rural women project which focused on 1) Capacity building for MoWA's officers and line provincial departments. 2) Adaptive capacity building for community people. Moreover, he had worked as a counterpart in other projects such as:

- National Gender Climate Adaptation project
- Promoting Climate Change Resilient Water Management and Agricultural Practices in Rural Cambodia
- Pilot Program for Climate Resilient phase I (PPCR)
- Cambodia Climate Change Alliance phase I (CCCA) that focused on strategic plans and action plans of line ministries.

7.2.3 The Study on Smallholder Aquaculture in Flood and Drought Areas in Phieng and Paklai Districts, Xayabuly Province, and Outhoumphone and Champhone Districts, Savannakhet Provinces

Mr Oulaytham Lasasimma, Senior Researcher of Aquaculture Unit, Living Aquatic Resources Research Center (LARReC), Ministry of Agriculture and Forest, Laos PDR (Co-authored by: Lieng Khamsivilay, Noukeav Phetsanghan, Amphone Chanthavong, Phonseri Phanvongsa, AlounPhonvisay, Living Aquatic Resources Research Center (LARReC), Livestock Research Center (LRC))

Abstract Aquatic animals play an important role in providing protein sources for smallholder farmers. At the present, fish consumption is estimated 22 kg per person per year, and in 2020 fish consumption is targeted at 26 kg per person per year. Inland fisheries have been continuously declined, and smallholder aquaculture has not faced a number of constraints due to the impact of climate change phenomena, especially severe flood and drought events.

Flood often damages aquaculture production and limits aquatic farming areas whereas drought causes shortage of water sources for smallholder aquaculture, and in some case water sources only support aquaculture for 4-5 months, thereby resulting in low aquaculture production.

As a result, Living Aquatic Resources Research Center (LARReC) has conducted the study on identification of appropriate smallholder aquaculture techniques and farming systems for climate change adaptation, particularly in flood and drought conditions. Such aquaculture systems include cage culture of cat fish in flood areas, integrated livestock-fish farming systems in flood areas, raising cat fish in plastic and cement ponds, frog raising in cages or cement ponds.

Mr Oulaytham LASASIMMA is a Senior Researcher of Aquaculture Unit, Living Aquatic Resources Research Center (LARReC), Ministry of Agriculture and Forest. He hold a degree of Master of Science in Aquaculture and Aquatic Resources Management Program from Asian Institute of Technology (AIT), Thailand.

He has more than 10 years experiences and have been involved in many projects namely (i) Strengthen capacity of household seed producers and district staff on fish seed production techniques; (ii) Develop training curriculums and training package of fish breeding and pond sealing techniques; (iii) research project of fish culture small scale in upland Lunang Prabang Province; (iv) SIDA project of farming systems in Luang Prabang and Oudomxay Province; and (v) research project of indigenous prawn with Japan International Research Center for Agriculture Sciences(JIRCAS) in Northern Lao PDR.

His outstanding publications are (i) Lasasimma, O and Vongvichit, B. (2005) Livelihood Opportunities for upland Aquaculture: Improving Livelihoods in the Upland of the Lao PDR. Volume 2: pp 103-107 and (ii) Lasasimma, O and Ingram, B. A. (2008) Production of Cirrhinusmolitorella and Labeochrysophekadion for culture based fisheries development in Lao PDR: Nursery culture and grow-out. Aquaculture Asia.Volume XIII No3.

Parallel Session 7.3: Replication and Upscaling

7.3.1 CCAI Local Demonstration Project in Viet Nam

[Speaker to be confirmed]

7.3.2 Up-scaling Climate Change Adaptation Practices in Drought Prone Areas of the Young River Basin Northeast Thailand

Assist. Prof. Rachapat Ratanavarah, Rajamangala University of Technology Isan, Director of Water Resources Management Research Center: Khong-Chi-Mun River Basin, Thailand

Abstract Northeast Thailand is the most hardest-hit area by climate impact while severe drought and flood increases over years at various landscapes. The TNMC and Thailand DWR of Ministry of Natural Resource and Environment, with kind financial and technical supports by the MRCS, assigned the Chi RBO to be in charge of implementation of Thailand CCAI project, batch 1. The Chi RBO selects the Young River Basin to be the site under investigation while further two communities, Sai Na Wang and Wang Luang, are chosen for detailed climate vulnerability and adaptation study.

The overall goal of the CCAI project is to initiate development planning activities on climate change impact assessment, adaptation and capacity building plan of stakeholders and target communities, and supporting community adaptation plan integrated into the local and central governments' planning system.

The specific objectives of the study project are; (i) to review national, provincial, local CCA policy and strategy, (ii) to explore some genuine facts of those villagers on their existing coping strategy and agricultural adaptation practice response to the climate change impacts, (iii) to innovate and test the adopted climate information management system that applied to detect changes of climate and being a tool for policy and planning process, and (iv) to create an evident-base as policy brief document and case-study report on community-base climate change adaptation options and strategy for policy decision-making development process.

The project outputs also influence a proactive movement between local governments and local business sector while they view that climate change impact is crucial and later they decided to make a Memorandum of Understanding (MoU) between five local governments and one business sector. This agreement encourages the partners to establish climate resilience pilot areas of each local government as well as set up an implementing connection between Sai Na Wang Sub-District Watershed Committee with Office of Water Resources Region 4.

Assist. Prof. Rachapat Ratanavaraha is full-time Professor in Rajamangala University of Technology Isan (RMUTI), Khon Kaen Campus, Thailand and Director of Water Resources Management Research Centre: Khong-Chi-Mun River Basin. He has experience in The RMUTI CCAI-MRC(Climate Change Adaptation Initiative of Mekong River Basin) project team considered that applying the professional GIS program may limit the use of geographic information by local, district and provincial governments as well as by community groups. As such, the team developed a simplified GIS modeling system using Google Earth. It is designed to enable users of different skill sets to manage and make changes on particular attributes for their specific purpose, developed a low-cost climate telemetering system, as well as building their appropriate on-farm irrigation system. The GIS, Climate Model, Hydrological Model, Agriculture Model-CropWat, and the telemetering early warning system were successfully invented and implemented.

As a researcher he is cooperating with various partners in the Mekong region on issues of climate change and water governance such as the MRC, SEI, IUCN, WWF, GIZ, World Bank etc.

7.3.3 CCAI Demonstration Project in Savannakhet Province, Lao PDR

Mr Sivannakone Malivarn, Director of GMS Cooperation Division, Lao National Mekong Committee, Ministry of Natural Resources and Environment

Abstract Under the Climate Change and Adaptation Initiative (CCAI) of the Mekong River Commission (MRC), the local demonstration project site of Lao PDR of both the 1st and 2nd batches is selected to implement at Champhone district of Savannakhet province. The focus is on three villages, namely Kangkoknuea, Nakathang and Taleo.

The 1st batch is entitled "Resilience Climate Change Adaptation in Champhone District, Savannakhet Province" and its objectives are (i) to improve the awareness and knowledge of vulnerable rural communities on the impacts of climate change and potential adaptation measures (ii) to enhance the livelihood of communities, and to provide feedback as well as lessons learned from the demonstration projects for upscaling of the activities. The key outcome of this project is increasing knowledge on climate changes impacts on natural resources related to the local communities, their livelihood, the local government and its key role in planning and implementing various activities which could be undertaken or guided by the government (bottom up approach).

The project of the 2nd batch is called, "Small holder livelihood improvement through adaptation to climate variability in Champhone district, Savanakhet province". The proposed activity focuses on applying the CCAI adaptation planning framework to extend the outputs from the 1st batch project activities and concretize the activity into tangible results. This includes the initiation of asystem to embed climate change adaptation into the local development planning cycle. The capacity building efforts in adaptation planning will be focused on Champhone district level. The investment project is being prioritized and selected in order to demonstrate the benefit for the local community related to climate change adaptation activities.

Mr Malivarn is a Director of GMS Cooperation Division, Lao National Mekong Committee, Ministry of Natural Resources and Environment. He is also the Lao National Coordinator for the Climate Change Adaptation Initiatives; the National Focal Point for Basel Convention on the Control of Transboundary Movements of Hazardous and their Disposal; and the Project Manager of the Lao PDR 2nd Demonstration Project in Champhone District, Savannakhet Province, Lao PDR. He earned a Master of Science in the field of Urban Environmental Management from the Asian Institute of Technology (AIT), Thailand.

Mr Malivarn has more than 10 years of experiences and was involved in (i) Poverty and Environment Nexus Update Project (PEN) (World Bank Supported); (ii) Capacity Development for WREA Project (Supported by World Bank); (iii) the Economy and Environment Programme for Southeast ASIA (EEPSEA); (iv) SUMMERNET Project on Rubber Plantation: Costs or Benefits to the Lao PDR; (v) Hazardous Chemical Strategy and Action Plan for Lao PDR (Strengthening Environmental Management [SEM] through STEA Lao PDR; (vi) Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention of Persistent Organic Pollutants in Lao PDR (GEF-UNIDO); and (vi) an assessment and Monitoring of Pollution from Industrial Sectors 'hotspots' in Vientiane Capital and Four Main Provinces (Champasack Province, Savannaketh Province, Vientiane Province, Luang Prabang Province) in Lao PDR.

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