

# Regional Conference

## The Future of CLMV: Challenges and Responses to Water, Food and Energy Security

3-4 April 2014

InterContinental Hotel, Phnom Penh, CAMBODIA



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## **BACKGROUND**

The science is clear: even drastic reductions of global greenhouse gas emissions will be insufficient to avoid the impacts of climate change (Solomon et al 2009). Additionally, rapid population growth, urbanization and economic growth have contributed to the ever increasing demand for energy, food and water. Many riparian countries of the Mekong Basin are increasingly considering hydropower as a solution to their growing energy needs. The construction of dams, and the subsequent alteration of the water regime, may pose immediate and long-term threats to food security unless food and water needs are taken into account. Moreover, the challenges go beyond the hydropower debate since other interventions and investments are increasingly claiming considerable portions of the available water and land resources. Solutions to food, energy, and water security issues will only be sustainable when the three sectors work together.

Water, food and energy security are critical issues that will need to be dealt with not only at local or national levels, but specifically at the regional level. Trans-boundary management guidance is urgently needed to support the sustainable development of the CLMV (Cambodia, Laos, Myanmar and Vietnam) sub-region.

## **RATIONALE OF THE CONFERENCE**

It is anticipated that a regional conference will enhance the understanding of policy makers and legislators in integrating water, food and energy security into development and natural resource planning across nations and across the CLMV region. The conference will portray the experiences, challenges and responses to water, food and energy security issues at both national and subnational levels from CLMV and neighbouring countries. Because the problems are challenging, a variety of practices, policies and innovative solutions of relevance to the CLMV countries will be sought. Finally, it will bring together diverse communities of scholars, policy makers, experts and civil society agents to explore different types of national and regional cooperation that could enhance sustainable mechanisms for development in the CLMV region.



# PROGRAMME

## DAY 1

Thursday, 3 April 2014

07:30 – 08:30 | **Registration**

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08:30 – 08:50 | **Welcome Remarks**      **HRH Samdech Norodom Sirivudh**  
Supreme Privy Counselor to His Majesty the King of Cambodia, Member of Constitutional Council and Founder and Chairman of Board of Directors, (CICP)

| **Special Remarks**      **Dr. Wilhelm Hofmeister**  
Director, Konrad-Adenauer-Stiftung (KAS),  
Regional Program Political Dialogue with Asia

08:50 – 09:20 | **Keynote Address**      **H.E. Mr. Sin Khandy**  
Undersecretary of State,  
Ministry of Environment of Cambodia

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09:20 – 09:40 | **Coffee Break**

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09:40 – 11:40 | **SESSION I**      **CONTEXTUALIZING DRIVERS AND CHALLENGES OF WATER, FOOD AND ENERGY SECURITY IN CLMV COUNTRIES**

**Chaired by**

**H.E. Ms. Pok Marina**  
Member of the Board of Directors of CICP

**Panel of Speakers**

| *“Achieving Rural Development and Food Security in Cambodia: Lessons from Indonesia”*      **Dr. Rick Barichello**  
Professor, Food & Resource Economic and Director of the Center for Southeast Asia Research University of British Columbia

| *“Towards Sustainable Development: Security in Energy, Food, Water and Air with a Perspective on CLMV”*      **Dr. Aris Ananta**  
Senior Research Fellow,  
The Institute of Southeast Asian Studies, Singapore

Programme

| *“Dealing with the Trade offs of Water, Food, and Energy Security, What Does It Mean in Cambodia and in the Region? ”*

**Dr. Rathana peou van den Heuvel**

Regional Scenarios Consultant for Consultative Group on International Agricultural Research (CGIAR- CRP7) of the Climate Change, Agriculture and Food Security (CCFAS), Visiting Professor University of Liberal Arts Bangladesh (ULAB), Visiting researcher Bangladesh Center of Advanced Studies (BCAS)

Questions & Answers

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11:40 – 13:00 | Lunch at InterContinental Hotel

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13:00 – 15:00 | **SESSION II** **WATER, FOOD AND ENERGY SECURITY IN CAMBODIA**

**Chaired by**

**H.E. Amb. Pou Sothirak**

Executive Director,  
The Cambodian Institute for Cooperation and Peace

**Panel of Speakers**

| *“Cambodia’s Beating Heart: The Importance of Water Security for Food and Livelihoods in Cambodia”*

**Ms. Pauline Taylor Mc. Keown**

Mekong Regional Program Manager,  
Oxfam Cambodia

| *“Food Security for Cambodia: Policy Challenges – What the Research Shows”*

**Mr. Nou Keosothea**

Coordinator for Social Development Program,  
The Cambodian Development Research Institute (CDRI)

| *“Towards Cambodia’s Energy Security: The Role of China’s Investment and Aid”*

**Mr. Heng Pheakdey**

Founder and Director of Enrich Institute for Sustainable Development, Phnom Penh, Cambodia

| Questions & Answers

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15:00 – 15:30 | Coffee Break

15:30 – 17:30		<b>SESSION III</b>	<b>WATER, FOOD AND ENERGY SECURITY IN LAOS, MYANMAR AND VIETNAM</b>
			<b>Chaired by</b>
			<b>H.E. Dr. Chap Sotharith</b> Advisor and Chief of Cabinet of Deputy Prime Minister H.E. Ms. Men Sam An, and Member of the Board of Directors, CICP
			<b>Panel of Speakers</b>
		<i>“Urban Water Supply Development Toward Achieving Lao MDG”</i>	<b>Mr. Noupheuak Virabouth</b> Deputy Director General of the Department of Housing and Urban Planning, Ministry of Public Works and Transport of the Lao PDR
		<i>“Change and Transformation in Myanmar: Critical Role of the Energy Sector”</i>	<b>H.E. Amb. Thaung Tun</b> Member of the Board of Directors Myanmar Development Resource Institute (MDRI), Yangon, Myanmar
		<i>“Challenges and Responses to Water, Energy and Food Security: the Case of Vietnam”</i>	<b>Ms. Do Lien Huong</b> Team Leader at the Strategy and Policy Research Division, Institute of Policy and Strategy for Agriculture and Rural Development in Vietnam
			Questions & Answers
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17:30		<b>End of Day One</b>	
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19:00		<b>Dinner</b>	<i>All role players will be invited to a Cambodian dinner outside the InterContinental Hotel. Venue of the dinner will be announced.</i>



**DAY 2**

**Friday, 4 April 2014**

8:30 – 10:00 | **SESSION IV**      **UNDERSTANDING THE TRADE-OFFS: HOW MULTI-STAKEHOLDERS SCENARIOS COULD SUPPORT POLICY-MAKERS AND INVESTORS?**

**Moderated by**

**H.E. Amb. Pou Sothirak**

Executive Director,  
The Cambodian Institute for Cooperation and Peace

**Lead Discussants**

**Dr. Rathana peou van den Heuvel**

Regional Scenarios Consultant for Consultative Group on International Agricultural Research (CGIAR- CRP7) of the Climate Change, Agriculture and Food Security (CCFAS), Visiting Professor University of Liberal Arts Bangladesh (ULAB), Visiting researcher Bangladesh Center of Advanced Studies (BCAS)

**Ms. Maliha Muzammil**

follow Global Policy Coordinator, Climate Change Agriculture and Food Security (CCAFS), Environmental Change Institute (ECI), University of Oxford

**Dr. Joost Vervoort**

Scenarios Officer for the Consultative Group on International Agricultural Research (CGIAR) Programme 7, Climate Change, Agriculture and Food Security (CCAFS)

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10:00 – 10:30 | Coffee Break

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10:30 – 11:00 | **WRAP-UP SESSION AND CLOSING REMARK**

**H.E. Amb. Pou Sothirak**

Executive Director,  
The Cambodian Institute for Cooperation and Peace

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| **End of Conference**

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12:00 – 14:00 | Lunch at  
InterContinental Hotel

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14:30 – 17:00 | *Sightseeing in Phnom  
Penh City organized for  
all role players only*

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## ROLE PLAYERS



### **HRH Samdech Norodom Sirivudh**

Supreme Privy Counselor to His Majesty the King of Cambodia, Founder and Chairman, Board of Directors, Cambodian Institute for Cooperation and Peace (CICP)

- Prince Norodom Sirivudh is a member of the Constitutional Council, Privy Counselor to His Majesty the King and Founder and Chairman of the Board of Directors, Cambodian Institute for Cooperation and Peace (CICP). His political career began in 1971 when he joined the Paris-based royalist movement, GRUNC/FUNK (Gouvernement Royal d'Union Nationale du Cambodge/United National Front of Kampuchea). In 1981, he joined the National United Front for an Independent, Neutral, Peaceful and Cooperative Cambodia (FUNCINPEC) and in 1988, left France for Thailand where he was appointed Chief of FUNCINPEC's Humanitarian Department. On Nov 7, 1991, he returned to Cambodia for the first time in 20 years, and, as Chief Survey Mission on behalf of Prince Norodom Ranariddh, was in charge of laying the groundwork for FUNCINPEC's participation in the electoral process, mandated under the Paris Peace Agreement, in advance of the UN's 18-month Mission in Cambodia. In May 1993, as FUNCINPEC's Bureau Chief in Phnom Penh, Prince Norodom Sirivudh helped his party to its elections victory, after which he was appointed Co-Deputy Prime Minister and Minister of Foreign Affairs. And in August 2001, Prince Norodom Sirivudh was elected as Senator. In the July 2003 General Elections, Prince Norodom Sirivudh was elected as Member of Parliament for Kandal Province of the third legislature and was nominated as Deputy Prime Minister and Co-Minister of Interior of the Royal Government until March 2006. From March 2006, Prince NORODOM Sirivudh is Privy Counselor to His Majesty the King and Member of Parliament. In May 2010, King Norodom Sihamoni appointed Prince Norodom Sirivudh as a new member of the Constitutional Council.



### **Dr. Wilhelm Hofmeister**

Director, Konrad-Adenauer-Stiftung (KAS)  
Regional Program Political Dialogue with Asia

- Dr. Wilhelm Hofmeister is the Director of the Konrad Adenauer Foundation's (KAF) regional programme "Political Dialogue with Asia" based in Singapore. Before assuming his current position, he was Director of the Research Centre of KAF in Rio de Janeiro, Brazil from July 1999 to April 2009. From 1993 to 1999 he served in the department of international cooperation in the headquarters of KAF in Germany, from 1996 to 1999 as its deputy-director with responsibility for programs in Africa, Asia and Latin America. From 1988 to 1993, he was KAF's representative in Chile. He studied Political Sciences, Sociology and History and received his M.A. and Ph.D. from the University of Mainz, Germany. His areas of special interest are, on one hand, political development, regime transformation and the institutionalization of political parties, and party systems, and on the other hand, the international relations of the European Union. These areas of interest are reflected by his numerous articles published in books and journals in Germany, Latin America and Asia.



**H.E. Mr. Sin Khandy**

Undersecretary of State, Ministry of Environment of Cambodia

- 🌐 H.E. Sin Khandy is currently serving as Undersecretary of State of the Ministry of Environment of Cambodia since 2003. He graduated from the University of Agriculture, Chamkar Daung with Bachelor Degree of Art in Agriculture in 1992. He obtained a Master Degree from IHE, Delft, the Netherlands in Water Resource Management in 1997. From 1998-2003, he served as Director of Cabinet of the Minister of Public Works and Transport.



**H.E. Amb. Pou Sothirak**

Executive Director, Cambodian Institute for Cooperation and Peace

- 🌐 **Pou Sothirak** is currently holding a position as Executive Director of the Cambodian Institute for Cooperation and Peace. He also serves as Advisor to the Royal Government of Cambodia as of February 2014. He worked as Secretary of State of the Ministry of Foreign Affairs and International Cooperation from September 2013 to January 2014. He was Visiting Senior Research Fellow at the Institute of Southeast Asian Studies (ISEAS) in Singapore from January 2009 to December 2012. He was appointed as Cambodian Ambassador to Japan from April 2005 to November 2008. He served as elected Cambodian Member of Parliaments twice during the general election in 1993 and 2003. He was appointed as Minister of Industry Mines and Energy of the Royal Government of Cambodia from 1993 to 1998. He joined the crusade to safeguard Cambodian from foreign occupation and internal conflict from 1986 - 1992, serving as Humanitarian Coordinator at one of the refugee camp on the border between Thailand and Cambodia. He had worked as an engineer at the Boeing Company from 1981-1986 after obtaining a Bachelor Degree in Electrical and Computer Engineering from Oregon State University, USA, in 1981. Pou Sothirak had edited a book titled "Cambodia: Progress and Challenges since 1991", published in 2011 by the Institute of Southeast Asian Studies and he is the co-writer of a book titled "PreahVihear: a Guide to the Thai-Cambodian Conflict and Its Solution", publish in 2013 by White Lotus. He has written extensively on issues concerning Cambodia.



**H.E. Dr. Chap Sotharith**

Advisor and Chief of Cabinet of Deputy Prime Minister, H.E. Ms. Men Sam An, and Member of the Board of Directors, CICP

🌐 Dr. Chap Sotharith is Research Director and Board Member of Cambodian Institute for Cooperation and Peace (CICP) Cambodia, an independent non-profit policy research and advocacy institute. During the past 15 years, Dr. Chap Sotharith has been involved in various policy research networks including Economic Research Institute for ASEAN and East Asia (ERIA), East Asian Development Network (EADN), and the ASEAN Institutes of Strategic and International Studies (ASEAN ISIS) that provides policy inputs to the ASEAN policy making processes. Within these networks, he is very active in writing papers, presenting ideas in many regional and international conferences in many topics related to international relations, international politics, trade, investment and international economies.

Dr. Chap Sotharith was former Executive Director of CICP from 2004-2008. He currently also serves as an Advisor to Deputy Prime Minister, H.E. Mrs. Men Sam An, in economic and social development strategy. He from time to time worked as consultant to many international organizations such as World Bank, UNCTAD and FAO. Dr. Chap Sotharith holds a Master of Science from Asian Institute of Technology (AIT), Bangkok in 1994, and Doctor of Philosophy (Ph.D) in Economics from the Sydney University, Australia in 2006. He has published many books both in English and Khmer on topics related to Cambodia and regional development.



**H.E. Ms. Pok Marina**

Member of the Board of Directors of CICP

🌐 H.E. Ms. Pok Marina got her post graduate at the University of Paris Dauphine in the field of Sustainable Development and Economics, Chevening Awardee as Research fellow at the London School of Economics under Prof Michael Leifer supervision “Security mechanism in ASEAN.” She was Under Secretary of State, at the Ministry of Foreign Affairs, Kingdom of Cambodia, 1993-1998, in charge of UN affairs and to bring Cambodia into ASEAN.

In 1999, she set up and developed the Asia center at the Institute of Political Sciences in Paris and was a Lecturer on “Gender in Asia.” In 2006, she created her consulting firm, Ethical Step. She advised multinationals on CSR (HSBC France, Le Meurice Palace, Alcatel Lucent, Kraft). She produced TV programs for France 5 and TV5 Monde on Global Footprint.

In 2010, she developed impact investment for SMEs, with Leopard Capital Fund and raised fund for the Heritage Park In Siem Reap. She was a lecturer at The Royal University of Law and Economics “Impact Investment in Cambodia.” She is a member of the 21<sup>st</sup> Century Club, Paris, elites from the Asian diaspora involved in business, politics and academics.

H.E. Ms. Pok Marina is a co-founder of The Cambodian Institute for Cooperation and Peace (CICP). She speaks English, French, Cambodian, Japanese and German.



**Dr. Aris Ananta**

Senior Research Fellow, the Institute of Southeast Asian Studies, Singapore

🌐 Aris Ananta is an economist-demographer with multi-disciplinary perspective. He earned his PhD in economics, majoring in population, from Duke University, the US, in 1983. He obtained his Master in Socio-economic Statistics, with specialization in demography, from George Washington University, the US in 1978.

He has been a senior research fellow at the Institute of Southeast Asian Studies (ISEAS), Singapore, since 2001. Previously, he was Professor in Economics at the University of Indonesia until 1998, before joining Department of Economics, National University of Singapore in 1999 - 2000.

He, along with Richard Barichello, edited a book "Poverty and Global Recession in Southeast Asia", published by ISEAS in 2012. Recently, along with Armin Bauer and Myo Thant, he edited a book "The Environments of the Poor in East Asia, Southeast Asia, and the Pacific", published by ISEAS and ADB, 2013. Along with Evi Nurvidya Arifin, he has edited books on "International Migration in Southeast Asia" and "Older Persons in Southeast Asia".



**Dr. Rick Barichello**

Professor, Food & Resource Economic and Director of the Center for Southeast Asia Research University of British Columbia

🌐 Rick Barichello is a Professor within the Food and Resource Economics Group at the University of British Columbia and has worked at UBC since his PhD at the University of Chicago in 1979. He was Head of the UBC Department of Agricultural Economics from 1988 to 1994, and since September 2007 has been the Director of the Center for Southeast Asia Research within UBC's Institute of Asian Research. He is currently a Visiting Senior Research Fellow at the Asian Research Institute, National University of Singapore. He has worked as a visiting professor at Yale, Stanford, Harvard, and California-Davis, Leuven in Belgium, and ISEAS in Singapore. He worked for the Harvard Institute for International Development in Jakarta, from 1986 to 1988, and has subsequently researched/taught in Indonesia, Vietnam, Singapore, Thailand, Philippines, Malaysia, Myanmar, China, Cambodia, Korea, and Ethiopia. He was President of the Canadian Agricultural Economics Society in 1999 and awarded the designation of Fellow of the Canadian Agricultural Economics Society, its highest honour, in 2008. His research has been on the economic analysis of public policy, particularly trade and agricultural policies and institutions, Canadian dairy and poultry quota markets, and on a variety of agricultural development issues, mostly applied to Southeast Asia. His work in development has focused mostly on trade policy, world food markets, Southeast Asia rural labour markets, and cost-benefit analysis.



**Ms. Pauline Taylor Mc. Keown**  
Mekong Regional Program Manager, Cambodia

- 🌐 Pauline Taylor McKeown is British and has worked in development for the past thirty years with a significant part of that time spent in SE Asia and S. Asia. She first came to Cambodia in 1996 and lived in Lao PDR from 1995-1998. She has managed programmes for different agencies over the past twenty years in Asia, Europe, Latin America, Middle East and Africa. Currently she is the regional manager for Oxfam Mekong Water Governance Programme and has been based in Cambodia with frequent travel around the region for the past 4 years. In 1996 HM the Queen awarded Pauline an MBE (Member of the British Empire) for humanitarian services during the war in Bosnia.



**Dr. Rathana peou van den Heuvel**  
Regional Scenarios Consultant for CGIAR- CRP7 of the Climate Change, Agriculture and Food Security (CCFAS), Visiting Professor ULAB, Visiting Researcher BCAS

- 🌐 Dr. Rathana peou is the South East Asia Regional Scenarios Coordinator under the CGIAR, CCAFS and on the Asia Pacific Migration Environment Network advisory board. She is also a visiting researcher at the Bangladesh Center of Advanced Studies (BCAS) as well as a fellow at the International Research Center on Sustainability (University of Reims). She holds a PhD in Political Science majoring in Philosophy and a minor in Arabic and Master degrees in Political Science and Philosophy. Dr. Rathana's research interests lie on the "4 inviolate principles": food security, water security, energy security and social "health" security. Dr. Rathana leads research programs on different issues related to Climate Change, human trafficking and sex workers in Bangladesh, issues related to climate induced migration, impacts of active learning, and characteristics of social business. She has been researching on climate induced migration in Bangladesh and as well the weight of remittance on local development. She has been involved with impact evaluation of participative model of market development as well as monitoring of value chain. Her current research and works involved a better understanding of the complexities and realities that SEA deal with in terms of Food Systems, Agriculture and Climate Change.

Dr. Rathana worked as an international consultant and humanitarian workers in Sudan, Pakistan and Bangladesh. She has worked with and consulted for agencies such as DFID, USAID, ECHO, DIPECHO, AFD, EU, ADB and different INGOs and NGOs.



**Mr. Heng Pheakdey**

Founder and Director of Enrich Institute for Sustainable Development, Phnom Penh, Cambodia

- Mr. Heng Pheakdey is the founder and director of Enrich Institute for Sustainable Development (EISD), an autonomous research and consulting organization based in Phnom Penh. Trained as a policy analyst by one of the most reputed public policy institutions in Asia, Mr. Heng has expertise in the field of energy and climate change. He has conducted research, written and published a number of articles about Cambodia's energy sector. Mr. Heng has also provided consultancy services related to policy research and analysis, monitoring and evaluation, training and capacity building to many national and international organization such as UNDP, UNICEF, The World Bank, NGO Forum, and the Ministry of Mine, Industry and Energy. Currently, Mr. Heng is pursuing his Ph.D in the Netherlands where his research focuses on China's roles in Cambodia's energy sector.



**Mr. Nou Keosothea**

Programme Coordinator of the Cambodian Development Research Institute's Social Development programme

- Mr. Nou Keosothea has over ten years research experience in rural, agricultural development, social and poverty studies. As a senior research fellow at Cambodia Development Resource Institute (CDRI) Mr Nou acted as a team leader on a number of high profile projects funded by the Asian Development Bank (ADB), World Bank, International Development Research Centre (IDRC), Oxfam America, the Australian Centre for International Agricultural Research (ACIAR), Rockefeller Foundation amongst others. He has expertise from these and other consulting experiences conducting in depth agriculture and food security analysis, resulting in lead author publications.

Mr Nou holds two master degrees from the University of Copenhagen, Denmark, a Master of Science in Agricultural Development and Master in Sustainable Land Use and Natural Resource Management. He is currently a PhD candidate at the University of Canberra, Australia on an ACIAR John Allwright fellowship.



**Mr. Noupheuak Virabouth**

Deputy Director General of the Department of Housing and Urban Planning, Ministry of Public Works and Transport of the Lao PDR

🌐 Mr. Noupheuak Virabouth is a Deputy Director General of the Department of Housing and Urban Planning, Ministry of Public Works and Transport of the Lao PDR. He got Bachelor Degree in Civil Engineering in Cuba in 1983, Graduate Diploma Degree in Civil Engineering in 1995 from Australia and Master Degree in Financial Management of Enterprises in 2002 from France.

He started to work for the Government of Lao PDR in 1983, and since 1997 he had dedicated for the urban water supply sector. He used to work as Deputy Director General of the Water Supply Authority from 1999 to 2003 and then as regulator of the urban water supply sector until 2009. He has been until now appointed as a Deputy Director General of the Department of Housing and Urban Planning. He had been in charge of the water supply affairs until 2013, and now in charge mainly of the urban development.

He is a member of the Association of Lao Architects and Civil Engineers (ALACE). Since 2006, he has been assigned as a member of the Governing Board of the Southeast Asian Water Utilities Network (SEAWUN). Actually, he serves as President of this organization.



**H.E. Amb. Thaung Tun**

Member of the Board of Directors

Myanmar Development Resource Institute (MDRI), Yangon, Myanmar

🌐 Thaung Tun is a retired Myanmar Ambassador. He joined the Myanmar Foreign Ministry in 1972 and served at headquarters and various diplomatic posts abroad until his retirement in April 2010.

His overseas postings include, Bern, Geneva, New York, Washington. D.C., Manila and Brussels. His last diplomatic posting was in Brussels where he served concurrently as Ambassador of Myanmar to Belgium, The Netherlands and The European Union from 2008 to 2010.

At headquarters he was Director General for Political Affairs and was Leader of the Myanmar delegation to The Association of Southeast Asian Nations (ASEAN) Senior Official Meetings (SOM) from 2001 to 2005. He was also Secretary of the National Commission for Environmental Affairs (NCEA) and the Myanmar Institute of Strategic Studies (MISIS).

He has a Bachelor of Science Degree from The Rangoon Arts and Science University and a Diploma in French from the Institute of Foreign Languages, Rangoon. He attended the School of Advanced International Studies (SAIS), The Johns Hopkins University, Washington. D.C. as a Fulbright Scholar and has a Master in International Public Policy.

He is a Member of the Board of Directors of the Myanmar Development Resource Institute (MDRI), Yangon. His is also a Visiting Senior Research Fellow at the Institute of Southeast Asian Studies, Singapore.





**Ms. Do Lien Huong**

Team Leader at the Strategy and Policy Research Division, Institute of Policy and Strategy for Agriculture and Rural Development in Vietnam

- Ms. Huong obtained her Master Degree in Economics of Development from National Economics University, Hanoi, Vietnam, in collaboration with the Institute of Social Studies, The Hague, The Netherlands in 2006. She has gained rich experiences in data processing and policy analysis. Currently, she is serving as Team Leader at the Strategy and Policy Research Division, Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD) in Vietnam. She has actively participated in many projects in agriculture and rural development funded by INGO or the government of Vietnam.



**Ms. Maliha Muzammil**

Follow Global Policy Coordinator, CCAFS, Environmental Change Institute (ECI), University of Oxford

- Maliha is currently working as a Scenarios and Policy Researcher for the Research Programme on Climate Change, Agriculture and Food Security (CCAFS) based in the Environmental Change Institute (ECI) at the University of Oxford. She is responsible to further the impact of the scenarios development on actual policy and decision making processes. The CCAFS Scenarios are formulated by using a “back-casting” method with stakeholders to identify critical policy outcomes, and then develop strategies and interventions to ensure these can be achieved under alternate scenarios. She is responsible for furthering the process of embedding these strategies in ongoing and new institutional processes and investment plans in South Asia.

Maliha is also a PhD student at SOAS, University of London. Her PhD examines the opportunities and barriers for low carbon, climate resilient pathways in least developed countries. She has extensive experience of working on knowledge management platforms, multi-stakeholder collaborations and supporting evidence-based policy research for donor agencies (UKCDS, EPSRC), multilateral agencies (UNEP), developing country governments (Bangladesh), research institutes (IIED, ODI, Stakeholder Forum), NGOs (BRAC, IUCN) and academic institutions (ECI, University of Oxford).



**Dr. Joost Vervoort**, Scenarios Officer for the CGIAR Research Programme 7, Climate Change, Agriculture and Food Security (CCAFS)

🌐 Joost Vervoort is the Scenarios Officer for the CGIAR Research Programme 7, Climate Change, Agriculture and Food Security (CCAFS). He is driving multi-stakeholder scenario development for the future of food security, livelihoods and environments for East Africa, West Africa, South Asia, South East Asia and Latin America, working extensively with a wide range of regional actors. The CCAFS scenarios work combines these stakeholder perspectives with economic modelling to explore the long-term implications of multiple socio-economic scenarios combined with climate scenarios. The regional scenarios are used to guide policies, investments and institutional change at national and regional levels. For more information visit [ccaafs.cgiar.org/scenarios](http://ccaafs.cgiar.org/scenarios).

In 2014, Joost started as a work package leader on the Trans Mango project, funded by the European Commission (FP7). Trans Mango will focus on plausible futures of the European food system in a global context.



## EXECUTIVE SUMMARY

The Cambodian Institute for Cooperation and Peace (CICP) hosted a regional conference on “The Future of CLMV: Drivers and Challenges of Water, Food and Energy Security” at the Intercontinental Hotel, Phnom Penh, Cambodia on 3-4 April 2014.

The aim of this regional conference was to enhance the understanding of policy makers and legislators in integrating energy, food and water security into development and natural resource planning across nations and across the Cambodia-Laos-Myanmar-Vietnam (CLMV) region. The conference portrayed the CLMV’s experiences of National and Subnational planning challenges and responses. Diverse communities of scholars, policy makers, experts and civil society agents had the opportunity to explore different types of national and regional cooperation that could enhance sustainable mechanisms for development in the CLMV region.

This conference brought together diverse communities of scholars, policy makers, experts and civil society agents to explore different types of national and regional cooperation that could enhance sustainable mechanisms for development in the CLMV region.

The challenges of water, energy and food insecurity are real and need collective efforts to address rapid population growth, urbanization and economic growth that have contributed to the ever-increasing demand for energy, food and water. Many riparian countries of the Mekong Basin are increasingly considering hydropower as a solution to their growing energy needs. The construction of dams, and the subsequent alteration of the water regime may pose immediate and long-term threats to food security unless food and water needs are taken into account. Moreover, the challenges go beyond the hydropower debate since other interventions and investments are increasingly claiming considerable portions of the available water and land resources. Solutions to food, energy, and water security issues will only be sustainable when the three sectors work together.

Water, energy and food security are critical issues that will need to be dealt with not only at local or national levels, but specifically at the regional level. Trans-boundary management guidance is urgently needed to support the sustainable development of the CLMV (Cambodia, Laos, Myanmar and Vietnam) sub-region. Due to this close connection between the CLMV countries concerning water, energy and food security, stronger collaboration is desirable and capacity building has to take place.

In order to contribute to a better understanding about current challenges and implement solutions, this publication includes welcome remarks, keynote addresses, and papers with different perspectives from Cambodia, Laos, Myanmar, and Vietnam. What are the major challenges and solutions to water, energy, and food security in the CLMV countries? What can the CLMV countries learn from each other? How might the CLMV ensure a stable food supply? Is hydropower a solution to energy supplies? How does the CLMV countries manage water resources? These and other questions will be tackled by this publication.

### **I. Welcome remarks, special remarks and keynote address**

The welcome remarks by HRH Samdech Norodom Sirivudh, the special remarks by Dr. Wilhelm Hofmeister, and the keynote address by H.E. Mr. Sin Khandy set the tone and highlight the theme of the regional conference. The nexus of water, food, and energy security remain one of the major concerns for CLMV countries that can threaten peace and stability in the region if left unattended. Important aspects of water, food and energy

relationship of securities and conflicting approaches were examined to create securities in water, food and energy in the CLMV countries.

1. **HRH Samdech Norodom Sirivudh**, Founder and Chairman of the Cambodian Institute for Cooperation and Peace (CICP), delivered a welcome address thanking all the attendees and stressing the importance of this regional conference. He stated that the purpose of this gathering was to portray the CLMV' experiences of national and subnational planning challenges and responses to the issues of water, food, and energy security as well as to enhance the understanding of policy makers and legislators in integrating water, food and energy security into development and natural resource planning across nations and across the CLMV region. The challenges and responses to the issues of water, food and energy security need to be addressed and dealt with not only at local or national levels, but specifically at the regional level.
2. **Dr. Wilhelm Hofmeister**, Director, Konrad-Adenauer-Stiftung, Regional Program Political Dialogue with Asia, funder of the regional conference, gave full support to this regional conference. He was pleased that CICP was able to invite a selective group of international experts to share their assessment of how these critical issues could be managed by learning about some of the best practices of other countries in the region. He emphasized the needs of finding common solutions and responses to the ever-increasing demand for water, food, and energy security in the CLMV region.
3. **H.E. Mr. Sin Khandy**, Undersecretary of State of the Ministry of Environment of Cambodia gave a keynote address. He stressed on the importance of finding solutions to water, food, and energy security issues by using the nexus approach and green solution economy. Cambodia has made many advances in terms of improving water, energy, and food security. From experiencing food insecurity in the past, Cambodia has become a rice exporter. To improve sustainability for water, energy, and food security, the government adopts multidisciplinary approaches to protect the natural resources at all costs. The Cambodian government also adopted its food security policy in terms of food availability, access, use and utilization. Developing a better understanding of land use, food production, urbanization, population growth, and environmental protection are very important and necessary to green growth. He stated that water and energy security remain a major challenge because Cambodia depends on a cross boundary basin. Electricity is very expensive compare to neighboring countries. The construction of hydropower dams can damage the ecosystem and affect down stream countries and food production. He hoped that this conference could stimulate wider discussion among and between the speakers and all of the participants with a view to explore different types of national and regional cooperation that could enhance effectiveness and sustainable mechanisms for water, energy and food security in the CLMV region.

## **II. Session 1: Contextualizing Drivers and Challenges of Water, Food and Energy Security in CLMV Countries.**

H.E. Ms. Pok Marina, Member of the Board of Director of CICP, chaired this session, which included three distinguished speakers: 1) Dr. Rick Barichello, Professor, Food & Resource Economic and Director of the Center for Southeast Asia Research University of British Columbia, 2) Dr. Aris Ananta, Senior Research Fellow, The Institute of Southeast Asian Studies, Singapore, and 3) Dr. Rathapeou van den

Heuvel, Regional Scenarios consultant for Consultative Group on International Agriculture Research (CGIAR- CRP7) of the Climate Change, Agriculture and Food Security (CCFAS), Visiting Professor ULAB, Visiting researcher Bangladesh Center of Advanced Studies (BCAS). This session addressed the contexts and challenges of water, food and energy security and provided lesson learned from the three international experts.

1. **Dr. Rick Barichello**, talked about *“Achieving Food Security in CLMV: Lessons from Indonesia.”* He stated that one of the priorities for CLMV country is to improve food security. One way to measure food security is the share of food expenditures in total household income. By drawing on lessons learned from Indonesia as a model to achieving food security, any significant effort by the policy makers must involve the agricultural sector and improve rural development which include improving diverse elements such as infrastructure, irrigations, education or literacy rates, mortality rates, health care system. Cambodia can learn a great deal from Indonesia on agricultural productivity, export growth, and its general agricultural policy framework.
2. **Dr. Aris Ananta**, discussed about *“Demographic Aspects of Water, Food and Energy Sustainability: with Some Illustrations from CLMV Countries.”* He emphasized sustainable development in terms of future CLMV needs. He also introduced another component: the importance of clean air. Energy, food, water, and air are interconnected to provide sustainable development. It is important for Cambodia to adopt a resolution similar to *“The Future We Want”* by the United Nations on 27 July 2012), which renewed *“the commitment economically, socially and environmentally sustainable development – a development which provides economic, social, and environmental needs of the current generation without sacrificing the ability of the future generation to produce their own needs. This sustainable development is inclusive and people-centered.”*
3. **Dr. Rathana peou van den Heuvel** presented a talk entitled *“Dealing with the tradeoffs of Water, Food, and Energy Security: What does it mean in Cambodia and in the Region.”* She emphasized the importance of working together to preserve food, water, and energy security and turned risks into opportunities. According to her assessment, water, food and energy security are not matter of choice but trade-offs. It is important to develop and adopt the long-term view of securing water, food and energy security. Understanding about the context and the complexity of the challenges to provide water, food and energy security can help minimize the risk factors. Rather than forecasting a single future (of water and food security), she created the scenarios that focus on contextual drivers of change for agriculture and food security as well as climate change and socio-economic changes (governance, infrastructure broad economic development). This process will enable societal actors to participate and engage in an analysis of the contextual factors of change for decision-making on food security, livelihoods and environments.

### III. Session 2: Water, Food and Energy Security in Cambodia

H.E. Amb. Pou Sothirak, Executive Director of CICP, chaired this session which included three distinguished speakers: 1) Ms. Pauline Taylor McKeown, Mekong Regional Program Manager, Oxfam Cambodia, 2) Mr. Nou Keosothea, Coordinator for Social Development Program, The Cambodian Development Research Institute and 3) Mr. Heng Pheakdey, Founder and Director of Enrich Institute for Sustainable

Development, Phnom Penh, Cambodia. Water, food and energy security in Cambodia were addressed by the three experts.

1. **Ms. Pauline Taylor McKeown** talked about *“Cambodia’s Beating Heart: The Importance of Water Security for Food and Livelihoods in Cambodia.”* She explored the relationship between water governance, water security and food in Cambodia as well as the threats posed by current trends, especially hydropower, export-oriented agriculture and water privatization. In terms of national water security, there are five interlinked elements, which comprise household water security, economic water security, environment water security, urban water security, and resilience to water based disaster (ADB 2013a). Cambodia’s level of national water security is ‘hazardous’, not because Cambodia is short of water, but the country lacks of the sufficient investment in water governance and infrastructure to make good use of that water. In terms on improving food security, there is also a great deal of work to be done in Cambodia where 28 percent of Cambodian children were underweight and 40 percent of children were stunted in 2013 in 2013 (UNICEF 2013).
2. **Mr. Nou Keosothea** discussed *“Food Security for Cambodia: Policy Challenges – What the Research Shows.”* He painted a challenging picture of food security in Cambodia based on his research. If food security is defined as “when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 2009) then food security and malnutrition remain critical issues for Cambodia. According to his research, despite the rapid economic growth during the past decades that contributes to poverty reduction and hunger, a great deal of challenges still haunts Cambodia relating to food supply, food access and quality and safety of food. Research uptake is a potential mechanism to improve food security and can serve a tool to effective policy and program formulation and implementation.
3. **Mr. Heng Pheakdey** spoke about *“Towards Cambodia’s Energy Security: The Role of China Investment And Aid.”* He examined Cambodia’s energy security challenges and critically analyzed China’s controversial role in the energy sector. In Cambodia, the speaker defines energy security is the sufficient, fair, reliable, and affordable supply of energy which does not seriously harm the environment nor negatively affect the livelihood of the local people. Since Cambodia has one of the lowest electrification rate in ASEAN – just a little ahead of Myanmar with only 24 percent of its entire population having access to reliable electricity, the government has turned to China for help and encouraged Chinese firms to invest in energy projects, especially hydropower. While the government is grateful to China’s multimillion-dollar investment in transforming Cambodia’s energy sector in terms of power generation and distribution, environmentalists and activists have criticized China funded project for failing to meet international standards and for imposing social and environmental damage and hurting the livelihood of the local communities. The energy security challenges in Cambodia include lack of access with over 11.3 million people are still not connected to the grid, the high cost of electricity (among the most expensive in the world), and the persistent shortage of supply. This inadequate supply of energy supply could hinder economic growth and the high cost of electricity could drive investors away.

#### IV. Session 3: Water, Food and Energy Security in Laos, Myanmar and Vietnam

H.E. Dr. Chap Sotharith, Advisor and Chief of Cabinet of Deputy Prime Minister H.E. Ms. Men Sam An, and Member of the Board of Directors of CICP, chaired this session, which included three distinguished speakers: 1) Mr. Noupheuk Virabouth, Deputy Director General of the Department of Housing and Urban Planning, Ministry of Public Work and Transport of the Lao PDR, 2) H.E. Amb. Thaung Tun, Member of the Board of Directors of Myanmar Development Resource Institute (MDRI), Yangon, Myanmar and 3) Ms. Do Lien Huong, Team Leader at the Strategy and Policy Research Division, Institute of Policy and Strategy for Agriculture and Rural Development in Vietnam. The three expert speakers shared a different perspective and lessons learned from Laos, Myanmar and Myanmar.

1. **Mr. Noupheuk Virabouth** delivered his speech on "*Urban Water Supply Development toward achieving Lao MDG.*" He shared water security experiences and lesson learned from Laos. One of the Lao Millennium Development Goals (MDG7) for 2011-2015 calls on country to "halve, by 2015, the proportion of people without sustainable access to clean drinking water and basic sanitation." It also targets the ratio of the population having access to clean water would be 80 percent of total population, the ratio of the rural population having access to clean water would be 75 percent of total population, and ratio of the population having access to hygiene toilets would be increased to 60 percent of the total population. The government seeks to meet the vision of "Safe, reliable and accessible water supplies and sanitation for all" by implementing the Seven National Five-year Socio-economic Development Plan. By developing water supply and improving sanitation, poverty will be reduced through economic growth.
2. **H.E. Amb. Thaung Tun** examined "*Change and Transformation in Myanmar: Critical Role of the Energy Sector.*" He shared the Myanmar experience on the critical role of the energy sector to keep pace with population growth, changing life styles and increasing demands. In terms of food security, the challenge for Myanmar is to boost food production to a growing population. Since water is a limited resource, shortage of water may be the most serious problem facing Myanmar to support agriculture. Regarding energy security, Myanmar has many sources of energy, which include biomass, hydropower, wind and solar power. Biomass accounts for 75 percent of total primary energy supply. Only about 26 percent of the total population has access to electricity. Myanmar needs to focus with sudden changes in the supply-demand balance as well to make timely investment to supply energy in keeping with economic growth and environmental protection. Managing its lands, water and energy resources for the benefits of all its citizens and those in the region are key challenges.
3. **Ms. Do Lien Huong** spoke about "*Challenges and Responses to Water, Energy and Food Security: the Case of Vietnam.*" The challenges and responses to water, energy, and food security were addressed. Vietnam has many sources of energy including hydropower, biomass energy, wind energy and solar energy. The increasing trend in energy consumption intensity is visible –twice as much as South Korea. To meet the demand, a large amount of renewable energy sources should be built. In terms of water resources, more than 60 percent of the water supply is originated from rivers from other countries. Vietnam has the highest rate of water evaporation in the agricultural sector with about 95 percent (World Bank 2012). Water scarcity is a big challenge for Vietnam to maintain its place as a major agricultural producer in the



future. Water treatment and reuse are leading solutions for coping with water scarcity. In terms of food security, the availability of food supply is ensured because there is excess of rice supply compare to rice demand in the country. Food accessibility is till problematic for ethnic groups in remote areas and food nutrition has become a major concern – rate of stunting children stagnant for the last 8 years. To avoid food shortage, food accessibility and stability should receive more attention.

#### **V. Session 4: Understanding the Trade-Offs: How Multi-Stakeholders Scenarios Could Support Policy Makers and Investors.**

H.E. Amb. Pou Sothirak moderated this session with the scenarios team of the Consultative Group on International Agriculture Research (CGIAR) composed of 1) Dr. Rathanapeou van den Heuvel, Regional Scenarios consultant for Consultative Group on International Agriculture Research (CGIAR- CRP7) of the Climate Change, Agriculture and Food Security (CCFAS), Visiting Professor ULAB, Visiting researcher Bangladesh Center of Advanced Studies (BCAS), 2) Ms. Maliha Muzammil, Fellow Global Coordinator, Climate Change, Agriculture and Food Security (CCAFS), Environmental Change Institute (ECI), University of Oxford, 3) Dr. Joost Vermont, Scenarios Officer for the Consultative Group on International Agriculture Research (CGIAR) Programme 7, Climate Change, Agriculture and Food Security (CCAFS). The aim of this session is to gather stakeholder views together using scenarios methodology to formulate policy recommendations. Rather than attempting to forecast a single future, scenarios represents multiple plausible directions that future drivers of change take.

After a brief introduction of the scenarios method, the participants guided by the scenarios team were divided into three groups with the aim to help formulate policy and investment recommendations. The participants examined each scenarios looking at the main challenges and drivers of CLMV, asking how to strengthen positive trends? How to prevent or mitigate the negative ones? Each group was asked to present the results.

Three scenarios were discussed: 1) Land of the Golden Mekong, 2) Buffalo Buffalo: water flows uphill and 3) The Doriki Dragon. The three groups discussed and suggested a large range of recommendations within the regional scenarios assigned per table. The participants offered the following recommendations:

##### **The land of Golden Mekong recommendations:**

*The Land of Golden Mekong is a future scenario with some positive elements that were aligned with the participant's own visions, and the discussion was guided by thinking about how these elements could be achieved. Please note that this group was mainly composed of Cambodian participants or international experts of Cambodia.*

- Invest in the Justice system in Cambodia, allocate more national budget to the justice system, and build a legal framework that will enhance legislative power.
- Build an educated civil society by investing more in the national education system with a better balance with the investment in the rural areas through quality teachers in primary and secondary schools but as well a new curriculum promoting new skills and technologies related to agro-business.
- Promote a safe culture for investments (local/ international-private/ public) that will ease the access to funding or credit to all stakeholders from the agro-business (from small- owner farmers to businesses elsewhere in the food system).
- Promote climate smart agriculture in the country.
- Reform tax systems and the use and allocation of taxes across the different ministries

- The main investment on the irrigation system in Cambodia should cover remote areas and ensuring a fair access to water and energy.

### The Buffalo, Buffalo recommendations

*Buffalo, buffalo is a scenario where regional tensions, resource scarcity and a lack of effective governance have crippling effects in Myanmar. Proposals to avoid such a future were made.*

- There is a need to cultivate a better informed and better trained civil society.
- Better coordination and cooperation with the ASEAN.
- Better understanding between the ASEAN countries.
- Regional EIAs with regional stakeholders present and contribute for international rivers.
- Promotion of regional forum (track 1,2,3).
- Use of technology and best practices to mitigate water shortages.
- Ensure maximum farmer participation in decision-making.
- Better dissemination of training.
- Investors should be responsible for subsidizing/ providing training.
- Private investors should provide training on new practices to farmers.
- Prevent land grabbing from the smallholders.
- Move beyond giving out complete monopoly rights to select private sector groups.
- Ensure smallholders can have the same prices as big firms.

### The Doreki Dragon recommendations

*The Doreki Dragon is a scenario of strong economic growth but widespread inequality in Southeast Asia. Participants discussed ways to prevent and/or overcome such inequality in the future of the CMLV.*

#### FOOD

- Rice production high but low food security.
- Diverse views on food security- specialization? Self-sufficiency?
- Specialization=> Political power imbalance (vulnerability of non-food production).
- Rice Speculative commodity, this is a global issue, global financial sector too much power.

#### WATER

- Need to strengthen access to clean water.
- More investment in clean water, but barriers: high costs for rural areas.
- Need better regulation by water authorities.
- Need to think about integrative concept of human security-shift from state centered to people centered.
- Encourage government to follow UN resolutions in sustainable development.
- Persuade business sector that green business more profitable.
- Take a multi- stakeholder approach to water management (include private sector but not privatization).
- Focus on delivery to poor, small scale.
- Need regulation but issue is enforcement in Cambodia.
- Promote change in individual behavior.

## ENERGY

- Promote energy conservation and renewable.
- Beyond large hydropower dams- look to new innovations and how they can be adapted (small scale solar for rural use).
- Pro- poor policy on energy (e.g. Laos).

This publication is part of a CACP core project and activity to raise greater public awareness on issues of importance to both the organization and the larger community. This project is supported and funded by Konrad-Adenauer Stiftung Singapore.

## POLICY RECOMMENDATIONS

### WATER

- Conference participants pointed out the critical importance of water resources for the livelihood and well-being of Cambodians.
- Considering the already low level of adequate nourishment and great importance of water sources for Cambodian food security, protecting Cambodian water and agricultural assets without compromising the energy needs is vital.
- Cambodia is not short of water, it needs sufficient investment in water governance and infrastructure to make good use of that water.
- Currently, the irrigation system is managed by the Ministry of Agriculture and Rural Development, while the river system is supervised by the Ministry of Transport Department. Hydropower plants are managed by the Ministry of Industry and Trade, and water supply for urban areas is supervised by the Ministry of Construction. Lack of clear definition of roles and responsibilities creates jurisdiction issues and prevents effective coordination among the relevant bodies. Strengthening institutional capacity for sustainable management and use of water resources will serve as a basis for flexible coordination and synchronization between all related agencies.
- Since a majority of Cambodians rely on tube wells for household water supply, ground water quality has to be maintained for public health. Underground water management and the proper use of water for irrigation has to be maintained to prevent contamination or depletion of ground water
- Water treatment and reuse should become leading solutions for enhancing the water use efficiency and coping with water scarcity in the future
- Governments must play a greater role in protecting public access to water for sustenance and income generation.
- Individuals and communities should be informed - in an appropriate and accessible language - about the projects that might take place on their land.
- Water security requires regional cooperation, especially with the upstream countries to ensure the extent of water availability to each country with stream flows.

### FOOD

- In order to improve incomes countrywide, or reduce poverty, any significant effort must involve the agricultural sector and improve food production.
- Food accessibility and stability should receive more attention to avoid food shortages in some specific regions and of some specific groups to ensure food nutrition safety in the near future.
- In terms of quality and safety of food, Cambodia needs to work much harder to improve diet diversification of the people.
- Increasing productivity and providing investment incentives for farmers is important to achieve sustainable rural development. For this purpose, farmers should be provided access to land to rent or buy, even if it only involves use-rights and farmers' right to their property should be clear, transferable, inheritable and long term which means arbitrary seizure of property by third parties should be avoided.
- While improvement on the farms is needed, new opportunities for farmer families, especially younger members of the families, are essential as well. Programs should

be put in place providing the rural youth population access to both general education and technical education on farming to improve their prospects in farming jobs and non-farming jobs should they migrate to urban centers.

- Considering the vitality, food security for all the stakeholders involved, promoting research uptake on food security can lead to better use of information with the hope that it shifts the focus from the supply side to the demand side of the research.

## **ENERGY**

- Development should go beyond simple GDP growth.
- In order to achieve sustainability and balance in energy, food, air and water nexus, promoting the use of renewable sources such as solar, wind and water is needed.
- Security with pollution free air is the most fundamental security we have to obtain to ensure sustainable development.
- Security in energy should not be pursued at the expense of security of healthy food.
- Attaining security in energy should not be done by sacrificing security in water.
- The temptation of turning energy, food, water and air into financial and political commodities should be avoided.
- The sustainable use of natural resources should be promoted to obtain long term stable development by reducing capability deprivation, producing energy from renewable resources, supplying healthy and affordable food, providing clean water and sanitation and pollution free air.
- Behavior or lifestyle in line with sustainable development should be marketed as a new trendy and cool behavior. A new norm should emerge that behaving in line with sustainable development is prestigious.
- Demand for energy in Cambodia will continue to increase and for reliable long term economic growth Cambodia needs to achieve energy independence meaning. This should happen in such a way that it should not only satisfy the energy needs of current and future generations in a sustainable way but also take place without posing serious harm to the environment or negatively affect the livelihood of the local communities.
- To ensure that energy projects will provide benefits rather than do harm, local governments must enhance their regulatory role by putting in place clear investment regulations, especially on environmentally sensitive investment projects and compliance should be strictly monitored.
- In order to assess the true cost and benefit of the energy projects comprehensive feasibility studies should be conducted before the implementation of any project.
- Stakeholders, especially in the local communities should be consulted and empowered to express their ideas and concerns.
- While investments are made to increase energy production through hydropower, improving the efficient use of energy and investment in less controversial renewable energy projects like solar power, micro hydropower, biofuel and biogas should be encouraged.

## **WELCOME REMARKS**

### **BY HRH SAMDECH NORODOM SIRIVUDH**

Chairman of the Cambodian Institute for Cooperation and Peace

During a Regional Conference on

### **“THE FUTURE OF CLMV: CHALLENGES AND RESPONSES TO WATER, FOOD, AND ENERGY SECURITY”**

Organized by the Cambodian Institute for Cooperation and Peace (CICP)

With the support of Konrad Adenauer Stiftung

3-4 April, 2014, Hotel InterContinental, Phnom Penh, Cambodia

- Excellency Mr. Sin Khandy, Under Secretary of State, Ministry of Environment of Cambodia
- Dr. Wilhelm Hofmeister, Director, Korad-Adenauer-Stiftung, Regional Program Political Dialogue with Asia
- Distinguished Ambassadors and Members of the Diplomatic Corps
- Excellencies, Distinguished Participants, Ladies and Gentlemen

First of all, it with great pleasure for me to extend a warm welcome to each and every one of you to the Regional Conference on “The Future of CLMV: Challenges and Responses to Water, Food and Energy Security organized by the Cambodian Institute for Cooperation and Peace (CICP) with the kind support from the Korad-Adenauer-Stiftung, Regional Office in Singapore.

CICP is particularly pleased to be able to host this Regional Conference in Phnom Penh as Water, Food and Energy Security in CLMV Countries remain as stumbling issues that can threaten peace and stability and could be the key cause of conflict and possible violence, if unattended properly.

The global picture concerning water, food and energy condition is severely impacted by the effects of environmental change, emitting ceaselessly greenhouse gas into the atmosphere, coupling with rapid population growth, urbanization and economic growth which contributed to the ever increasing demand for water, food and energy by developed and developing countries alike.

Many riparian countries of the Mekong Basin are increasingly considering hydropower as a solution to their growing energy needs. The construction of dams, and the subsequent alteration of the water regime, may pose immediate and long-term threats to food security unless food and water needs are taken seriously into account. Moreover, the challenges go beyond the hydropower debate since other interventions and investments are increasingly claiming considerable portions of the available water and land resources.

Solutions to water, food, and energy security issues will only be sustainable when the three sectors work together in a concerted manner. Water, food and energy security are critical issues that will need to be dealt with not only at local or national levels, but specifically at the regional level. Trans-boundary management guidance is urgently needed to support the sustainable development of the Cambodia, Laos, Myanmar and Vietnam (CLMV) sub-region.

#### **Excellencies, Ladies and Gentlemen,**

Today I am delighted that this regional conference could be held to enhance the understanding of policy makers and legislators in integrating water, food and energy

security into development and natural resource planning across nations and across the CLMV region.

The purpose of this conference is to portray the CLMV's experiences of National and Subnational planning challenges and responses to the issues of water, food and energy security.

CICP is able to invite a selective group of international experts to share their assessment of how these critical issues could be managed by learning on some of the best practices of other countries in the region. In addition, we manage to bring together CLMV scholars, governmental officer, and civil society agent to deliberate on these three issues based on their respective country-specific cases. It is therefore our hope that this conference could stimulate wider discussion among and between the speakers and all of the participants with a view to explore different types of national and regional cooperation that could enhance sustainable mechanisms for development in the CLMV region.

I would like to take this opportunity to express my sincere appreciation for the keen supports from Dr. Wilhelm Hofmeister, Director, Korad-Adenauer-Stiftung, Regional Program Political Dialogue with Asia, without his continuous support and understanding this regional conference could not take place today. In addition, I would like to extend my sincere appreciation to all of our oversea and local guest speakers and chairmen of all of the sessions of this conference for their valuable contributions.

I would like to thank the distinguished Ambassadors from friendly countries, government officials, civil societies and university students who have taken their valuable time to attend and contribute to the conference.

I should not fail to thank H.E. Ambassador Pou Sothirak, Executive Director of CICP and all his team for the wonderful coordination and efficient arrangement in the preparation leading up to this conference.

I shall look forward to actively taking part in the discussion with all of you and wish the conference successful.

Thank you very much for your attention.

**KEYNOTE ADDRESS  
BY H.E. MR. SIN KHANDY**

Undersecretary of State, Ministry of Environment  
During a Regional Conference on

**“THE FUTURE OF CLMV: CHALLENGES AND RESPONSES  
TO WATER, FOOD, AND ENERGY SECURITY”**

Organized by the Cambodian Institute for Cooperation and Peace (CICP)  
With the support of Konrad Adenauer Stiftung

3-4 April 2014, Hotel InterContinental, Phnom Penh, Cambodia

- I would like to pay my respect to **Samdech Norodom Sirivudh**, personal advisor to the King of the Kingdom of Cambodia, the Chairman of Governance Council and the founder of Cambodian Institute for Cooperation and Peace.
- **Dr. Wilhelm Hofmeister**, KAS and the Chairman of Asia Political Program Discussion.
- Excellencies, Ladies and Gentlemen, National and International guests, and all Participants.

First, on behalf of the Ministry of Environment, I would like to express my pleasure to having an opportunity to deliver this keynote address at this very important conference. Nowadays, the pressure of growth such as population growth and economic expansion has created a great need for water resources. At the same time, the global economic crisis also has reduced investment and fund contributions to many development programs. The guarantee of water security will prevent risk of food and energy security, while economic growth and stability accompanied with climate change remain the challenges that Cambodia and the region are facing nowadays. Environmentalists, economists and politicians are discussing and finding solutions for these challenges especially balancing the nexus between water, energy and food security. In the world, this nexus is a very important process and we have seen in the conference on “the Nexus of Water, Energy and Food Security and Solution for a Green Economy” in 2011 at Bonn City, Germany.

Green economy and the nexus of water, energy, and food security have gained more and more acceptance, and it is necessary to pay attention and put ideological statements into real action through specific programs by building strategic relationships at the sub-national, national, regional and global level to move into the future.

- **Samdech**
- **Respected Guests**

Important political priorities in Cambodia are identified in the strategic plan, step 3 of the Royal government (2014-2018). These priorities and concepts reflect the world



situation in Cambodia and the region to ensure effectiveness, efficiency, increased competitiveness, sustenance of high economic growth and the reduction of poverty.

Cambodia has taken a long journey from American war in Vietnam and the Indochina peninsular war, civil war and political economic isolation. Now, Cambodia plays an active role in both regional and global integration. Cambodia, a country which has experienced food insecurity in the past, has become a rice exporter and is ranked among the high ranking countries in terms of economic growth at 11<sup>th</sup> place and 5<sup>th</sup> place on the Century Development Direction index. Water and energy security are still a challenge because Cambodia depends on a cross-boundary basin system. Our energy is very expensive compared to neighboring countries and the rate for families to access to electricity is still relatively low.

Environment and natural resource management has been improved through the strengthening of management work on mineral, forest, fishery and national fish resources, land, water resource management and ecology systems of the Tonle Sap basin and Mekong River. The nation is confronting challenges such as population growth, climate change, and development. We still have low coordination mechanism with other concerned countries in important sectors such as water, agriculture, forest, fishery, energy and infrastructure.

Cambodia, as well as other countries in the Great Mekong Sub-region and CLMV, using the nexus concept on water policy implementation still remains a challenge. For example, the construction of hydro-power dams does not yet include other purposes such as agricultural watering, fishery protection and consideration in terms of hazard sharing that will mutually benefit between people living upstream and downstream. Government states that challenges regarding water security, food security and energy as well as environmental challenges are characterized by cross-sectors. These challenges demand coordination between institutions and stakeholders at the regional, national and subnational level.

Due to environmental management and changes in the economic development for social sustainability, the Royal Government of Cambodia (RGC) adopts multidisciplinary approach for environmental management through:

1. Sustainable Natural Resource Management
2. Efforts to reduce climate change impacts through building capacity and resilience to climate change and other direct economic activities changes.

Particularly in order to strengthening the nexus of water, energy and food security in the international stage, the RGC focuses on prioritizing and fulfilling its roles effectively in all regional and international affairs. The RGC determines to implement effective actions for development and poverty reduction. The Ministry of Environment is cooperating with other national institutions, developmental partners at the subnational level on designing and implementing strategic planning relating to green growth. We noted that direction of the nexus of water, energy and food security and green growth are similar and complement each other on:

1. Promoting growth and poverty reduction particularly for the very poor and the next generation.

2. Promoting environmental sustainability, green economy, job creation and protecting natural heritage and ecology.
3. Ensuring effective use of land management and natural resources in order to strengthening quality of life and resilience to natural disaster, climate change, and other economic activities.

The nexus and green growth's activities demand consideration, commitment and real capability at the national and the subnational level. In terms of CLMV sub-region, we examine some considerations on the requirement of the nexus, especially considerations on how can development in some areas can contribute to promote food, water and energy security to other areas. We should consider what mechanisms are to ensure hazard sharing and benefits between communities and countries in the upper and lower area, particularly for the most vulnerable communities.

Meanwhile, I also wish to have a discussion and exchange on the political administration and technology in response to the growing of need of energy usage as well as addressing the positive and negative impacts on food and water security. Understanding of intersectional relations, such land use, food production, urbanization, population growth, and environmental protection are necessary. Inter-sector relation and interdependency of all sectors are even more important for the preparation of an energy development plan. I would like to confirm that water food and energy security are necessary factors for sustainable and equitable development that can be achieved only by using the integrated approach such as the nexus of water, energy, and food security or Green Growth.

This multidisciplinary approach is an opportunity for policy makers, private sector leaders, investors, civil society and the public to address the challenges facing important development through important resources management such as water, energy and food security. I hope to have a full participation from all stakeholders in this project' efforts.

Finally, I wish Samdech, Excellencies, Ladies and Gentlemen, National and International Guests and the conference a success. May you receive the four blessings of Buddha: long life, prosperity, health, and happiness.



# ACHIEVING RURAL DEVELOPMENT AND FOOD SECURITY IN CAMBODIA: LESSONS FROM INDONESIA

Richard Barichello

## Introduction

One of the priority areas for most countries within the Cambodia-Laos-Myanmar-Vietnam (CLMV) group is to improve food security. But the concept of food security is used in many ways, making it important to define clearly what we mean by this term. A standard definition is "...". But to make it more clear what we mean by the term, we suggest measuring food security as the share of food expenditures in total household income. There is a negative relationship between food security and the budget share spent on food: food security increases if the ratio falls, or decreases if the ratio rises. The ratio can fall (improved food security) if the numerator falls, such as from food becoming cheaper, or from the denominator rising, such as from rising incomes. A measure such as increased import tariffs for rice will make rice (food) more expensive and so will reduce food security.

Improving rural incomes serves two objectives. It not only improves food security by our definition above, but it helps reduce poverty. If done with appropriate (high-payoff) investments in the agricultural sector, it will also generate increased domestic production and possibly more exports (or fewer imports). The collection of policy measures that increase farm and rural incomes, and possibly increase efficient and environmentally sound farm production, can be described as "rural development." So achieving a higher level of rural development, by this broad definition, will not only meet many poverty reduction, environmental, and developmental goals but will also meet a food security goal. We now turn to a set of guidelines on how this can be accomplished in Cambodia, doing so by drawing on lessons from Indonesia.

Some basic facts about Cambodia are that it is predominantly agricultural, and although declining, the share of agriculture in national GDP is still relatively high at 36 percent (2012, WB WDI). This share fell sharply from 50% in 1995 to 32% in 2006-2007, after which it has grown slightly. The share of the Cambodian workforce involved in farming is 51 percent (2012, WB WDI), which is almost half more than the agricultural share of GDP, showing that agricultural labour productivity is still much lower than that in the non-agricultural sector. Agricultural value-added in Cambodia has grown rapidly (4.5%/yr) in the last 19 years (for which we have data), but farm incomes are highly variable and remain lower than non-agricultural incomes. About 80 percent of the country's population is rural, and the rate of rural poverty is almost triple that of the urban population (23.6% vs 8.7% in 2012, measured at rural and urban domestic poverty lines, respectively (WB WDI)).

If one wishes to improve incomes country-wide, or reduce poverty, any significant effort must involve the agricultural sector and improve *rural* development. This is a complex task, achieving numerous objectives and can include diverse strategies. In this paper I provide a checklist of some of the tasks that lie ahead, and draw lessons from Indonesia's experience so that Cambodia can avoid its mistakes but follow its successes. Although we focus on economic dimensions of rural development, similar lists of governance issues and technical elements needed for agricultural success can be drawn. We will first review the key elements that must be considered in devising policies that enhance rural development, and then look at a specific country within the ASEAN region, Indonesia, to see how that country has chosen to deal with this policy area, pointing to the strengths and weaknesses of its policies.

We define rural development, starting simply, as an increase in the incomes of those people who live in rural (non-urban) areas. It could be defined more broadly to cover diverse elements such as infrastructure, education or literacy rates, mortality rates, etc., but incomes are needed for financing these other components of human development, and such measures are typically correlated, so we use the more widely available income data.

Rural development is broader than agricultural development by including all non-farm activities in the rural area, including the food (value-added) sector and non-food activities in addition to farm production. Those incomes can be generated by farm income, and wage incomes in trading, food processing, and the non-farm goods and services economy. They are enhanced by better rural infrastructure, rural education, and health care. Rural development is closely related to food security, as noted above, but is broader. An inferior definition of food security is self-sufficiency in food, which at best is much narrower than rural development; attempts to increase self-sufficiency often worsen rural development. A better definition of food security is the level of food expenditures (including the value of home production) divided by household income. Rural development explicitly increases the denominator, helping achieve food security. Poverty alleviation is focused on increasing incomes of the bottom segment of the income distribution, so is a narrower concept than rural development, which would include raising *all* rural incomes. But rural development efforts can be designed to include or even focus on raising incomes at the lower end of the income distribution.

### *Output market measures*

One major issue is to decide how much to focus policy measures on the agricultural sector compared to how much to focus on the non-farm sector. We begin by looking at agriculture. One of the more important areas of policy is the output sector, which means the set of policies that affect farm output prices. There are many options, from leaving farm markets alone domestically, to allowing open trade with minimal import or export barriers, to possible subsidies or taxes on the farm product. The greatest gains to economic growth are typically achieved if domestic prices reflect world prices. This means that generally a country seeking economic development should refrain from engaging in export taxation or export bans, and similarly refrain from import quotas or significant import tariffs. In addition, a country should avoid subsidizing domestic prices, at least on an across-the-board basis. Agricultural product subsidies invariably become very expensive if the crop involves any reasonable scale of output. Not only does this mean the measure is rarely financially sustainable but it takes scarce budget funds away from critically important investments such as infrastructure and education. It also usually leads to the capture of the policy process by lobbies for the recipient groups. These guidelines are general, subject to periodic exceptions in special circumstance, so output market policies in actual situations must be handled artfully, with nuance and flexibility.

### *Input Markets*

More serious attention is needed on agricultural input markets, and policies related to them. Here we are talking about research and extension expenditures, including farmer training, better seeds and cattle genetics, better on-farm practices and know-how, including how to shift to more environmentally sustainable practices. In addition we include credit market options for borrowing and saving, agricultural labour issues including broader education, skills training, health, the ability to migrate successfully, land access which means the ability to purchase and rent, as well as land tenure security (respect for property rights, freedom

from land grabs), irrigation, rural infrastructure (transport and communication), and power (typically electrification).

### *Research and Extension*

The ultimate goal of research and extension investments is to increase agricultural productivity across various inputs (increase output per unit input). If successful such investments provide competitive advantages for specific sectors, as well as individual firms. It can be aimed at new innovation or adaptive research that takes international research results (e.g., varieties) and adapts them for local conditions. Then one adds extension and training programs to transfer these research results to farmers. These innovations can be output-increasing (e.g., higher yielding or disease resistant seeds), labour-saving (forms of mechanization for high cost labour regions), land-saving (for high cost land regions), or provide better know-how (e.g., better nutrition for cattle). It can provide for better land/chemical/fertilizer management to improve environmental stewardship and practices that are sustainable. Public research is important (it often meets the definition of a “public good”), but private sector research is highly valuable for inputs that can be sold privately (e.g., tractors, patented seeds).

### *Credit Markets*

These markets can almost always be made more efficient and accessible by introducing reforms to supply more credit to small farmers. This can be done through existing banks that have widespread numbers of branches in rural areas, or by small new lending institutions through NGOs. Partly this exercise involves cutting the margins by making more efficient lending decisions based upon farmers’ repayment ability instead of just their collateral levels. Interest rates should be high enough to cover the costs of savings (the supply of credit), plus margins, to be sustainable to the financial institution. Rates of 3-4 percent per month are typically still profitable to the borrowing farmer in a developing country. Subsidized credit almost always does not work because it induces lower repayment rates (due to excess demand), so such programs are virtually always unsustainable. Savings programs are also an important part of credit market reforms to tap available savings and provide the supply for lending activities. Indonesia has initiated a successful and sustainable model through the state bank, BRI (the KUPEDDES and SIMPEDES programs).

### *Land Access and Security*

Farmers need access to land to rent or buy, even if it only involves use-rights, in order to provide for higher levels of land productivity. To achieve this it is important to avoid regulations that inhibit either market. It is even more important to provide secure tenure to farmers so they have an incentive to invest in increasing their land’s productivity. This means that the farmer’s right to his/her property is clear, transferable, inheritable, and long term (e.g., 20+ years), and that this right can be upheld through a legal system that is judged to be fair, and which allows land to be used as collateral for loans. What this also means is that one should avoid laws that allow arbitrary seizure of property by others, whether the others are the State or private land developers. If farmers’ lands are to be taken, there should be compensation rules that tie the compensation the farmer receives to market values of that land, or values that closely mimic such values. Vietnam’s model here is quite good, where the State owns all the land, but they allow farmers to hold use rights that can be transferred permanently (buy/sell) or temporarily (land rental).

### *Agricultural Labour*

Agricultural labour markets exist widely, at least during peak labour periods, but two issues are critical. First, growth in labour productivity is a key component of overall economic growth, and it is improved by higher education and health levels. General education is highly valuable for literacy and numeracy, including the ability to learn to use mobile phones and their apps to learn farm prices and gain access to extension training. Technical agricultural training is also valuable. But the ability to migrate is also highly valuable, both for the farm family member to earn additional income to help finance farm investments and to gain useful skills from off-farm jobs. Migration can be increased by removing government restrictions on migration, by education levels that make rural kids competitive for jobs with village/urban kids, and by infrastructure that allows for good communications (mobile phone networks in particular).

### *Importance of the Non-Farm Sector and Migration*

The last paragraph points to the importance of access to off-farm jobs and migration to urban regions. This is *under-appreciated* as a very effective pathway to poverty reduction, especially for the young. It does not matter whether the migrant moves for the long term or the short. The key is gaining access to higher incomes and skills from non-farm jobs, either in off-season for farming activities or for more permanent shifts to off-farm jobs. This can raise incomes of farm people very effectively, especially for those with small land holdings, limited access to capital, or debt to repay. But it requires a vibrant non-farm economy and job creation, especially for lower skilled jobs that rural migrants can fill. So the government objective of creating non-farm jobs and generalized economic growth is a particularly valuable means of solving *rural* poverty. Rural youth also need the education to compete with urban youth, physical access through adequate infrastructure, and access to information about where job options exist.

Migration is best seen in the context of the family. Some family members, notably the young, have the best prospect for migration or shifting to off-farm jobs. It should be realized that this is a step-wise process: from farm to nearby village, from that village to small towns, from such towns to regional centers, and from those cities to large cities. What makes this process important is that in a growing nonfarm sector, its wage rates are typically higher than those in agriculture; the non-farm sector has higher productivity jobs than those in agriculture. Put differently, a modernizing agriculture needs fewer farmers. Exits should and do occur by those with less comparative advantage in farming. Moving people from low productivity jobs to higher productivity jobs is the essence of economic development that raises incomes for all. It is also what individual low income farmers see as the route to raising their own incomes. In other words, this is a private process of job movement and migration that is enhanced by but not dependent upon government policy.

There are, however, important implications for government policy in this situation. As people exit from agriculture to higher paying jobs elsewhere, the wage rate in the agricultural sector will rise due to the reduced supply of agricultural labour. This migration process raises wages for both the migrant and ultimately for those who stay in farming. Note that migration from rural to urban areas may impose costs on urban unskilled residents by keeping their wages from rising as quickly as they otherwise would. As a result, they often oppose such migration or fight it. At the same time migration helps urban businesses by keeping their wage rates lower. Migration requires no government expenditure or policy, aside from not restricting it or getting in the way. It is growth-enhancing and poverty-reducing. However, governments can help migration by investing in

rural education and health, by providing information about job openings, and by improving rural infrastructure.

### **Indonesia's Rural Development Experience**

Indonesia had great success in poverty reduction over the 1970-1997 period, until the Asian Financial Crisis, and over this period was one of the most successful in relative poverty reduction in Asia. Yet surprisingly, it has a poor track record in agricultural productivity growth (worse than Cambodia). Its agricultural sector is large (13 percent of GDP), it is an internationally significant producer or exporter of rice, palm oil, coffee, rubber, cocoa, and spices (cinnamon, nutmeg and cloves). But agricultural GDP grew at only 2.3 percent per year from 1990-2005, less than half of the 4.8 percent growth in Indonesia's total GDP. To compare, Cambodia's agricultural GDP grew at 4.9 percent per year from 2001-2012. Out of 13 developing countries in Asia, Indonesia ranked 10<sup>th</sup> in terms of its agricultural GDP growth rate. The same situation existed in the 1980s, so this is not a new issue for Indonesia. It is also true in certain large sectors of agriculture, notably rice and sugar. So despite the size of Indonesia's agricultural sector, it is a serious under-performer in this important dimension.

#### *Situation for Rice*

Why might this be so? One must consider the country's policy framework as a highly plausible explanatory variable. Indonesia is the third largest rice producer in many years, and the largest per capita consumer (140kg/cap), but its rice policy is significantly protectionist due to its rice tariff and the exclusive import rights granted to its 'famous' state owned enterprise (SOE), BULOG. The result of these measures is that rice prices are 50 percent above world prices now, about the average margin since 2000, but much higher than was observed in prior years (the 1970s, 80s and 90s). This has resulted from strong lobby pressures from rice producer interest groups ever since the democratic post-Suharto reforms. Also, there has been a longstanding crop bias in government support toward rice, despite recognition at the highest levels of the need to diversify crop production and increase support to other food crops since the mid 1990s. This kind of policy reform has been steadfastly resisted by BULOG and the Ministry of Agriculture. Budget support to BULOG is roughly USD0.5 billion, plus a fertilizer subsidy that heavily benefits rice, costing about 2 billion USD.

The outcomes for rice are (a) a very large budgetary cost, dwarfed only by the country's costly gasoline subsidy, (b) the highest rice prices in Asia, (c) a large environmental cost arising from high fertilizer applications due to the fertilizer subsidy, and (d) low agricultural productivity growth, in an agricultural sector dominated by rice. The World Bank described the rice sector's high cost, low productivity problem along with its corruption, as follows: "No parliamentarians have been willing to take on these dual dimensions of the rice program simultaneously, and so the huge budget subsidies that accrue to BULOG to run these program, and the corruption that accompanies them, go unchallenged." (World Bank, 2008, quoted in Barichello and Patunru, 2009).

#### *Outcomes for Non-Rice Food Crops*

In other non-rice food crops (e.g., sugar, soybeans, corn), we observe the same focus on domestic self-sufficiency and trade protection as in rice. It is not possible to produce all these crops at sufficient levels to yield self-sufficiency, given that they all compete for a similar set of resources, notably land. And there have been no matching efforts to increase supply

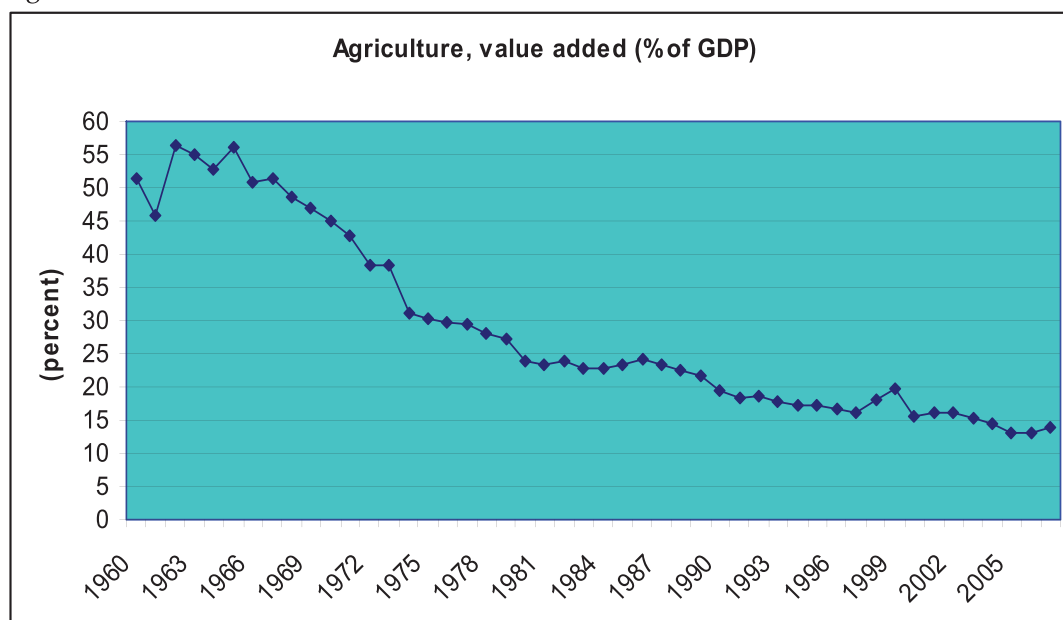


capabilities through agricultural research, given the low levels of agricultural research and extension public support. All one observes is a biofuels policy that adds a subsidy estimated to cost \$100 million in 2007, plus regulatory requirements for gasoline makers to add biofuels (mandated). This program has been widely criticized as a bad investment, with high environmental costs due to the associated deforestation, and elevating the price of some food crops.

### *Lack of Agricultural Productivity*

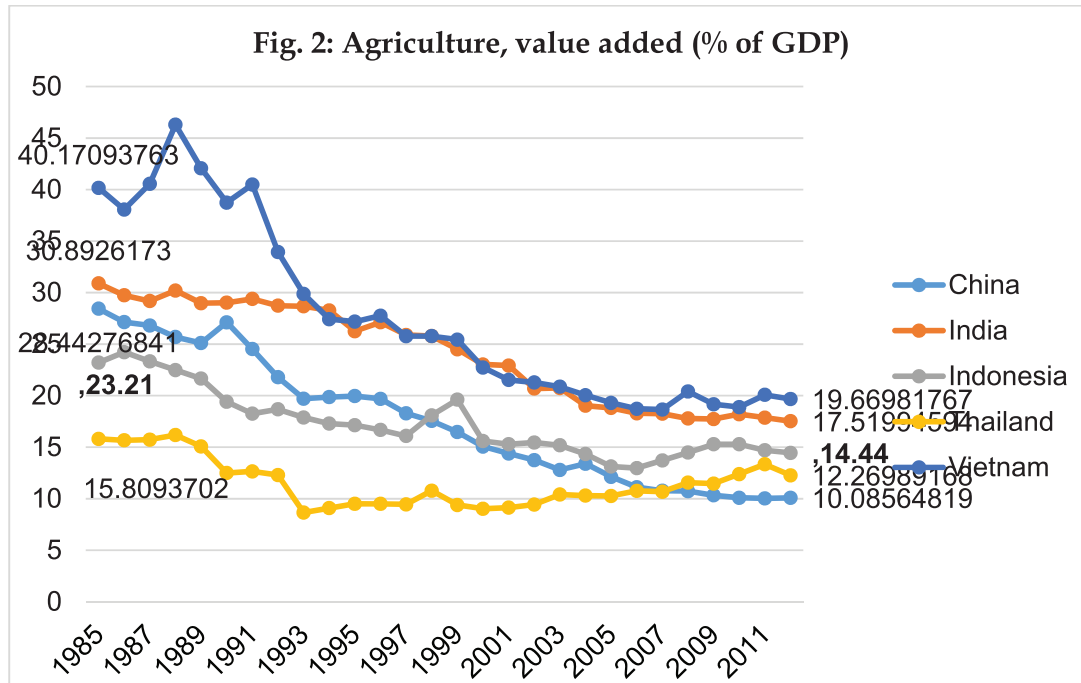
Another reflection of the disappointing productivity performance of the agricultural sector is the time pattern of agriculture's share of GDP. With a normal path of economic growth, agriculture's share of GDP steadily falls over time as labour and other resources shift to sectors whose income elasticities are larger and productivity is higher. But Indonesia's share has flattened since the early 1990s and stagnated since 2001 (see Fig 1). If this happened following the spike in agricultural commodity prices, it would be no cause for concern but a spike did not occur until 2007. This suggests that the transfer of labour to the higher productivity non-farm economy is occurring sluggishly, reducing the country's overall economic growth. This is corroborated by the observation that non-agricultural productivity growth is double that of the agricultural sector. It should be noted that high annual crop prices in import competing sectors in Indonesia, notably in rice, sugar, corn and soybeans, have done nothing to change this situation. Without productivity growth (e.g., yield growth or cost reductions), Indonesian agriculture loses its comparative advantage. Then the only hope of reducing reliance on imports is to restrict trade and raise domestic prices, exactly the policy the country has adopted for those crops.

Figure 1:



The decline in the share of agricultural value-added is also below that of all but three other Asian countries. As is shown in Figure 2, Indonesia lags substantially behind the performance of China and Vietnam. The annual rate of decline in the agriculture share of total GDP for Indonesia from 1985 to 2011 was 1.8 percent. For Vietnam it was 2.7 percent,

and for China, 3.9 percent. These latter two countries have both achieved strong growth rates in agricultural value-added, are regional competitors in many farm products, and they illustrate what can be accomplished.

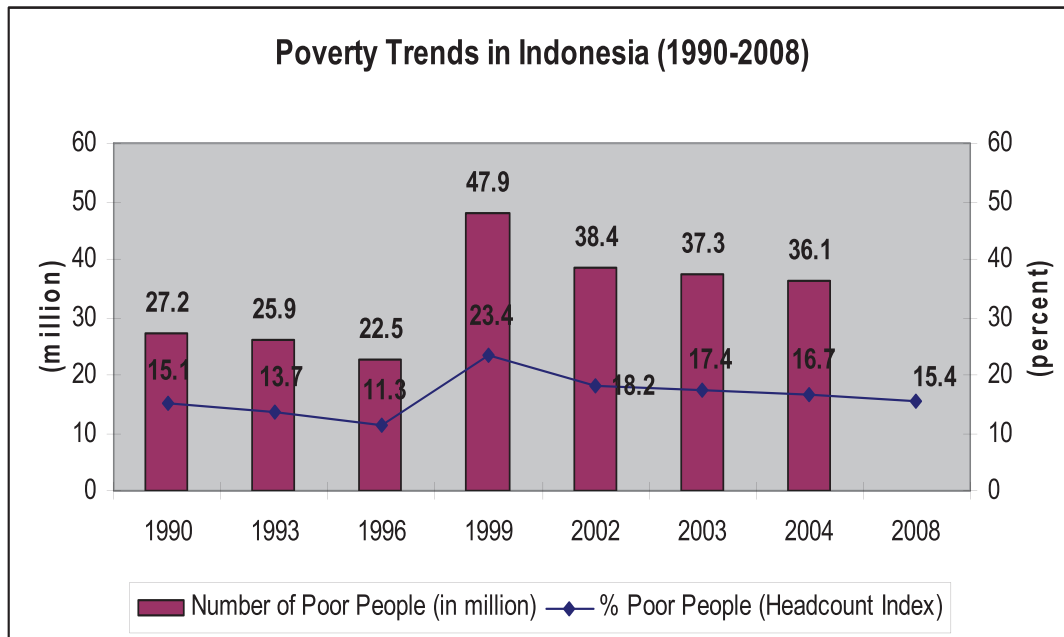


### Poverty Alleviation

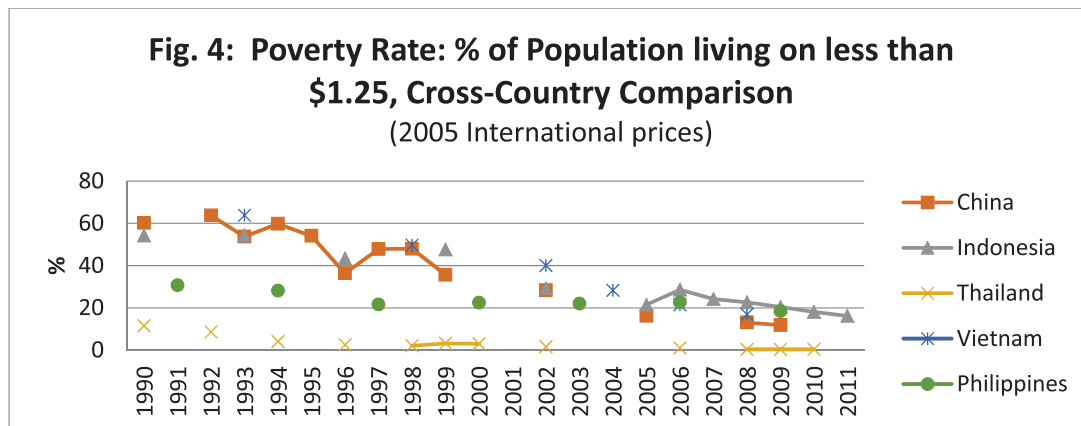
A final point of comparison is poverty reduction, still a major issue in Indonesia. Many agricultural policies like those discredited above embrace the rhetoric of poverty alleviation, including the rice price supports, but this is only rhetoric. High rice prices have hurt all Indonesian consumers, most of all poor consumers, and as well have hurt the poorest farmers who are net consumers. In addition, they have done little to raise agricultural wage rates to benefit agricultural labour in agriculture. Increases in the non-farm demand for labour have had ten times the effect on agricultural wage rates as has the post 2000 rice price increase (Harahap and Barichello, 2014). Instead, the benefits of high rice price policies have been strongly tilted to raising farmland prices, benefitting those landowners, and increasing income inequality.

The gains that have occurred in poverty alleviation, some of which are shown in Figure 3 from 1990 to 1996 (-4.7%/year), and after 1999 to 2008 (-4.5%/year), were more prominent in the decade or two prior to 1990. These gains have arisen from (1) strong non-farm economic growth, and (2) a dynamic rural labour market that features (3) substantial off-farm employment and (4) high levels of rural-to-urban migration. However, even those positive elements have not been enough to generate a very impressive pattern of reduced poverty as is seen in Figure 2. The lack of support for reduced poverty arising from the post-1990 relatively stagnant agricultural sector is part of the problem. These data use the Indonesian poverty line as the measure of poverty. If you use instead the internationally comparable value of incomes below US\$1.25/day (World Bank, WDI), you get the data in Fig. 4, and a rate of decline in poverty from 1993 to 2008 of -6.7% per year.

Figure 3:



What figure 4 also allows one to see is the experience of China and Vietnam in poverty reduction. The rate of decline in poverty for China is the most impressive over this period at -9.1%/year, while for Vietnam the rate of decline is a very similar -8.7%/year. These two countries' poverty reduction success can be described as outstanding, and Indonesia, at -6.7%/year, has lagged them considerably. However its performance is still relatively strong, notably in comparison with the Philippines, whose poverty rate declined at only 2.7%/year.



*Conclusions for Cambodia from Indonesia's Experience*

Indonesia has a mixed record when it comes to its policies for rural development. It has done well in terms of its non-agricultural growth, its moderate support of rural infrastructure and education, and its open migration policy. This has had positive beneficial effects on reducing rural poverty, although its performance over the past two decades has not matched the successes in those areas enjoyed in China and Vietnam. However, many of

its direct agricultural policies have been overtly protectionist, expensive, and unsuccessful, in terms of agricultural exports, agricultural productivity growth, and contributions from agriculture to overall GDP. This says nothing of the high budgetary cost of its fertilizer subsidy and support of BULOG operations. Rural credit policy has been a success but it is an exception. These outcomes, both those favorable and those disappointing, represent lessons from which a country like Cambodia can learn a great deal. On agricultural productivity, export growth, and its general agricultural policy framework, Cambodia can learn much from Vietnam. Adopting Vietnam's agricultural successes with Indonesia's labour market and migration success would represent a highly desirable policy mix to achieve strongly positive rural development and food security outcomes.



# TOWARDS SUSTAINABLE DEVELOPMENT: SECURITY IN ENERGY, FOOD, WATER, AND AIR WITH A PERSPECTIVE ON CLMV

Aris Ananta & Evi Nurvidya Arifin

## 1. A New Development Paradigm

### 1.1 The Future We Want: Sustainable Development

The General Assembly of United Nations adopted a resolution entitled “The Future We Want” on 27 July 2012. This resolution renewed the United Nations’ commitment to economically, socially, and environmentally sustainable development – a development which provides economic, social, and environmental needs of the current generation without sacrificing the ability of the future generation to produce their own needs. The sustainable development is inclusive and people-centred, for all people, regardless of ages and gender (United Nations, 2012). Sustainable development is also closely related to elimination of capability deprivation, both poverty and disability. We believe that this is also the “Future that CLMV Wants” sustainable development.

With the “Future We Want”, in this paper we provide perspectives on security in energy, food, water, and air, which can be applicable in CLMV. As the “Future We Want” is basically concerned with people as both producers and consumers of development, we also discuss difference in population dynamics – as a market and production base – in CLMV and some possible implications for the securities of energy, food, water, and air in these countries. Including air -- in addition to energy, food, and water-- in the discussion of security is the first contribution of this paper. Another important contribution of this paper is its discussion on some important aspects of energy, food, water, and air – the interlink among the four issues, relationship of securities with global financialization and political power, and conflicting approaches to create securities in energy, food, water, and air.

This paper does not attempt to make a detailed examination of securities of energy, food, water, and air in CLMV. This paper, however, provides a brief discussion on the issues as related to sustainable development in CLMV, in comparison with those in other Southeast Asian countries and some rich countries in the world.

### 1.2. Not the Future CLMV Want

As discussed by the UNDP (2011), we are now moving from a world “empty” of human-made capital and “abundance” of natural resources to the opposite one, with an “abundance” of human-made capital and “scarcity” of natural resources. This path will not produce sustainable development. This is *Not* the Future CLMV Wants. A conventional economic growth-oriented development paradigm emphasizes the exploitation of natural resources and cheap labour, without attention to its environmental and social impacts. This trend is not sustainable, and neither is the Future CLMV Wants. If the trend is not reversed, the future generation will not have an ability to produce goods and services for their own needs.

Sustainable Development Goals (SDG) does not emphasize the size and growth of GDP. It does not target high economic growth, such as a double-digit economic growth rate. Economic growth remains important, because without economic growth, little can be done to increase the welfare of the people. However, the message is that economic growth is only one of the many means of development, rather than the goal of development.

Providing future generations with greater GDP (more goods and services) to compensate them for polluted air, dirty water, infertile soil, and unhealthy food they consume is not the Future We Want – is not a sustainable development. (UNDP, 2011). For example, we do not want to see a booming industry selling bottles or tubes containing fresh O<sub>2</sub> because the air we breathe has been heavily polluted – fresh clean, unpolluted, air is no longer free. This kind of industry promotes economic growth, but this is not the Future We Want. The future generation will condemn us because we bequeath a harmful environment to them, though we compensate them with a much larger amount of goods and services.

### **1.3. Beyond GDP Growth**

Our development should go beyond simple GDP growth. It is not simply replacing the conventional GDP (brown GDP) with green GDP. Green GDP adjusts GDP and savings for environmental quality and resource exhaustion. Adjusted saving indicates overall capital in the economy, a combination of financial, physical, human, and environmental capital. It assumes that each of these capitals are perfect substitutes, meaning, for example, that financial savings can compensate for a loss in natural resources. Adjusted savings is a measurement of saving that has taken into account investment in human capital, depletion of natural resources and cost of pollution, indicated as a percentage of Gross National Income (GNI). A negative value means an unsustainable path.

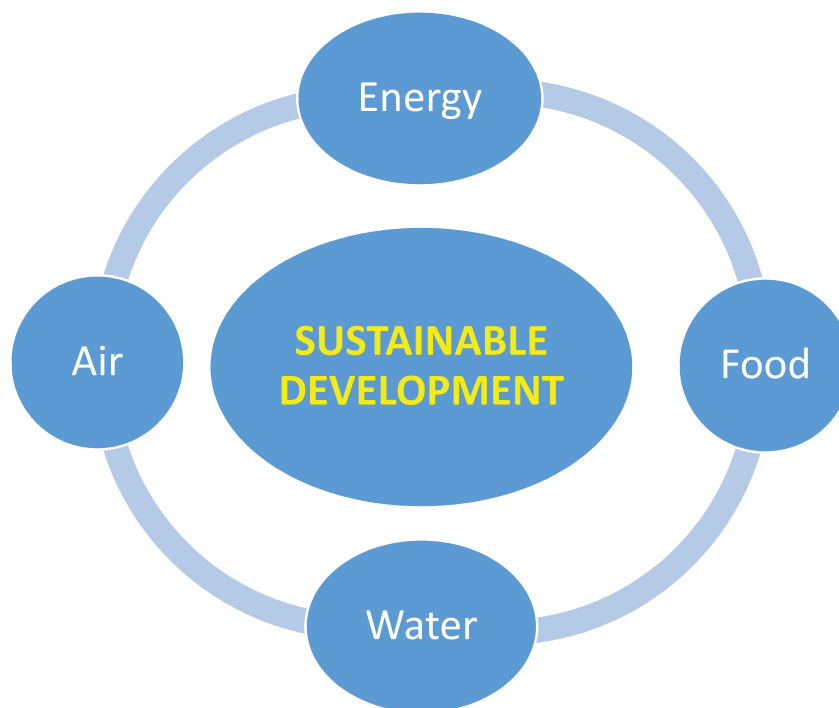
This measurement of sustainable development is often called *weak sustainability*. The problem with this measurement is that everything is measured in money. A natural disaster in a poor region will have a small impact on the GDP, but a less severe natural disaster in a rich region will cost the GDP a lot more. This adjustment misses many important issues, such as evaluating the health status, and particularly the welfare of the population.

On the other hand, as further discussed in UNDP (2011), measuring *strong sustainability* uses composite indices, rather than a single index. It aggregates social, economic, and environmental indicators into several indices, depending on the social, economic, and environmental dimensions. Five examples of this measurement are ecological footprint, environmental performance index, carbon dioxide emission per capita, greenhouse gas emission per capita, and primary renewable energy supply. These indicators are expected to stress the importance of strong sustainability by emphasizing poor performance and deterioration on any aspect of development.

## 2. Three Aspects of Energy, Food, Water, and Air

### 2.1 Interlink and the importance of air

Figure 1. Sustainable Development



*Source: designed by the authors*

The four issues are interconnected. Energy is needed to modernize our economy. Without energy, it is difficult to enable the economy to grow. However, producing energy is not without costs. Some energies use non-renewable resources, and too much exploitation for current use (including export) may deplete the sources for future uses. At the same time, producing the energy may be accompanied by harmful impacts on the environment, which will then much reduce the welfare of the people. Producing energy may destroy the quality of air, thus endangering the effort to have pollution-free air. Producing energy may also pollute the water, which will jeopardize our effort to provide security with safe and clean water. Producing energy may also mean competing with the sources to produce healthy and delicious food. It is therefore important to promote the use of renewable sources, such as from solar, wind, and water, which are also environmentally friendly.

Though energy is much needed for economic growth, with less energy human-beings will still survive if they have a sufficient amount of healthy food. Therefore, security in healthy food is more fundamental than security in energy. Nevertheless, producing food is not necessarily environmentally friendly. Livestock is an important source of methane emission which contributes significantly to global warming. The use of fertilizer and the practice of wet paddy farming produce nitrogen, which is also an important driver of global warming, and polluting water in streams and rivers. Therefore, we need to promote food habits which emphasize plant-based diets. This is environmentally friendly and promotes health by reducing the consumption of meat and dairy products. In other words, security in energy should not be pursued at the expense of security in healthy food.



Though food is very important for the survival of human being, people can still survive without food for months if they can still have safe fresh water. Thus, security of safe fresh water is much more fundamental than security of healthy food, and thus much more important than security in energy. In other words, attaining security in energy should not be done, for example, by sacrificing security in water.

In the absence of safe and clean fresh water, people may still survive if they live in an environment with pollution-free air for days or several weeks. However, without clean air, people will die in minutes. In a nutshell, security with pollution-free air is the most fundamental security we have to obtain to ensure sustainable development.

## **2.2 Financialization of Natural Resources**

In macro-economics, we learn about the difference of the “real sector” (which produces goods and services) and the “financial sector” which produces “money” to facilitate the production and consumption of the goods and services. In other words, the financial sector is supposed to be a means in the production and consumption for the “real sector.” However, since the 1990s, the growth of world financial sector has greatly exceeded that of the real sector the sector that is supposed to be merely facilitated by the financial sector. Thus the financial sector has become its own world.

The best people are attracted to the financial sector. Money and all its derivatives has become a special commodity, especially for speculative purposes. The price of a commodity can fluctuate without necessarily meaning that the value of that commodity changes. This kind of economy is sometimes called the Finance Insurance Real Estate FIRE economy, an economy which depends of finance, insurance, and real estate, or at other times called a paper economy, not the real economy. Financialization of a commodity from the real sector makes the commodity that is sold and bought in an ordinary market, but the commodity is seen as a financial instrument, subject to speculative behaviour by the financial sector.

Unfortunately, financialization of the economy has been spreading to more and more commodities. Not only real estate, but also energy. As discussed in a note by Tricarico and Amicucci (2012), financialization has invaded almost all commodity markets including those social reproductive systems (pensions, health, education, and housing) and natural resources.

At the same time, as mentioned in the note, the global economy has changed partly because of rising global competition to control natural resources. The rising global competition is not merely attributable to fast industrialisation and emerging economies given limited natural resources; but also because of neo-geopolitical dynamics to control the flow of natural resources as an important means to direct future markets, political relations and economic supremacy. In other words, the financialization of natural resources has and will also make natural resources important global political commodities.

Among natural resources, we already see the financialization of energy. Energy has become a financial instrument and a strategic global political commodity. Financialization of land/ food has also been seen. However, financialization of water is still at the beginning stage, being conceptualized by some strong financial speculators. Later, it is not impossible, that air, too, will become a financial instrument and later, a global political commodity. Those who can control clean air will survive and be able to control other countries.

People all over the world will compete for scarce energy, food, water, and air. Natural resources will not only be an economic commodity, but also global financial and political commodities.

### **2.3. Between Free Trade and Self-Sufficiency**

There are two extreme approaches to create security in natural resources: free international trade and self-sufficiency. The free international trade approach lets the market work without intervention from the government. An economy should produce its own best competitive advantage. It does not have to produce everything, including natural resources, by itself. From free international trade, an economy can export goods it has for a competitive advantage, and imports natural resources. For example, it can also import bottles of pollution-free air if the air in the country has been heavily polluted. To guarantee the security, the country has to diversify the sources of energy, food, water, and air so that a country does not depend on a small number of countries.

On the other extreme, there is a heavy emphasis with nations on producing their own energy, food, water, and air. There is no international trade. This approach eliminates the risk of being manipulated by other countries. However, this approach also has its own weaknesses, if a country cannot produce anything it wants for its people. Furthermore, by closing itself from foreign competition, the domestic price of energy, food, water, and air can become very expensive. A few oligarchical businesses may benefit because of lack of competition from the global market.

The third approach is a combination of the two. Most countries use the third approach. The difference is only the degree of free trade and self-sufficiency. A country which promotes free trade also attempts as much as it can to provide its own energy, food, and water. A country who believes in self-sufficiency also still need to import energy, food, or water. Hopefully, no country will need to import pollution-free air.

## **3. Some Conditions of Natural Resources in CLMV**

### **3.1 Poverty**

Column 2 in Table 1 shows poverty measured in a multi-dimensional index (MPI). It refers to a percentage of the population that is multi-dimensionally poor, adjusted by intensity of deprivation. It indicates multiple deprivations at the individual level in education, health, and standard of living. A threshold of 33.3 percent is used to distinguish the poor from non-poor. Those below 33.3 per cent are considered as non-poor. Those between 20.0 percent and 33.3 percent are non-poor but vulnerable or having risk becoming multi-dimensionally poor. Those with an index above 50.0 percent are severely multi-dimensionally poor.<sup>1</sup>

Among CLMV, Laos has the highest poverty index, having 26.7 percent of its population considered as multi-dimensionally poor. Cambodia is the next one, not far below Laos, at 25.1 percent. Vietnam is the best, with a relatively very low index, only 8.4 percent of its population considered to be multi-dimensionally poor. Vietnam is even slightly better than Indonesia, the largest economy in Southeast Asia, where 9.5 percent of its population was considered multi-dimensionally poor. However, the index in Vietnam is still much higher than Thailand, where only 0.6 percent of its population are considered multi-dimensionally poor. At 15.4 percent, Myanmar is much better than Laos and Cambodia, but its poverty index is still much higher than that in Vietnam.

The challenge is whether it is possible that CLMV achieve multi-dimensional poverty index at most 0.6 percent in 2030, as Thailand has done.

### **3.2 Ecological Footprint and Environmental Performance Index**

Ecological footprint shows the amount of biologically productive land and sea areas sacrificed by a country in order to produce and consume its goods and services as well as to

absorb the waste from the production and consumption. Cambodia is the best with only one hectare per capita, followed by Laos, Vietnam, and Myanmar. The range of the index is not wide, only between 1 hectare (Cambodia) and 1.8 hectare (Myanmar). However, the ecological footprint in CLMV is much better than in Singapore, with 5.3 hectares, the worst in Southeast Asia. Malaysia is the second worst, with 4.9 hectares. Furthermore, the ecological footprint in rich countries is much higher than those in CLMV. For example, the United States' ecological footprint is 8.0; and that of Australia, 6.8.

Interestingly, an ecological footprint is not positively correlated with environmental index, which consists of 25 performance indicators from 10 policy categories, including both environmental public health and ecosystem vitality. In term of performance indicators with regards to environment, Cambodia is the worst in CLMV, though it is the best in term of its ecological footprint. However, among CLMV, the range of the performance indicator is also narrow, from 41.7 in Cambodia to 59.0 in Vietnam.

Singapore is the best in Southeast Asia, with 69.6, though it is the worst in ecological footprint. In rich countries outside Southeast Asia, the performance indicator can be as high as 81.1 in Norway or 73.4 in New Zealand. It should be noted, nevertheless, that ecological footprint in those countries are also relatively high, 5.6 in Norway and 4.9 in New Zealand.

The challenge is whether CLMV can avoid the path of richer countries, which are characterized with rising ecological footprints accompanying rising GDP per capita, while having increasing performance indicators.

### 3.3 Energy

To achieve sustainable development, we should promote the use of renewable source of energy such as solar, wind, biomass, geothermal, hydropower, ocean resources, and waste, but excluding nuclear power. Column 5 in Table 1 indicates the percentage of energy produced from fossil fuel (non-renewable resources).

In terms of the percentage of fossil fuels for its energy, Cambodia is the best, with only 29.7 percent of its energy comes from fossil fuel, followed by Myanmar, which is not very different from Cambodia. Vietnam is the worst, with 54.0 percent, much higher than that in Cambodia and Myanmar. There is no data for Laos.

However, the percentages in CLMV are still much better than those in other Southeast Asian countries. In Singapore and Brunei, 100 percent of their primary energy supply come from fossil fuels; in Malaysia, 95.1 percent. The percentages in rich countries in outside Southeast Asia are also high. It is 94.6 in Australia and 92.5 in the Netherlands.

**Table 1. Poverty, Sustainability, Energy, and Emission**

Countries	Multidimensional Poverty Index	Composite Measures of Sustainability		Primary Energy Supply	Per Capita Emissions	
		<i>Ecological Footprint (hectares per capita) 2007</i>	<i>Environmental Performance Index (0-100)2010</i>		<i>Fossil Fuels (% of total)</i>	<i>Carbon Dioxide /CO2 (tonnes )</i>
<b>CLMV</b>						
Cambodia	0.251 (year2005)	1.0	41.7	29.7	0.3	1.9

Laos	0.267 (year 2006)	1.3	59.6	*	0.3	*
Myanmar	0.154 (year 2000)	1.8	51.3	31.0	0.3	2.2
Viet Nam	0.084 (year 2002)	1.4	59.0	54.0	1.5	1.3
<b>Other ASEAN Countries</b>						
Brunei	*	*	60.8	100.0	27.0	17.9
Indonesia	0.095 (year2007)	1.2	44.6	65.6	1.8	1.5
Malaysia	*	4.9	65.0	95.1	7.7	2.4
Philippines	0.064 (year 2008)	1.3	65.7	56.9	0.9	0.8
Thailand	0.006 (year2005)	2.4	62.2	80.6	4.3	1.6
Singapore	*	5.3	69.6	100.0	7.0	1.4
<b>Some Rich Countries</b>						
Norway	*	5.6	81.1	58.6	10.5	5.8
Australia	*	6.8	65.7	94.6	19.0	9.6
Netherlands	*	6.2	66.4	92.5	10.5	2.4
United States	*	8.0	63.5	85.0	17.3	3.7
New Zealand	*	4.9	73.4	66.7	7.8	10.0

*Sources:* compiled from UNDP (2011), Tables 5 and 6.

### 3.4 Air

Cambodia, Laos, and Myanmar have very low per capita emission of CO<sub>2</sub>, at 0.3 tonnes per capita. Carbon dioxide emission per capita refers to carbon dioxide emission from human activities, particularly from burning fossil fuels, gas flaring, and production of cement. The denominator is the number of mid-year population. See Column 6 in Table 1.

Vietnam per capita emission of CO<sub>2</sub> is five times that in each of Cambodia, Laos, and Myanmar. On the other hand, measured with other emissions (such as NH<sub>4</sub>), Myanmar is the worst, with 2.2 tonnes per capita, higher than in Vietnam, with 1.3 tonnes per capita. Cambodia is the second with 1.9.

The per capita emission of CO<sub>2</sub> in the CLMV is very much below that in Brunei, with 27.0 tonnes per capita of CO<sub>2</sub>. The second largest per capita emission of CO<sub>2</sub> is Singapore, though much lower than that in Brunei, at 7.0 per hectare. In rich countries outside Southeast Asia, the emission of CO<sub>2</sub> is not as high as in Brunei, higher than that in Singapore, except New Zealand, which is just slightly higher than Singapore.

Column 7 shows non CO<sub>2</sub> emissions. It is called “greenhouse gas emissions per capita”, measuring emissions from methane, nitrous oxide and other greenhouse gases such as hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Greenhouse gas emissions do not include carbon dioxide emissions. The denominator is the number of mid-year population.

Because of shorter life expectancy in the atmosphere of these greenhouse gas emission in the atmosphere, Cambodia and Myanmar are more likely to contribute to the slowing down, if not total reduction, in global temperature by reducing their methane emissions.

The per capita emission of greenhouse gases in CLMV is also much below than that in Brunei. However, it is not very different from other Southeast Asian countries. Singapore, which has a high per capita emission of CO<sub>2</sub>, has a relatively low per capita emission of NH<sub>4</sub>, at 1.4, just slightly higher than that in Vietnam. A country such as the Netherlands has

a higher per capita emission of NH<sub>4</sub>, but not very high, only at 2.4. Will CLMV follow the path of richer countries, raising their per capita emissions of both CO<sub>2</sub> and other greenhouse gases? Table 2 indicates the impact of air pollution on number of deaths. Cambodia is the worst in its impact from indoor air pollution, with 500 deaths per 1 million people. Laos is lower, but not much different from Cambodia. Vietnam is the best, with its number about half of that in Cambodia.

The number of deaths because of indoor air pollution in CLMV is higher than those in other Southeast Asian Countries. The numbers are even already insignificant in Malaysia and Singapore. Interestingly, Cambodia is very good in term of number of deaths due to outdoor air pollution with only 23 death per 1 million people. Cambodia is the second after Laos, who recorded almost insignificant number of deaths due to outdoor air pollution. Malaysia is the same as Cambodia, having 23 deaths. Singapore is the worst, with 264 deaths per 1 million population, followed by Indonesia.

### 3.5. Water

Table 2 shows the impact of water pollution on number of deaths. Cambodia is the worst among CLMV, with 826 deaths per 1 million people. Vietnam is much better than Cambodia, with deaths amounting for only 72 per 1 million people. Laos and Myanmar are in between, with 459 and 393 per 1 million people. Vietnam is even better than Indonesia, Philippines, and Thailand, whose numbers are between 100 and 200. Malaysia is better than Vietnam, with only 35 per one million people. The number of deaths due to water pollution is not significant in Singapore.

**Table 2. Death due to Water and Air Pollution**

Countries	DEATH DUE TO (per million people)		
	Water Pollution	Indoor Air Pollution	Outdoor Air Pollution
CLMV			
Cambodia	826	500	23
Laos PDR	406	459	<1
Myanmar	432	393	96
Vietnam	72	289	81
Other ASEAN Countries			
Brunei	.	.	.
Indonesia	141	202	144
Malaysia	35	<1	23
Philippines	182	86	54
Thailand	121	159	61
Singapore	.....	....	264

*Source:* compiled from UNDP

#### 4. Population in CLMV as a Market and Production Base

##### 4.1 Trend in Size of Population and its Annual Growth Rate

At the time when the Millennium Development Goals ends in 2015, ASEAN will have its ASEAN Economic Community which aims for economic integration of the region, embracing three characteristics: a single market and production base, a highly competitive economic region, and a region highly integrated into the global economy. By 2015, CLMV economies collectively account for about 170.2 million people as of the United Nations medium variant projection. This is about 67 percent of Indonesia, the largest economy and population in the region. This number will continue to increase in the next 15 years to reach 188.5 million people with a slowing down growth rate as seen in Table 3. This rising number will need more energy and food, as well as water, and air. Coupled with the anticipated rapid economic growth in the CLMV, the demand for energy, food, water, and air will be multiplied. Will the growing population be able to produce its own energy, food, water, and air?

**Table 3** Number of Population in CLMV 2000-2030

Country	2000	2005	2010	2015	2020	2025	2030
<i>Number of Population (in thousands)</i>							
Cambodia	12,223	13,356	14,363	15,677	16,947	18,121	19,143
Laos	5,386	5,791	6,396	7,020	7,651	8,251	8,807
Myanmar	48,453	50,180	51,929	54,164	56,124	57,647	58,699
Viet Nam	80,886	84,948	89,048	93,386	97,055	99,813	101,829
CLMV	146,948	154,275	161,736	170,247	177,777	183,832	188,478
<i>Rate of Growth (in percent)</i>							
Cambodia		1.77	1.45	1.75	1.56	1.34	1.10
Laos		1.45	1.99	1.86	1.72	1.51	1.30
Myanmar		0.70	0.69	0.84	0.71	0.54	0.36
Viet Nam		0.98	0.94	0.95	0.77	0.56	0.40
CLMV		0.97	0.94	1.03	0.87	0.67	0.50

Source: Compiled and calculated from United Nations (2013).

Among the CLMV, Cambodia's population will not only grow in terms of absolute number, but also in terms of relative number related to the whole CLMV population. Its population will grow from 12.2 million at the turn of this century to 15.7 million in 2015 and will be 19.1 million in another 15 years. Its share in CLMV increased from 8.3 percent in 2000 to 9.2 percent in 2015 and will continue to increase to 10.2 percent in 2030. However, the Cambodia's population will remain as the second smallest after the Lao PDR's population. With this trend, there will be 3.7 million additional people in Cambodia by 2030. This additional population is quite substantial, about one fifth of today's population, and will require a significant amount of resources to feed with healthy food, cloth, to educate, and to provide jobs as well as to ensure well-being in old age.

The population of Cambodia is growing fast at 1.75 percent annually for the period of 2010-2015. The growth rate of its population will remain high although the growth rate will slow down to 1.10 percent in 2025-2030. With this rapidly growing population, should Cambodia produce its own energy, food, water, and air, or should it import some of them, and how much? Or, should Cambodia export some of them, and how much to export?

Laos population is the smallest among the CLMV with only 7.0 million in 2015 and will increase to 8.8 million in 2030. This number accounts for 4.1 percent of the whole CLMV market and production base in 2015 and will be 4.7 percent in 2030. However, with regards to its annual growth rate of its population, Laos grew the fastest and will continue growing rapidly in the future. Laos had its fastest growth in its history of 1.86 percent annually reached in 2005-2010, and began to slow down its growth to 1.30 percent annually in 2025-2030. In Laos too, the demand for energy, food, water, and air will increase rapidly. However, Laos should maintain its condition of having insignificant number of deaths due to outdoor air pollution.

As the second largest economy in the CLMV, Myanmar will have 54.2 million population in 2015 and will increase to 58.7 million in 2030. Although the number is larger, it is growing slower than Laos and Cambodia as Myanmar women have smaller number of children than women in Laos and Cambodia. Myanmar's population accounted for 31.8 percent of the whole CLMV in 2015 and will become 31.1 percent in 2030.

With its increasingly larger population, coupled with high economic growth, will Myanmar be able to maintain its ecological footprint at a low level and continue to use a small percentage of non-renewable resources for energy? Or, will Myanmar follow the conventional path of a rising ecological footprint and rising percentage of using non-renewable resources for energy, as its population and economy grow? The relatively large population in Myanmar, coupled with the rapid economic growth, may put pressure to security in energy, food, water, and air. Should Myanmar continue to export its non-renewable resources, or to distribute it for its own use, for the present and the future?

Vietnam has the largest population in CLMV and the third among ASEAN countries after Indonesia and the Philippines. In 2015, Vietnam will have 93.3 million population and will continue to increase and pass a 100-million mark just before 2030. Vietnam's population is growing slower than Myanmar. With its very large population, though now growing slowly, the projected high economic growth will bring a large increase in demand for energy, food, water, and air. A question arises, for example, whether Vietnam should continue to export its rice, or make a better domestic distribution of rice so that everybody can have access to affordable rice. If it stops or reduces its exports, who should provide rice for its neighbours? Who should be prioritized, the population of other countries or its own population? With the growing number of its population, is it possible that Vietnam multiplies its production of rice, so that it can provide affordable rice for the entire population in Vietnam and, at the same, continue to export its rice?

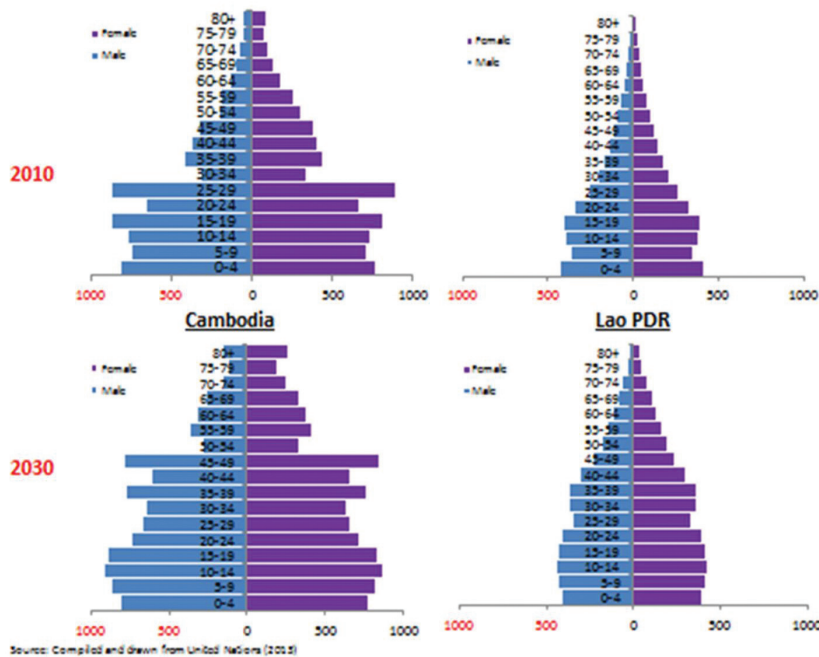
## **4.2 Transition in Age-Structure of CLMV Population**

The information on age structure of a population as a market and production base plays an important role as age influences the goods and services consumed and produced. As seen in Figures 2 and 3, the age structure of the population in each CLMV country is distinctive and will evolve within the next 20 years from 2010 to 2030.

In Cambodia, the age structure of the population can clearly be divided into two generations: the generation born before 1980, and the generation born after 1980. The division is marked by the smallest sector of the population between the ages of 30-34, who were born between 1975 and 1980 during the Khmer Rouge. After 1980, when the country was already in the peace process, the population began to reproduce and this resulted in a large population. The population below 30 is dominant, and will continue getting larger in the next 15 years as seen in Figure 2. This means more working-age people are entering the labour market. This increasing population below 30 years old can be an opportunity, as long as Cambodia can prepare appropriate policies to make sure that this growing young working age population is educated and healthy. Consequently, the rising number of young

people below 30 indicates a greater pressure to educate them, including providing educational facilities, and make them healthy by preparing healthy and nutritious food as well as providing better health infrastructure, and preparing job opportunities. It is also important to secure clean water and good sanitation as the young ones are more likely to be affected by waterborne diseases.

FIGURE 2. Age Structure of Population:  
Cambodia and Lao PDR, 2010 and 2030



Laos is different from Cambodia with regards to the age structure of its population. The young population below 15, the dependents, will continue to increase in absolute terms, although it will decline in relative number. They are mostly the potential consumers. The youth, aged 15-24, will continue to increase in both size and share. Thus, Lao PDR's youth bulge will still be there until 2015 and will continue to decline to reach 18.7 percent of the total population in 2030. Some of the youth are producers as they are working already, while some others are mainly consumers. The prime working age population aged 25-59 will continue to increase, providing opportunity for the labour market to produce more in the future. During this time, they save some of the labour income for their old age and/or to invest in their own well-being as well as in their children's education and health. This is assuming that their savings are not eroded by a high inflation rate. As in Cambodia, the rising number of prime working age people in Laos can be an opportunity for development, if the working age people is educated and healthy. Otherwise, the rising number of prime working age people can be a liability to sustainable development in Laos.

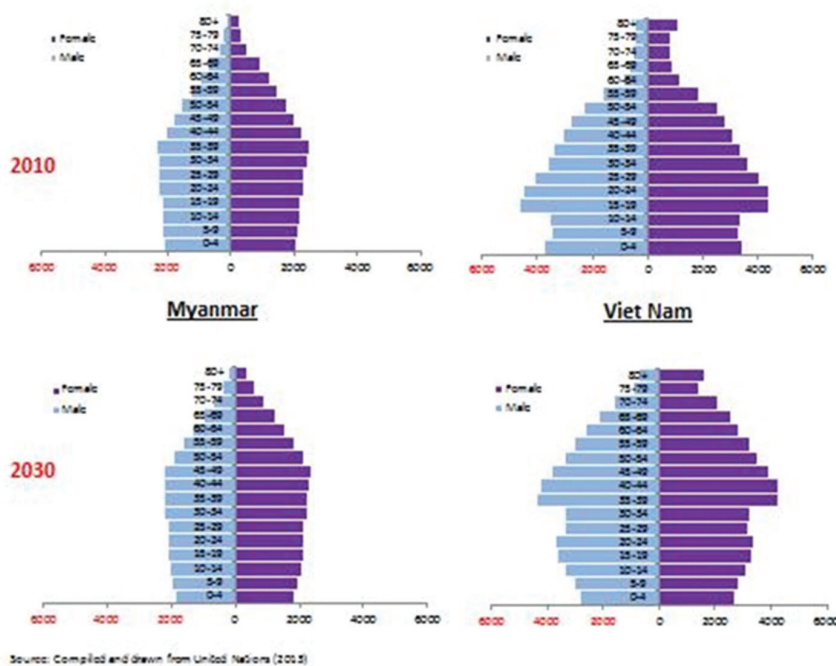
Unlike Cambodia and Laos, the Myanmar population is more mature as the younger ones will be declining, reducing the pressure on consumption, and there are more working age people as older adults, shifting the largest number from 30-39 to 40-49 within the period of 2010-2030. As seen from Figure 3, the Myanmar population has a relatively wide and flat shape among older than working-age population. In general, the age structure in 2030



resembles a coffin shape. This can be a favourable structure for development in Myanmar, with a more mature labour force. However, with rapid globalization, skill can become obsolete very quickly. Will the increasingly more mature labour force also lose its marketable skills? Furthermore, globalization is also often accompanied with unhealthy behaviour, so will the mature labour force remain healthy? The large number of deaths due to water and air pollution, for example, should become a great concern to make sure that the mature labour force keeps healthy.

Vietnam is very different from the three others where the pressure from the young people is lessening. It is clearly seen that in 2010, the percentage of population aged below 15 dropped significantly, reflecting a significant decline in the fertility level. In the meantime, the percentage of working age population accounted for more than half of the population in 2015. The percentage of older persons aged 60 and above accounted for about 8.9 percent in 2010. In the next 15 years, the structure will be very different as seen in Figure 3 with a higher percentage of older persons (18.3 percent) and larger than the young people below 15 (17.6 percent).

FIGURE 3. Age Structure of Population:  
Myanmar and Viet Nam, 2010 and 2030



With its relatively large number and the high percentage of older persons, the Vietnam population can become more vulnerable to natural disasters and climate change. In addition, Vietnam should also anticipate a different demand for energy, food, water, and air as its population is getting older. Will there be a change in the mix of the demand for those commodities because of rising number of older persons?

In summary, efforts to achieve “The Future We Want” --sustainable development-- among CLMV should take into account the population dynamics in each country as each has its own dynamics.

## **5. Policy Recommendations**

There is no one standard policy for all areas. Each country, and even each area within a country, can have its own priority in achieving its sustainable development. It should also be noted, therefore, that a sustainable program does not have to be large in its scale. Indeed, small scale activities can be promoted, suited to the particular needs of an area.

Laos, for example, is not in urgent need for outdoor pollution-free air, but it has to ensure that its outdoor air will not be polluted in the future. However, Laos and Cambodia must give a high priority to reduce water pollution and indoor air pollution.

Another example is on the use of non-renewable resources for energy. Vietnam has depended a lot on non-renewable resources for energy. Should Vietnam continue its trend or should it slow down the trend and move to non-renewable resources? Cambodia has not used a lot of non-renewable resources, and it must make sure that it will not follow the path of other countries, especially richer countries, with high percentages of use of non-renewable resources.

In a nutshell, as water, food, energy and air are interlinked, sustainable development in CLMV should promote and ensure that the air we breathe should be clean and fresh, the water we drink is clean and fresh, the food we eat is delicious and healthy; and much of the energy we use comes from renewable sources. All of these should also be affordable and accessible for everybody. Below are three recommendations for energy, food, water, and air.

### **5.1 Create Long-term Domestic Capacity**

As energy, food, water and air are the basic needs for human well-being, relying on and fulfilling these basic needs from mostly external supplies may hamper the sustainability of a country's development. Therefore, each country should seek to create its own long-term domestic capacity. But, this does mean that free trade is a taboo. Free Trade should be used to meet the needs of basic needs as long as a country cannot sufficiently produce its own resources.

We should avoid the temptation to make energy, food, water, and air into financial and political commodities. Otherwise, security in energy, food, water, and air can be too risky to depend much on the international market.

### **5.2 Natural Resources for Sustainable Development**

Natural resources should not be exploited to promote high GDP growth. The utilization of natural resources should be promoted to obtain sustainable development by reducing capability deprivation; producing energy from renewable resources; supplying healthy, delicious and cheap food; providing clean water and sanitation; and creating clean fresh air.

### **5.3 Promote Trendy and "Cool" Behaviour**

Behaviour or lifestyle in line with sustainable development should be marketed as a new trendy and "cool" behaviour. A new norm should emerge that behaving in line with sustainable development is prestigious. By doing so, the population, as consumers, will demand only goods and services that are sustainable. Producers will then produce following the consumers' demand. From the business point of views, this new lifestyle can be a new, promising, market. The business will be racing to provide sustainable goods and services

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## Notes

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Education: having no household member who has completed five years of schooling and having at least one school age child (up to grade 8) who is not attending school.

Health: having at least one household member who is malnourished and have had one or more children die.

Standard of living: not having electricity, not having access to clean drinking water, not having access to adequate sanitation, using "dirty" cooking fuel (dung, wood or charcoal), having a home with a dirt floor, and owning no car, truck, or similar motorized vehicle while owning at most one of these assets: bicycle, motorcycle, radio, refrigerator, telephone, or television.

# **CAMBODIA'S BEATING HEART: THE IMPORTANCE OF WATER SECURITY FOR FOOD AND LIVELIHOODS IN CAMBODIA**

**Pauline Taylor Mc.keown**

## **Introduction**

This paper is a brief exploration of the relationship between water governance, water security and food in Cambodia, and the threats posed by current development trends, specifically hydropower, export-oriented agriculture and water privatisation. It will also describe Oxfam's efforts to empower communities and civil society to contribute to informed decision making that will hopefully prioritise the long term viability of the water resources that could, if managed well, raise the standard of living for millions of Cambodians into the foreseeable future.

## **Water security in Cambodia**

The 2013 Asian Water Development Outlook report, produced by the Asian Development Bank (ADB 2013a) divides national water security into five separate but interlinked elements. These are household water security, economic water security, environmental water security, urban water security and resilience to water based disasters. The report indicates that Cambodia's level of national water security is 'hazardous'. Cambodia is not short of water. What it lacks, the report argues, is sufficient investment in water governance and infrastructure to make good use of that water. Cambodia's challenge is not 'physical water scarcity', but 'economic water scarcity' (ibid). 'Economic water scarcity', says the report, describes a situation where water resources are abundant relative to water use: ie less than 25% of water from rivers is withdrawn for human purposes, but malnutrition persists.

The assessment also rates Cambodia's level of household water security (which includes sanitation) as hazardous. Approximately 80% of Cambodian people live in rural areas with little to no piped water supply, (a figure supported by the 2014 UN World Water Development Report, which put Cambodia last in the list of 11 countries surveyed) (WWAP 2014). Phnom Penh has a reasonably reliable water supply, however in the smaller cities, there is stark inequality between the rich and the poor with regards to urban water supply. The result is that Cambodia's urban water security is also rated as 'hazardous' by the ADB. Resilience to water related disasters is the same (ADB 2013a). Clearly there is significant work to be done in improving these aspects of Cambodia's water security. For the purposes of this paper however, economic and environmental water security are of greatest concern, which received ratings of 'capable' and 'engaged' respectively. These are still quite low ratings, but they are important because they encompass the water that Cambodians need to access and produce food. There is also a great deal of work to be done on improving food security in Cambodia where, in 2013, 28% of Cambodian children were underweight and 40% of children were stunted (UNICEF 2013). In fact only 25% of Cambodians as a whole presently manage to consume their daily required calorie intake (IFReDI 2013). Fortunately, in the struggle to meet the food requirements of a growing population, Cambodia has, in the Mekong and the Tonle Sap, incredible national resources.

## **Implications for food security**

The Mekong catchment covers over 86% of Cambodia's territory (FAO 2010). The Tonle Sap Lake is often referred to as being the 'heart' of Cambodia. Whimsical as this may sound, it is in fact a fair analogy for the role the Lake plays in supporting both the fisheries and the agriculture that supports much of Cambodia's population. The link between water security and both fisheries and agriculture will be explored briefly here.

Cambodia's fisheries contribute nearly 12% of the country's GDP, and Cambodian people presently have one of the highest rates of fish consumption in the world. A recent study conducted by the Inland Fisheries Research and Development Institute found fish and aquatic resources provide 76% of the Cambodian population's animal protein intake, 37% of iron intake, and 28% of the fats intake (IFReDI 2013). Fish also possess a wide range of essential micronutrients which may not otherwise be available to those without access to varied diets (FAO 2012). The significance of fish in the Cambodian diet is largely thanks to the Tonle Sap. The Tonle Sap is the fourth largest inland fishery in the world and is a critically important economic, social and environmental resource for Cambodia. Over 1.7 million people live in the lake and its floodplains, while up to half of Cambodia's population is estimated to benefit directly or indirectly from the lake's resources both in terms of livelihoods and food security (Keskinen et al 2011). The Tonle Sap is so productive because of its natural flooding regime. The inflow from the Mekong in the wet season increases the area of the Lake from 2,600 km<sup>2</sup> to up a maximum of approximately 15,000 km<sup>2</sup> and raises its water level by about 8-10 meters (World Food Program 2014). The spawning cycles of fish are intimately attuned to the annual flood. Major migrations occur both at the beginning and the end of the monsoon to access floodplain habitats and spawning ground as they emerge and then return before they dry out. A former Mekong River Commission fish biologist, Anders Poulsen, carried the 'heart' analogy further to stress the importance of the flooding pulse for the ecological integrity of the system, when he said 'the flood pulse is what keeps the heart beating. If the heart stops, the system dies' (Poulsen 2003). The amount of fish available per person is set to drop by a third by 2030 in Cambodia purely due to population pressure (IFReDI 2013). Considering the already poor levels of nutrition and food security, fish - and the natural hydrological 'pulsing' that supports their populations and biodiversity - are clearly critical national assets that all Cambodians must work to protect.

As the annual flood waters recedes, farmers cultivate their crops on the floodplains that have been nutrient-enriched by the silted flood waters. This is the case not only on the Tonle Sap floodplains, but all along the Mekong, where women tend river bank gardens - a vital source of food and income for women in Cambodia, as well as in Laos and Thailand. Irrigated agriculture is also reliant on water. It is estimated that Cambodia channels of 94% of its extracted water to food production (FAO 2010). The vast majority of Cambodian farmers are smallholders focused on subsistence, and most agricultural activity is based on low input and rain fed paddy rice production (FAO 2010). Rural dwellers also grow some other annual and perennial crops, raise livestock, and harvest wild foods to supplement their fish and forest food harvests for subsistence and income (Royal Government of Cambodia 2011). Overall, agriculture comprises a further 40% of Cambodia's GDP and accounts for more than 60% of total employment (ibid), but no agriculture is possible at all without water.

## **Primary threats to water and food security in Cambodia**

The contribution the Mekong and Tonle Sap make to Cambodia's food security is significant - but it is fragile. Numerous pressures on the quality, quantity, and the natural flooding regime of their waters are threatening the ability of the system to continue to provide for

Cambodian people. Unsustainable agricultural developments, hydropower dams, and privatisation schemes are all beginning to compromise the integrity of – and equitable access to – the ecosystem services the basin provides. Women deserve special mention as their livelihoods are key to family food security – yet are often first to suffer in the face of poor water governance.

### **Unsustainable agriculture**

Large-scale, export oriented agricultural production poses significant water security concerns. Rubber, oil palm, sugarcane, cassava and acacia are just a few examples of the monoculture cash-crops cultivated in Cambodia. Whilst each crop has some unique environmental and social impacts, there are some that are generalisable – including impacts on water resources. Pesticides can run off agricultural land, harming the reproduction and growth of fish – and leach into ground water making groundwater undrinkable; fertiliser, especially phosphorous, can also run off into waterways and result in ‘eutrophication’ (excessive algal growth which depletes the oxygen in the water and kills fish); groundwater can also be contaminated by nitrate through fertilisation which, in excessive levels, also makes the water dangerous for drinking; and sediment run-off from ploughing can make rivers too silted for fish (adapted from Palaniappan et al (2010). Although there has been little research, at this stage Cambodia’s ground waters are suspected to be in a reasonable condition (WEPA date unknown). Given that increasing numbers of rural dwellers are accessing their own household water supplies by digging tube wells (in the face of poor water supply infrastructure, described earlier), it is extremely important for public health that this groundwater quality is maintained.

Industrial scale, export-oriented irrigated rice production is another large user of water, including groundwater. If the large-scale agricultural sector and industrial sector continue to extract groundwater to extract ground water at current rates, problems may arise (WEPA date unknown). Equity will become a first issue, as lowering water tables put the groundwater out of reach of smallholders, subsistence farmers with less pumping capability. Again, such a scenario would pose an immediate threat to food security.

### **Hydropower dams**

Cambodia needs energy, as an integral part of the water-food-energy nexus. However, the proposed and planned Mekong mainstream hydropower dams in Cambodia will have immediate and dramatic impacts on rivers and on the livelihoods, water and food security of local communities upstream, and downstream from the reservoirs (Chheang 2012, IFRDI 2012).

Amongst other impacts, hydropower dams reduce fish populations by: destroying habitat diversity through flooding; altering the natural regime of high and low flows which trigger spawning and provide spawning habitat; blocking migration to spawning grounds; in deep reservoirs, chilling and de-oxygenating water to a point that kills fish; and altering the distribution of natural nutrient-rich sediment in the water upon which a variety of species depend (World Commission on Dams 2000, Kirby et al 2010). The IFRDI study concluded that the Sambor dam alone would block all fish migrations upstream. This would reduce yields of fish and other aquatic animals by 16% to 31% or 98,000–182,000 tonnes compared to 2011 baseline values. The development of the Stung Treng dam is predicted to reduce yields of fish and other aquatic animals by 6% to 24% or 34,000–145,000 tonnes (IFReDI 2013).

Floodplain agriculture is also disrupted by changed flooding regimes. Peak natural flows are reduced by dams, reducing the reach of water for natural crop irrigation, and with

it, the nutrient rich sediment recharge that replenishes soil fertility (World Commission on Dams Final Report 2010). The resultant increased reliance on irrigation and fertilisers excludes the poorest of the poor women - who have less access to these inputs. In addition, over half of all riverbank gardens along the Mekong would be inundated by the proposed dams which, combined with losses in agricultural land for reservoirs and transmission lines, has been calculated at US\$25.1 million per year (ICEM 2010a and 2010b). It must be noted that the trans boundary impacts of hydropower dams are a further concern for Cambodia's water and food security.

### **Privatisation**

A fundamental base for national water governance is whether water is regarded as an 'economic good' (which often implies privatisation), or a human right (which generally keeps water in public ownership). The difference can be significant for the water and food security of the poor. Privatisation is supported by powerful actors such as the Asian Development Bank (ADB) and the Association of South East Asian Nations (ASEAN) who have a primary focus on economic growth (Kirby et al 2010, ADB 2013b). However governments must play a role in protecting public access to water for subsistence and income generating, because as the World Economic Forum acknowledges, 'an unfettered reliance on markets will not deliver the social, economic or environmental outcomes needed. Good regulation in water is indispensable' (World Economic Forum 2011 p2). A preliminary draft of a recent Oxfam study in Cambodia suggests that women farmers are particularly marginalised in areas where irrigation schemes have privatised water as opposed to where the community retains control of water governance (Oxfam Great Britain, unpublished). The resulting higher reliance on rain-fed agriculture leaves women's livelihood pursuits more vulnerable than those of men to the impacts of increasingly variable weather patterns under climate change.

### **Losses in women's livelihoods and welfare**

Household-based 'reproductive' tasks such as cleaning, washing clothes, bathing and caring for children, caring for livestock and preparation of crops and food - considered to be the responsibility of women and girls - all require water. Low rates of household water supply mean that water must be collected for these tasks which is time consuming and reduces women's ability to participate in other livelihood and food production, or political activities. Caring for family members who are ill on account of poor sanitation services also takes time from these activities. In a vicious cycle, women's participation in water governance decision-making is hampered by these heavy workloads which are in part at least, perpetuated by poor water governance (Nang and Ouch 2014). A 2014 report suggests that men dominate most important positions in the Farmers Water Users Committees (FWUC), and make the final decisions regarding water management, meaning women's voices in decisions on irrigation, drought and flood protection, dam construction and commune development projects can be overlooked (ibid). The rural poor more broadly and indigenous people join women in the ranks of those least heard in water governance debates. Ironically however, these are the groups who have the most to lose if water security is threatened (Kirby et al 2010).

### **Better decision making for water and food security**

The ADB's 2013 report, stressed the importance of good water governance, but ranked Cambodia fourth-last in a list of 49 countries in terms of effective water governance leading

to water security (ADB 2013a). This could be seen as an opportunity rather than a point for despair. Cambodia has excellent water resources, still relatively intact; the framework for managing Cambodia's ecosystems and water sources are still in the early stages of development; and there are several potential entry points for supporting Cambodian people to help make decisions for the sustainable management of their water.

Oxfam Australia has been working in the Mekong region for more than 25 years. In cooperation with other Oxfam affiliates in Cambodia, Oxfam Australia supports a network of local and non-governmental organisations across the six countries in the region, linking grassroots village work with international and regional organisations. We help communities understand their rights regarding major development decisions, particularly those that threaten water and food security. We're especially concerned with assessing the impacts of development on women and ethnic minorities, and seek to influence the drivers of this development, including development banks, donor governments and the private sector.

Some of the standards that Oxfam is promoting to increase the influence affected communities have over water policy and decision making mechanisms are 'Free, Prior and Informed Consent' (FPIC), the 'Rapid Basin-wide Hydropower Sustainability Assessment Tool' (RSAT) and Gender Impact Assessment. Free, Prior and Informed Consent is recognised in the United Nations Declaration on the Rights of Indigenous Peoples. FPIC requires that individuals and communities should be informed - in an appropriate and accessible language - about projects that might take place on their land. A 2013 study focussed on the Tonle Sap and analysed the degree of inclusion in decision making encouraged by the Asian Development Bank, and found that participation was better described as 'information receiving' (Rosien and Middleton 2013). Another study still underway with Monash University is finding that villagers due to be affected by the Lower Sesan 2 dam have received very little information about likely impacts of their rights (Oxfam Australia, unpublished).

In response, Oxfam have developed a step-by step guide to assist communities who wish to assert their right to FPIC. The guide provides practical advice on what communities' rights are; what information to request from developers and governments; the dynamics of community-level information sharing and decision-making; seeking legal advice; and negotiating with developers. The Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT) was developed by the Asian Development Bank, the Mekong River Commission (MRC) and World Wide Fund for Nature (WWF). It is an innovative assessment tool that helps identify the most sustainable sites, designs and operation rules for hydropower development in the lower Mekong River Basin.

It has two main functions: as a framework for participatory assessment of Strength, Weakness, Opportunities and Threats (SWOT) for hydropower sustainability in a river basin by multiple stakeholders; and scoring proposals against a set of sustainability criteria. It works by bringing together different sectors including affected communities and institutions and seeks integrated basin-wide planning and cooperation. The RSAT is produced as an open source document with new drafts being developed on an ongoing basis. Cambodia has relatively little legislation that is likely to protect and promote the rights of women impacted by hydropower or other water security threats, as identified in a 2013 Oxfam study (Simpson and Simon 2013). Although multilateral bank social safeguards may provide guidelines, in instances where these are not adhered to, or in instances of independent financing, the inclusion of women's rights (or 'gender justice') in hydropower and other water affecting initiatives is left to be determined on a project-by-project basis. The Gender Impact Assessment manual, developed by Oxfam and freely available online, promotes a step-by-step gender impact assessment process - specific for hydropower. The GIA manual has adapted many proven gender impact tools to the context of Mekong hydropower



development. It provides checklists for developers to help ensure they have assessed gender impacts at different stages of project development; and which help guide companies to consider how a project can contribute to positive outcomes for women, as well as men.

## **Conclusion**

Cambodia has had more than its share of misfortune, and still faces many challenges largely as a direct result. However when considering Cambodia's water resources, and the potential for food security that those waters represent, it is a lucky country. Many developed countries have already devastated their rivers ecologically, and wish for a second chance to do things differently. This is even more the case as global understanding of the water-food-energy nexus grows. Oxfam believes that Cambodia's rural poor, women and indigenous people know well enough what they need to sustain and improve their livelihoods, raise their standards of living, improve their health and ensure food security for their children. All of these things depend on water. The challenge is for Cambodian decision makers, the private sector, and finance corporations to hear their voices, and develop a responsive and responsible water governance sector that will serve all Cambodians into the future.

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# **FOOD SECURITY IN CAMBODIA: POLICY CHALLENGES - WHAT THE RESEARCH SHOWS**

**Nou Keosothea & Heng Molyaneth**

## **Introduction**

Food security is a national as well as global issue affecting social and economic development, good governance and basic human rights. In Cambodia, the concern on food security is well reflected in a series of policy adoption on either specifically food security or its cross-cutting issues. Notwithstanding the significant improvement during the past decades, food security and malnutrition remain critical issues for Cambodia (CARD and TWG-FSN 2008).

To improve food security and nutrition situation in Cambodia, huge numbers of studies and interventions have been carried out in order to provide food security information to inform policy and program formulation and implementation. However, the usefulness of the information is reduced by its poor communication and the brokerage between research and decision markers.

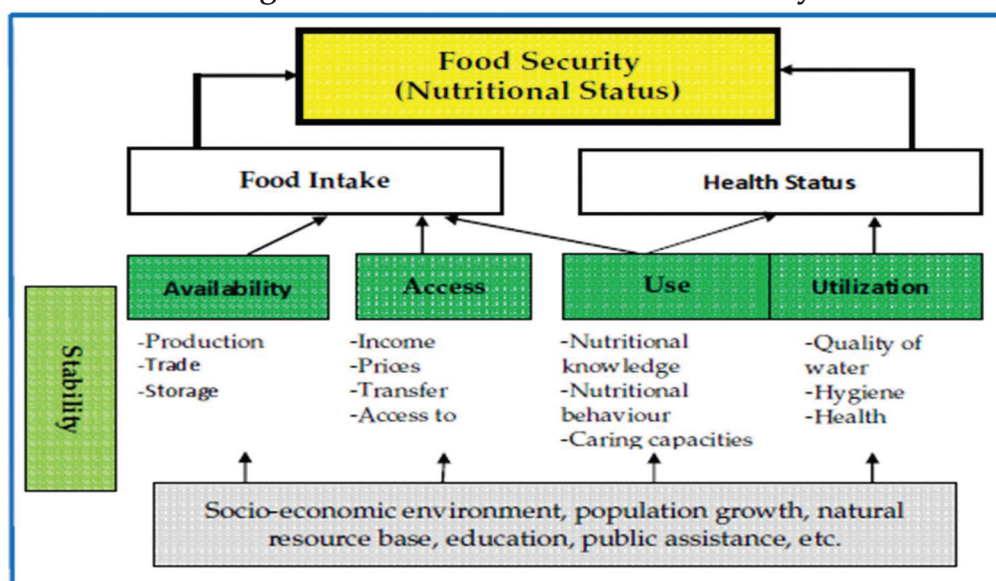
This paper, therefore, aims at introducing the concept of research uptake as a solution to the current policy challenges in food security. To achieve this objective, the paper provides an overview of food security in Cambodia in terms of its current status, priority challenges, government policies, and situation of food security information. The paper then explains why research uptake is a potential mechanism to improve food security. The explanation is centered on the concept of research uptake and components of research uptake strategy.

## **Food Security in Cambodia**

### **Current Status - What the Research Shows**

Food security is defined at the 1996 World Summit of Food Security as “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996). At the 2009 World Summit of Food Security, the international community further specified four pillars of food security to be improved: availability, access, utilization, and stability (FAO 2009). The Cambodian government also adopted the definition and four suggested pillars in its food security policy. Figure 1 presents how the four pillars affect food security in the context of Cambodia.

Figure 1: Determinants of Food Security



Source: Ker (2011)

Information on food security in Cambodia can be obtained from several sources both at the national and global levels. Table 1 presents statistics of some selected indicators of food security in Cambodia.

Table 1: Selected Indicators of Food Security in Cambodia

Indicator	Year	Value	Change
Proportion of people living with hunger (%) (CMDG1)	2015	≤10	
Food poverty (%)*	2007	18.7	▽
	2011	2.7	
Stunting children (%)**	2005	42.7	▽
	2010	39.9	
Wasting children (%)**	2005	8.4	△
	2010	10.9	
Global Hunger Index (GHI)***	1990	32.2	▽
	2013	16.8	
Undernourished population (%)***	1990-92	39.9	▽
	2010-12	17.1	
Underweight children (%)***	1988-92	44.9	▽
	2008-12	29.0	
Under-five mortality (%)***	1990	11.7	▽
	2011	4.3	
Global Food Security Index (GFSI)****	2012	30.9	△
	2013	31.3	
Affordability Index****	2012	26.7	△

	2013	27.9	
Availability Index****	2012	35.0	△
	2013	35.2	
Quality and Safety Index****	2012	30.3	▽
	2013	29.2	

Source: \* from RGC and UNDP (2013); \*\* from NIS, DGH et al. (2011); \*\*\* from Welthungerhilfe and IFPRI et al. (2013); \*\*\*\* from EIU (2013)

At the national level, information on food security can be obtained from the food poverty indicator generated by the National Institute of Statistics (NIS) using data from the Cambodia Socio-Economic Survey (CSES). The survey showed a significant decline in the share of food-poor population – those whose total consumption is equal to or less than the nutritional norm in the poverty line – from 18.7 percent in 2007 to only 2.7 percent in 2011, which is already far below the CDMG target. The decline is witnessed in all regions of the country, with urban areas falling from 16 percent to 2.4 percent and rural areas from 21.3 percent to 3 percent in the same period (Royal Government of Cambodia: RGC and United Nations Development Fund: UNDP 2013).

However, while the supply of food has been significantly improved, nutrition remains an alarming issue, especially among children. The same CSES has shown that for a period of five years (2005-2010), the share of children with stunted growth reduced by only 3 percent from 43 percent in 2005. The situation was worse for wasting children since the number of children who are wasted increased from 8.4 percent in 2005 to 10.9 percent in 2010 (National Institute of Statistics: NIS, Directorate General for Health: DGH et al. 2011).

The global-level indicators on food security and nutrition also present a similar pattern of change. For example, the Global Hunger Index (GHI) measures hunger from three aspects: (i) the share of undernourished population by calorie intake, (ii) the share of children younger than age five who are underweight, and (iii) the rate of child mortality. According to the 2013 GHI report, among 78 countries, with the 1<sup>st</sup> having a moderate state of hunger and the 78<sup>th</sup> having an extremely alarming state of hunger, Cambodia ranked 47<sup>th</sup>. The country's GHI score dropped from 32.2 in 1990 to 20.9 in 2005 and 16.8 in 2013, turning Cambodia from a country with an extremely alarming state of hunger to a country with a serious state of hunger (Welthungerhilfe, IFPRI et al. 2013). The score of each GHI components suggests that the country was better able to improve the nutritional status of the general population than that of the children. Compared to the indicator “undernourished population”, the indicators “underweight children” and “child mortality rate” experienced lower decline for the same period 1990-2013.

Following the concept of food security suggested at the 2009 World Summit of Food Security, the most exact measurement of food security apparently seems to be that of the Global Food Security Index (GFSI), developed by the Economist Intelligence Unit (EIU). The index measures food security status of countries in terms of (i) affordability, (2) availability, and (3) quality and safety. Based on the 2013 GFSI report, the score of Cambodia's food security index is stable at around 31 in 2012 and 2013. The current index (0=least food secure, 100=most food secure) ranks Cambodia 89<sup>th</sup> out of 107 countries. The 2013 scores of each index component show that food availability/supply is relatively steady and that Cambodians are better able to afford food though of a lower nutritional quality (EIU 2013).

The above information on food security derived from various indicators at both national and global levels strongly and consistently suggests that Cambodia has made impressive progress during the past two decades in improving population's access to food but not much in terms of enhancing nutritional status of the people, especially children. The following section, therefore, discusses the priority challenges hindering the progress.

## **Priority Challenges**

Cambodia's rapid economic growth since 1993 has significantly reduced poverty and improved food security in the country, but the progress is not as substantial as those of other South Asian and Southeast Asian countries. A study of CDRI has shown that Cambodia's current food security situation is at similar stage with that of Lao PDR and Bangladesh today, Vietnam in the early 1990s, and Thailand in the late 1970s. Cambodia largely followed the pathways of Vietnam and China, where economic growth brings about poverty reduction and food security. However, recently the country has diverted from this pathway, making food security and nutrition not a component of economic growth anymore (Ecker and Diao 2011).

The 2013 GFSI report has revealed several strengths and weaknesses of Cambodia with regards to food security. Generally, food availability highly depends on the country's ability to provide sufficient food supply, cope with supply disruption (stability of food), disseminate food, and expand agricultural output through research. Cambodia could provide fairly sufficient food supply and moderately cope with the volatility of agricultural production (EIU 2013). Although at the macro level the country has become self-sufficient in rice production, the production distribution is uneven among geographical areas and socio-economic groups (CARD and TWG-FSN 2008). The supply of food is disrupted by flood and drought, environmental degradation, shifts in purchasing power for market goods, and political instability (CARD and TWG-FSN 2008). The small amount of public expenditure on agricultural R&D and poor agricultural infrastructure are also causes of insufficient food supply in Cambodia (EIU 2013).

The country needs to put more emphasis on improving people's access to food, which is largely determined by household income, food safety net programs, and access to credit. Food consumption as a share of household expenditure in Cambodia is very low. The majority of rural Cambodians are both food producers and food buyers. Their purchasing power often is negatively affected by their limited cash income and the rapidly increasing food prices (CARD and TWG-FSN 2008). In-kind food transfers, conditional case transfers (i.e. food vouchers), and school feeding programs for people unable to produce or purchase their food needs are not widely implemented. Moreover, there is limited multilateral or government farmers financing programs to assist farmers.

In terms of quality and safety of food, Cambodia needs to work much harder to improve the diet diversification of the people. The government has published a national strategy to improve nutrition of the population but has not yet developed any guidelines for dietary practices. The inappropriate use of food and limited diet diversification can cause malnutrition. High malnutrition among mothers and children in Cambodia particularly can be attributed to poor nutrition knowledge and practices of mothers, insufficient access to maternal care services, inappropriate mother-child care practices, high prevalence of child illnesses, and insufficient access to safe drinking water and hygienic sanitation (CARD and TWG-FSN 2008). The quality and safety of food in Cambodia is further hampered by the absence of agencies to ensure the safety and health of food (EIU 2013).

## Government Policies and Perspectives

Following the Prime Minister’s Circulars on Food Security in 1999 and 2003, eradicating extreme poverty and hunger was set as one of the Cambodia Millennium Development Goals (CMDGs), which were adopted in 2003. However, food security is not just an end in itself, but achieving food security is also a mean to attain other CMDGs. The CMDGs could be reached through implementation of the Rectangular Strategy (RS) and its instrument, the National Strategic Development Plan (NSDP), recognizing the cross-cutting nature of food security and the importance to set it as a priority of national development (CARD and TWG-FSN 2008).

Accordingly, the improvement of food security has been targeted in several policy documents. The policies include Macro-economic Development Policy, Decentralization and Deconcentration Policy, Rectangular Strategy 2004, Gender Policy, Disaster Management Policy, Environment Policy, National Adaptation Program of Action to Climate Change (NAPA), National Population Policy 2003, Strategy on Agriculture and Water 2006-2010 (SAW), Ministry of Water Resources and Meteorology Strategic Development Plan 2006-2010 of, Land Management Policy/Land Law 2001, Forestry Policy, National Fisheries Sector Policy and draft Fisheries Law 2005, Rural Water Supply and Sanitation Sector (RWSS) 10 Year Sector Strategy 2001-2011, Food Safety Policy, Ministry of Health Sector Strategic Plan 2003-2007, and Education Sector Strategic Plan 2006-2010 (see CARD and TWG-FSN 2008 for details on food security is integrated in these policies).

To ensure strong and effective coordination among line ministries and institutions involving in food security, in 2007 the Council for Agricultural and Rural Development (CARD) in consultation with the Technical Working Group on Food Security and Nutrition (TWG-FSN) has developed a Strategic Framework for Food Security and Nutrition in Cambodia 2008-2012 (SFFSN). The framework aims at improving food access of the poor and food-insecure Cambodians by focusing on five aspects: food availability, food access, utilization of food, stability of food, and institutional and policy environment. Table 2 below presents detailed objectives of the SFFSN and priority areas of action to achieve each objective.

**Table 2: Objectives of the SFFSN and Their Priority Areas**

<i>Objective 1: Food-insecure households increase food availability from their own agriculture and livestock production and from common property forests and fisheries resources.</i>
<ol style="list-style-type: none"> <li>1. Improving the productivity and diversification of agriculture.</li> <li>2. Improving the management of water resources and irrigation.</li> <li>3. Enhancing fisheries reforms.</li> <li>4. Enhancing forestry reforms.</li> </ol>
<i>Objective 2: Food-insecure households increase their food access by increasing household income.</i>
<ol style="list-style-type: none"> <li>1. Increasing wage employment opportunities for the poor and food-insecure.</li> <li>2. Increasing micro-enterprise opportunities for the poor and food-insecure.</li> <li>3. Developing market infrastructure and services.</li> <li>4. Developing transport infrastructure and services.</li> </ol>
<i>Objective 3: Food-insecure households improve their utilization of food resulting in reduced malnutrition, morbidity and mortality, particularly among women and children.</i>
<ol style="list-style-type: none"> <li>1. Reducing child and maternal malnutrition and mortality.</li> <li>2. Improving domestic water supply and sanitation and hygiene practices.</li> </ol>



3. Improving food safety and enhancing food fortification.
<i>Objective 4: Improved social safety nets and enhanced capacities of food insecure households to cope with risks and shocks increase the stability of their food supply.</i>
1. Strengthening disaster management safety nets. 2. Establishing social safety nets for vulnerable groups.
<i>Objective 5: The institutional and policy environment for achieving improved food security and nutrition in Cambodia is enhanced.</i>
1. Strengthening capacities and improving coordination for food security and nutrition. 2. Integration of food security and nutrition into the decentralized local planning process. 3. Improved food security and nutrition-related information management and targeting of interventions.

Source: CARD and TWG-FSN (2008)

### Food Security Information in Cambodia

Since food security is a cross-cutting issue, understanding the food security situation of a country requires a lot of information on various aspects and at different levels. The Food Security and Vulnerability Information and Mapping System (FSVIMS) Secretariat at the FAO has developed a food security conceptual framework as a guideline for formulating and operating comprehensive national food security information systems. The framework divides information of food security into three levels: national, sub-national and community level; household level; and individual level. Information from the three levels is used to provide various pictures of the population and economy regarding demographic conditions; economic condition; health and sanitation; food consumption status; environmental conditions; food availability; household characteristics; health status; risks, hazards, and shocks; political conditions; stability of food supplies and access; care and feeding practices; and nutritional status (Ker 2011).

Notwithstanding their different purposes of using food security information, users may require similar kinds of information. Generally, food security information is used for five purposes: (i) early warning purposes, (ii) to inform and guide response efforts when an emergency occurs, (iii) for longer term planning and programming, (iv) for monitoring and evaluation, and (v) for vulnerability assessments. Depending on how it is analyzed and the different timeframe used for analysis, the same information can be used for different purposes (Ker 2011).

Due to its broad range of uses, the users of food security information are diverse as well. The users may include decision makers and practitioners from various government agencies and international development agencies, academic institutions and NGOs involved in planning, implementing and evaluating policies and programs, and even farmers themselves. Although different users may require the same information, how they want the information to be presented to them is different. For example, decision makers require fewer details and are more interested in well-prepared briefs rather than lengthy technical reports. Such kinds of preference have to be well communicated between users and suppliers of food security information. Generally, supply is driven by demand, but it is not the case for food security information in Cambodia. There is reportedly poor linkage between the demand and supply of information, resulting in poor quality of knowledge products produced by the supply side (Ker 2011).

Information about food security in Cambodia could be obtained from various systems and datasets managed by different government and non-governmental agencies. Yet, they are often criticized for not being able to fulfill users' requirements. On the one hand, most of the systems are not demand driven and there is lack of coordination among each other. There are cases where potential users are unaware of or may not have easy access to available information and analysis. On the other hand, some published information is not friendly for non-experts or policy makers, resulting in the information not being use to inform the decision making processes (Ker 2011).

Ker, through his scoping exercise of food security information, has made several recommendations on how to improve food security information in Cambodia. Those recommendations focus on (i) institutional mechanism strengthening, (ii) food security information exchange, (iii) data quality, harmonization and analysis, and (iv) usage of food security information (Ker 2011). Effective communication of information has been stressed in two out of the four recommendations (see Table 3 for details of the recommendations).

**Table 3: Recommendations to Strengthen Food Security Information**

<b><i>Recommendation 1: Institutional mechanism strengthening</i></b>
1. Strengthen the FSN information management Task force
<b><i>Recommendation 2: Food security information exchange</i></b>
1. Strengthen the National Food Security Forum.
2. Upgrade Food Security and Nutrition Information System to be a search engine for food security and nutrition information.
3. Ensure sustainability of the food security and nutrition monitoring system: The early warning bulletin.
4. Use the media
5. Effective communication and reporting of food security information.
<b><i>Recommendation 3: Data quality, harmonization and analysis</i></b>
1. Improve capacity of the food security and nutrition analysis team.
2. Conduct study on cross border trade of rice.
<b><i>Recommendation 4: Using food security information</i></b>
1. Develop food security and nutrition communication strategy and plan to promote the use of food security information among stakeholders.
2. Make products user friendly within the Cambodian context.

Source: Ker (2011)

## Research Uptake for Food Security

### Concept of Research Uptake

Why is research uptake an answer to the current problems of food security information in Cambodia? As the review in the previous section has shown, the supply-driven nature of the current food security information systems with poor communication has led to mismatches between the demand and supply of the information. Policy makers, development practitioners, and other potential users need to be better informed about the existing food security information and able to voice their demands of the information more effectively. Research

uptake adopts a different approach by allowing the demand and supply of research to negotiate their needs through an iterative process of dialogues with the aim of making research more relevant for users, and to facilitate the understanding and application of research by users (Adolph, Proctor et al. 2009).

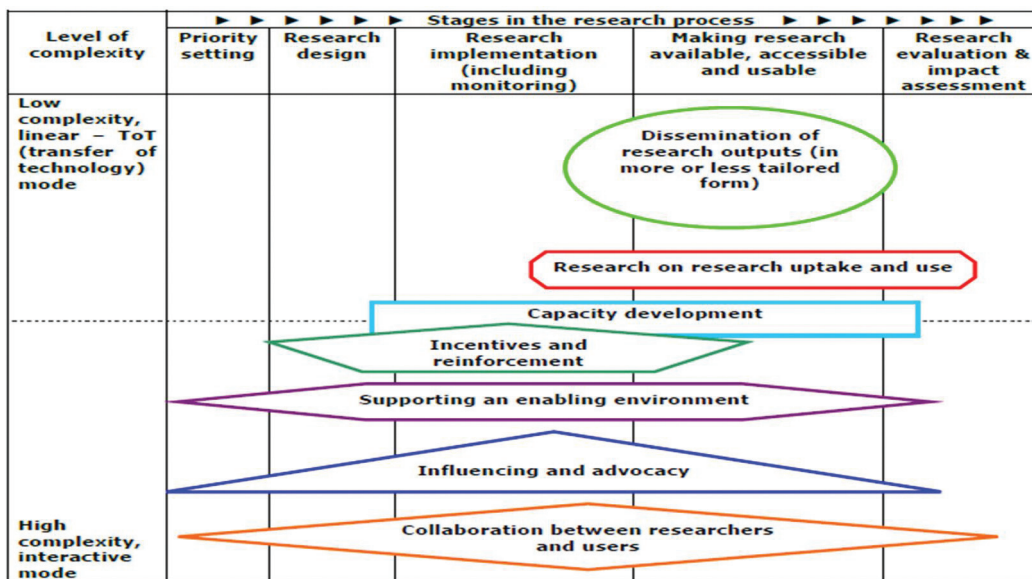
Clear understanding of the concept of research uptake, thus, is obviously warranted. As yet there is no universal definition of the term. Adolph and her colleagues, in their commissioned assignment to assess contribution of DFID's research into policy, explain how they come up with a definition of research uptake as the *“process of becoming aware of and accessing research outputs, and the institutions, policies, systems and mechanisms supporting this process”* (Adolph, Herbert-Jones et al. 2010). The Cambridge Dictionary defines *“uptake”* as *“the rate or act of accepting something”*, for example *“There is 90 percent uptake of vaccination in Cambodia”*. The term *“research”* as such is defined (in the Oxford Dictionary) as *“a systematic study of materials and sources in order to establish facts and reach new conclusions”*. These two definitions suggest that the process of research uptake requires at least two stages:

- 1) awareness of research to be taken up, and
- 2) access to the research.

In order for users to be aware of the research, the research team needs to develop *“uptake pathways”* – pathways by which research outputs come to the attention of potential users. However, after research uptake (being aware of and having access to the research), users still need various supporting mechanisms to make an effective use of (or apply) the research outputs (i.e. the evidence, finding, product/technology). The supporting mechanisms could be grouped into following seven categories. Figure 1 shows how each category fits into various stages of research. Below is the list of the seven supporting mechanisms.

- 1) Dissemination of research findings (message)
- 2) Capacity development (learning)
- 3) Influence (social influence)
- 4) Collaboration between researchers and users (communication)
- 5) Incentives and reinforcement (motivation through reward)
- 6) Enabling environment (facilitation)
- 7) Research on research uptake and use

Figure 2: Research Uptake Mechanisms during Different Stages of Research Process

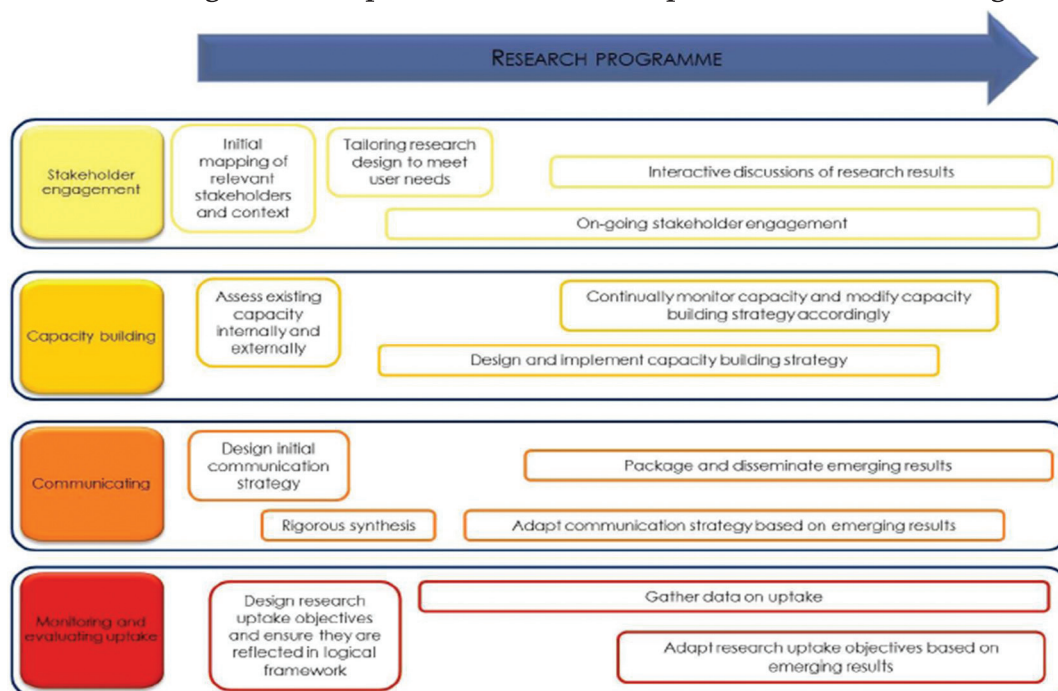


Source: Adolph, Herbert-Jones et al. (2010)

### Components of Research Uptake

To implement research uptake, the research team needs to do four strands of work: (i) stakeholder engagement, (ii) capacity building, (iii) communication, and (iv) monitoring and evaluation of uptake (DFID 2013). Figure 2 presents components of research uptake for a research program.

Figure 3: Components of Research Uptake for a Research Program



Source: DFID (2013)

## **Stakeholder Engagement**

It is absolutely necessary to identify relevant stakeholders from the beginning of the research project. Stakeholders may include policy-makers, civil society organizations, the private sector, other researchers or even research participants. In addition to identification of individual stakeholders, the research team also needs to map the groups, structures and processes relevant to the area of research. Experience from many research programs has shown that policy makers tend to be the most difficult group to be identified. As a tip, the research team should first try to understand the basics of political systems and then how policy on the research topic is made in the selected country and what relevant policy processes are on-going (DFID 2013).

The next task is to align research design to needs of stakeholders. If the research aims at informing policy formulation, then the research team can discuss with the identified policy-makers about their priority areas and predicted future trends. Depending on the types of information they need and timeframe they have, the research design and methodology can be adjusted accordingly. For example, if the policy-makers want to know the impact of any particular policy intervention, then an experimental or quasi-experimental design may be appropriate. And if the research aims at informing any policy formulation with one year 's time, the research should adopt any method that can produce results within that timeframe (DFID 2013).

After the research is carried out, it can be easy to forget the policy makers until findings are ready for dissemination. Ideally, stakeholders' engagement should be maintained throughout the research program, so that stakeholders can continuously advise the team on research implementation and are interested in the research findings. One possible way to keep them engaged is to invite them to sit on an advisory board of the research program that meets occasionally to provide guidance on emerging issues. Another way is for the member of the research team to sit on national level advisory panels on the research topic (DFID 2013).

Once the results are ready, the research team needs to communicate them effectively to potential users. Effective dissemination of research findings need to be tailored-made to meet the different needs of audiences. Depending on the types of audience and information they need, research findings could be disseminated through various channels, such as printed publication (journals, bulletins, briefings, reports or newsletters), oral presentations (in seminars or conferences), alternative presentation (videos, audio tapes, poster presentation, or communication events), website, social media and mass media (Adolph, Herbert-Jones et al. 2010).

It is an ideal objective that a research program can inform policy and practice decisions. In order to do that, the research team has to ensure that their findings are available and accessible to a wide range of audiences both specialists and non-specialists. Moreover, the research team can initiate evidence-informed discussions of research findings and encourage decision makers to make use of the full range of research evidence on the studied topic. The research team should also invite other research programs on the same topic to join the discussion, so that decision makers get a balanced view of the topic.

## **Capacity Building**

Key stakeholders and the research team may need some sorts of capacity development for them to implement research uptake and to understand and demand high-quality research. At an

early stage of the program, capacity assessment should be done both internally (within research team) and externally (within stakeholders who could use the research findings).

Internal capacity for research uptake includes the knowledge, skills and attitudes needed to access, use, create and communicate research information. Specifically, some important areas of skill may include information literacy (i.e. skills in finding and appraising academic literature), knowledge of research methodologies, internal communication (including effective use of email), internal knowledge management, academic writing and summarizing skills, skills in communicating with non-specialists (DFID 2013).

External stakeholders also need to have some sorts of skills for research uptake. Those skills may include understanding of research and skills in finding and appraising evidence, thematic topic knowledge, and incentives (or disincentives) to consider evidence (DFID 2013).

The capacity development can happen in the forms of provision of educational materials, interactive training and outreach (e.g. field days, training courses on writing skills or critical appraisal skills), expert support, or organizational/institutional strengthening in general (Adolph, Herbert-Jones et al. 2010). To decide on the mode of capacity building, the research team needs to consider individual learning style and organizational capacity of external organizations that are potential users of the research findings (DFID 2013).

## **Communicating**

As a starting point of communication, the research team should conduct a rigorous literature review of the topic before they conduct their study and communicate this review with decision makers to get their advice on the topic and interest in the research evidence. This communication can help the research team set policy-relevant research objectives.

Section 3.2.1 has shown that the research team should keep communication with decision makers open throughout the research program, not just at the dissemination stage. When it comes to dissemination of research findings, the research team should adopt various modes of communication to suit with the characteristics of individual groups of audiences.

## **Monitoring and Evaluating Research Uptake**

Research uptake indicators should be included in the log frame of the research program. The primary aim of the research is absolutely to produce high quality research outputs. When the program also aims at promoting research uptake of the findings, the next objective should be to ensure that research findings are available and accessible and that evidence-informed discussions are facilitated. Capacity building (to do research or to support research uptake) should be another output of the research program. Therefore, a research program may have three outputs as follows:

- ✓ Output 1: High quality, relevant research carried out
- ✓ Output 2: Research accessed and discussed
- ✓ Output 3: Capacity to do research/support research uptake built

Although it is difficult to assess the impact of a research program, it is still necessary to record all observed outcomes – the effects which may be linked causally to a program's output and work – be them intended or unintended and positive or negative. When possible, the research team should provide supporting evidence of the effect of research program on the outcomes (DFID 2013).

## **Conclusions**

Through analysis of the stocktaking, this paper aims to shed some light on how to bridge the gap between research on food security and decision makers either at the policy or program level.

The rapid economic growth during the past two decades has significantly contributed to the reduction of poverty and hunger but less in improving nutritional status of the people, especially children. A great deal of challenges still exists relating to food supply, food access and quality and safety of food. Due to its cross-cutting nature, improving food security requires involvement from various line ministries and agencies.

Studies have shown that poor communication of food security information is one of the key hindrances to effective policy and program formulation and implementation. The information is mostly supply-driven and thus does not reflect the needs of demand side. Moreover, the choice of knowledge products usually does not match with the needs of different users.

Promoting research uptake of food security studies can lead to better use of food security information since it shifts focus from the supply side to the demand side of the research. Engagement of stakeholders throughout the research project, capacity building for research team and key stakeholders, communication on research project and findings, and monitoring and evaluation of uptake are all components of research uptake. By so doing, decision makers are informed about the research project, able to express their needs of information, capable of accessing and making use of the research findings to inform their policy or program development.

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# TOWARDS CAMBODIA'S ENERGY SECURITY: THE ROLES OF CHINA'S INVESTMENT AND AID

Heng Pheakdey

## Abstract

China is the largest foreign investor in Cambodia's energy sector. Its multimillion-dollar investment is transforming the country's energy sector, helping to reduce reliance on foreign energy, increase electrification rate, and potentially reduce the energy cost. However, China-funded energy projects, particularly hydropower dams, have met with widespread suspicion and harsh criticism for failing to meet international standards and for imposing social and environmental damage. Combining fieldwork, in-depth interview and comprehensive desk research, this paper examines Cambodia energy security challenges and critically analyzes the China's controversial role in the energy sector, asking if it is the solution or part of the problem. The paper provides significant insights into the link between energy and sustainable development and directly contributes to the formation of sustainable energy policy for Cambodia.

## Introduction

Apart from Myanmar, Cambodia has the lowest electrification rate in the region with only 24 per cent of its entire population having access to reliable electricity.<sup>1</sup> Currently, it has to import 42 per cent of its electricity from neighboring countries to meet its local demand.<sup>2</sup> Also, since 93 per cent of the power locally produced depends on imported diesel fuel, the electricity tariff in Cambodia is one of the highest in the world.<sup>3</sup> Such high cost of energy imposes a heavy financial burden on the majority of low-income households, deprives the poor rural population of access to electricity and drives potential investors away. Cambodia's woefully inadequate supply of power presents one of the main structural problems affecting the country's competitiveness.

Cambodia's desire for energy is obvious but how to get it remains controversial. The government has turned to China for loans and encouraged Chinese firms to invest in energy projects, especially hydropower. China has been the main engine for Cambodia's energy development, investing billions of dollars in power generation and distribution projects. China is currently the dominant player in the hydropower sector, financing and building most of the hydroelectric dams across the Kingdom. The government is grateful for China's contribution to the energy sector, saying that it is helping Cambodia to achieve energy independence. However, to civil society, the role of China is mysterious at least and potentially detrimental at worst. Activists and environmentalists have criticized China-funded hydropower projects for failing to adopt international standards, for causing environmental damage and hurting the livelihood of the local communities. Experts also warn that the construction of dams in some places such as Koh Kong and Kratie province will greatly affect the fish populations in Cambodia's rivers and threaten the few remaining habitats of endangered species like the freshwater Irrawaddy dolphin and the Siamese crocodile.<sup>4</sup> Hydropower projects built by Chinese firms have also been criticized for the

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<sup>1</sup>International Energy Agency (2011), World Energy Outlook Factsheet, Paris: IEA, p 167

<sup>2</sup>Ministry of Industry Mines and Energy (2011), Cambodia Energy Status and Its Development, presentation slide at Cambodia Outlook Conference on 16 March 2011, Phnom Penh

<sup>3</sup>World Bank (2006), Energy Sector Strategy Review, Phnom Penh, p 4.

<sup>4</sup><http://www.internationalrivers.org/campaigns/sambor-dam>

absence of meaningful public consultation and an overall lack of transparency in the decision-making process.<sup>5</sup>

### **Conceptualizing energy security in Cambodia's context**

The term “energy security” came into the center of international policy agenda after various incidents that threaten the national and global energy supply such as the increase the price of oil, political instability in several energy producing countries and the competition over energy sources. While the term has become central in energy policies in many countries, there is neither consensus on its precise interpretation, nor is there an ideal tool to measure it.

Traditionally, definitions of the term tend to revolve around having abundant energy resource, ensuring uninterrupted supply of energy at a reasonable price, not being heavily dependent on a single state for energy and having diversified energy sources. For example, International Energy Agency (2001) broadly defines energy security as the physical availability of supplies to satisfy demand at a given price.<sup>6</sup> Similarly, Bohi and Toman (1993) stresses that energy insecurity is the loss of welfare as a result of a change in price or availability of energy.<sup>7</sup> Jun et al. (2009) describe energy security as a reliable and uninterrupted supply of energy sufficient to meet the needs of the economy that is obtained at a reasonable price.<sup>8</sup> However, over time the notion of the term has broadened to include dimensions other than the availability of supply and the affordability of the price. The concept of “acceptability” or “sustainability” has recently been included as an element of energy security. For instance, APERC (2007) describes energy security as the availability of energy at all times in various forms, in sufficient quantities and at affordable prices without unacceptable or irreversible impact on the environment.<sup>9</sup> Similarly, the European Commission states in the Green Paper that “Strategy for energy supply security must be geared to ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development.”<sup>10</sup>

Energy security is highly context dependent and strategies to attain this goal differ from country to country. In China, for example, the energy security goal is to acquire sufficient energy supplies to protect China's core objectives at prices that neither too high nor too low to undermine those objectives.<sup>11</sup> In the USA, the focus is on reducing dependence on oil and increasing share of renewable energy.<sup>12</sup> In India, energy security is achieved when the country can supply lifeline energy to all citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to

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<sup>5</sup>Carl Middleton (2008), *Cambodia's Hydropower Development and China's Involvement*, Berkeley: International Rivers, pp. 12-20

<sup>6</sup> International Energy Agency (2001), *Towards a sustainable energy future*, online <[http://www.iea.org/g8/2008/G8\\_Towards\\_Sustainable\\_Future.pdf](http://www.iea.org/g8/2008/G8_Towards_Sustainable_Future.pdf)> (Accessed 12 July 2012)

<sup>7</sup>Bohi, Douglas R. and Toman, Michael A. (1996), *The Economics of Energy Security*, Boston: Kluwer Academic Publishers.

<sup>8</sup>Jun, Eunju, Kim, Wonjoon and Chang, Soon Heung (2009), *The Analysis of Security Cost for Different Energy Sources*. *Applied Energy*, 86(10): 1894-1901.

<sup>9</sup> Asia Pacific Energy Research Centre (2007), *A quest for Energy Security in the 21st Century: Resources and Constraints*, Tokyo: APEC

<sup>10</sup> European Commission (2000), *Green Paper - Towards a European Strategy for the Security of Energy Supply* online: <[http://ec.europa.eu/energy/green-paper-energy-supply/doc/green\\_paper\\_energy\\_supply\\_en.pdf](http://ec.europa.eu/energy/green-paper-energy-supply/doc/green_paper_energy_supply_en.pdf)>

<sup>11</sup> Downs, Erica (2006), *Energy Security Series: China*, The Brookings Foreign Policy Studies

<sup>12</sup> The White House (2011), *Fact sheet: America's Energy Security*, online: <<http://www.whitehouse.gov/the-press-office/2011/03/30/fact-sheet-americas-energy-security>>.

satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected.<sup>13</sup> It should be emphasized that energy policy is multi-dimensional and pursuing a particular energy goal has serious implications for various policy areas including but not limited to climate change, poverty and inequality. Therefore, policies to achieve energy security must reflect and address local context in such a way that solving energy problems will not create new problems in other areas.

In Cambodia the official definition of “energy security” is lacking so for the purpose of discussion, the author proposes the following definition:

“Energy security is the sufficient, fair, reliable and affordable supply of energy which does not seriously harm the environment nor negatively affect the livelihood of the local people.”

Sufficiency in this definition means having enough energy to support economic and social activities without heavily depending on foreign import. Fairness implies equitable access to energy across the population and no part of the country is marginalized. Reliability implies the provision of energy with minimal disruptions to supply. Affordability means supplying energy at a price which consumers can afford to pay relative to their living standard. This definition stresses that while securing adequate energy supply is important, it should be done in a sustainable way by minimizing current and future threats on the environment and the communities. Based on this definition, the following section discusses the challenging facing energy security in Cambodia.

### **Cambodia’s energy challenges**

Even after decades of rehabilitation, Cambodia’s energy sector remains underdeveloped. Currently, traditional biomass (mainly wood) accounts for 73 per cent of primary energy demand, following by oil at 26 per cent.<sup>14</sup> Hydropower, despite its huge potential, has so far made a very small contribution, while coal and gas have not yet featured in the energy mix. Cambodia, which has one of the lowest GDP per capita in the world, also has one of the lowest energy uses per capita in ASEAN. On average, one person in Cambodia uses only 370 kgoe (kilograms of oil equivalent) of energy, compared to 423 kgoe in the Philippines, 744 kgoe in Vietnam and 1,503 kgoe in Thailand.<sup>15</sup> In 2009 Cambodia had an electricity consumption per capita of 130 kwh, a little more than Myanmar, but much less than its neighboring countries (Table 1).

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<sup>13</sup> Government of India (2006), *Integrated Energy Policy: Report of the Expert Committee*. New Delhi: Government of India!

<sup>14</sup> Business Monitor International (2011), *Cambodia Power Report*, London: BMI

<sup>15</sup> World Development Indicator, website

<http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2>

Table 1: Energy Statistics in ASEAN

Country	GDP per capita in 2011 (constant 2000 US\$)	Population 2011 (million)	Energy production in 2009 (ktoe)	Energy use per capita in 2009 (kgoe)	Electrification rate 2009 (percentage)	Electric power consumption 2009 (kWh per capita)
Brunei	17,225	0.4	18,939	7,971	99.7	8,661.8
Cambodia	589	14.3	3,667	370	24.0*	130.8
Indonesia	1206	242.3	351,841	850	64.5	590.2
Lao PDR	591	6.2	n.a	n.a	n.a	n.a
Malaysia	5,364	28.8	89,693	2,390	99.4	3,613.5
Myanmar	n.a	48.3	22,357	316	13.0	103.7
Philippines	1,410	94.8	23,474	423	89.7	593.5
Singapore	33,529	5.1	28	3,704	100	7,948.9
Thailand	2,698	69.5	61,705	1,503	99.3	2,044.8
Vietnam	757	87.8	76,642	744	97.6	917.6

Source: Author's compilation from World Bank Database and World Energy Outlook report 2011.

\*According the latest presentation document of an official at MIME, Cambodia's electrification has increased to 35% in 2011. See Victor Jona (2012).

The power sector in Cambodia is highly fragmented. Since there is no integrated national transmission system, electricity is produced and distributed by 24 isolated power systems in various provincial cities. The largest system in Phnom Penh is run by Electricité du Cambodge (EdC), a wholly state-owned limited liability company formed in 1958 to generate, transmit and distribute electric power throughout Cambodia. However, due to its limited capacity, EdC currently produces electricity for only 376,000 customers in 18 cities and provincial towns, while the remaining areas are served by 249 licensed Rural Electricity Enterprise (REEs), which are small locally-owned businesses operating small diesel-powered mini-grids (1-10 MV) or battery charging services to sell power to local households and businesses.<sup>16</sup> It should be noted about half of these REEs operates only 4-12 hours a day and usually charges higher price than EdC.<sup>17</sup>

Arguably, one of the major problems in the power sector is the lack of access. Over 11.3 million people (mostly in rural areas) are still not connected to the grid. Cambodia's electricity level stands in stark contrast to those of its neighbors: 64.5 per cent in Indonesia, 90 per cent in the Philippines, 98 per cent in Vietnam and 99 per cent in Thailand.<sup>18</sup> Expanding access has been relatively slower than the neighboring countries. For example, in 1995 Laos and Cambodia had a similar electrification rate of 15 per cent, but fifteen years later, Cambodia is far behind Laos whose access to electricity had more than quadrupled to 69 per cent in 2010.<sup>19</sup> There are two major reasons for such low electricity access in Cambodia. First, electricity grids cover very limited areas (mostly in the biggest cities) and are not connected to each other so communities in the remote locations cannot be served. Secondly, the high electricity cost prevents poor rural population from getting connected

<sup>16</sup>Electricité du Cambodge (2010), Annual Report, Phnom Penh: EdC, p. 5

<sup>17</sup>World Bank (2011), One Goal, Two Paths: Achieving Universal Access to Modern Energy in East Asia and Pacific, Washington, D.C: World Bank, p. 105

<sup>18</sup> International Energy Agency (2011), p 134

<sup>19</sup>World Bank (2012), Lao PDR; Power to the People: Twenty Years of National Electrification, Washington, D.C.: World Bank, p viii

even if they have access to the grid. According to the World Bank, Cambodia's electricity is among the most expensive in the world. In the cities, the prices range from US\$0.165 to US\$0.205 per kilowatt-hour (kwh) and in rural areas the cost can be as high as US\$1.25 per kwh.<sup>20</sup> Heavy reliance on the imported fossil fuel for electricity generation and the lack of integrated high voltage transmission system are the main culprits for the costly electricity price.

Another key issue in the power sector is the persistent shortage of supply. Growing at an average rate of 19 per cent per year, electricity demand in Cambodia reached 409 megawatts in 2010 while the electricity supply stood at 485 megawatts in the same year.<sup>21</sup> Of this supply output, only about 50 per cent is produced domestically while the remaining half of the electricity is imported from Vietnam, Thailand and Laos. Currently, the electricity supply barely meets the local demand but in the dry season when more energy is needed for cooling, intermittent blackout is common due to power shortage. The lack of reliable power increases the operating cost of doing business and affects the productivities of the people.<sup>22</sup> With the demand expected to increase fivefold by 2020, Cambodia is under intense pressure to boost its power supply to meet the soaring demand.

Realizing that costly electricity bills and the inadequate supply of power could hinder economic growth and drive investors away, the government has made ambitious plan to significantly increase Cambodia's power output and to supply 70 per cent of the population with reliable electricity by 2030. To achieve this goal, a number of strategies have been put into place. First, the government has prioritized 17 power generation projects in different phases to be completed by 2020. This includes the construction of eight hydropower dams and a number of coal power plants with an installed capacity of 4,023 megawatts and 1,300 megawatts respectively. Secondly, according to the national power grid development plan, sixteen power grid projects, with the total length of 2100 kms, are also to be constructed by 2027 to help increase electricity access to the rural villages.<sup>23</sup> In addition, rural electrification programs focusing on solar energy have also been implemented to bring electricity to remote places outside the grid system.

Some improvements have been made in the power sector in the recent years, particularly in the expansion of the electricity generation and supply system. As of July 2012, one hydropower project (the Kamchay dam) was completed and four more are under construction (table 5). Several transmission lines and substations are also being built.<sup>24</sup> Also, as part of the Rural Electrification Fund projects, a total of 12,000 Solar Home Systems have been installed in seven provinces.<sup>25</sup> Despite the progress, Cambodia's energy sector remains in a critical situation and is facing significant financial, technical and institutional challenges.

One of key barriers to the improvement of the sector is the lack of adequate financial resources. The World Bank estimates that Cambodia will need to invest a total of US\$1.4 billion from 2011-2020 and an additional US\$2.3 billion from 2021-2030 to achieve universal electricity access.<sup>26</sup> Given the government's poor budget performance, such funding will have to come from donors and private investors. Another major challenge is the lack of technical and institutional capacity to implement the plan. The management systems of the

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<sup>20</sup><http://www.worldbank.org/en/news/2011/02/25/cambodia-villagers-enjoy-cheaper-reliable-electricity>

<sup>21</sup>Ministry of Industry, Mines and Energy (2011), Development of Electricity in Cambodia, Presentation paper in the first national conference on climate change, agriculture and energy on 01-02 December, Phnom Penh.

<sup>22</sup>The Phnom Penh Post (2012), Kingdom Telecoms Deals with Blackouts (12 March), website <http://www.phnompenhpost.com/index.php/2012031254977/Business/kingdoms-telecoms-deal-withblackouts.html>

<sup>23</sup> Ministry of Industry, Mines and Energy (2011)

<sup>24</sup> Author's interview with the director of planning department of MIME on 03 February 2012

<sup>25</sup> Author's Interview with the executive director of the Rural Electricity Fund on 15 February 2012

<sup>26</sup> World Bank (2011), p. 105

two governing bodies of the energy sector (MIME and EAC) are weak as their staff lack technical expertise and research capacity. These present major barriers for effective policy formulation and implementation.

“We lack experience and expertise and this is our challenge for the future. The energy sector will grow in the future and we don’t know how to manage it effectively. So we’ll have to learn from international experiences.”<sup>27</sup>

### **China’s involvement in Cambodia’s energy sector**

China is one of the most prominent foreign players in Cambodia. A century-old relationship between China and Cambodia allows the two nations to establish close diplomatic, political and economic ties. Presently, China is Cambodia’s top foreign investor and a major source of foreign assistance. China’s cumulative official development assistance (ODA) from 1992-2011 reached US\$ 0.86 billion accounting for 7.1 per cent of total ODA, making it the second largest bilateral donor, behind only Japan.<sup>28</sup>

According to Council for Development of Cambodia, the highest decision-making level of the government for private and public sector investment, by September 2011 China’s cumulative investment reached US\$8.8 billion, making it the largest investor in the kingdom.<sup>29</sup> China has now become a leading investor in natural resources and the energy sector. In fact, 92% of total energy investment approved from 1998-2008 came from China.<sup>30</sup> Noticeably, five hydroelectric dams with a total capacity of 915 megawatts were financed by Chinese investors with the total investments of US\$ 1.8 billion and five more projects, also known to have been financed by Chinese firms, are also currently being studied (Table 5).<sup>31</sup>

Table 5: Hydropower Plants funded by China

No	Project	Capacity (MW)	Cost (million USD)	Expected Year of Operation	Status
1	Kamchay	193	280	2011	Completed
2	Kirirom III	18	47	2012	Construction
3	Stung Atay	120	450	2013	Construction
4	Stung Tatay	246	540	2014	Construction
5	Lower Stung Russey Chhrum	338	495	2013	Construction
6	Stung Chhay Areng	108	-	2017	MoU
7	Lower Sesan II	400	781	2017	MoU
8	Lower SrePok III	416	-	2018	MoU
9	Lower SrePok IV	48	-	2018	MoU
10	Sambor	2,600	4,947	2019	MoU

Source: Author’s compilation from MIME report and various media reports. Note: MoU means a memorandum of understanding has been signed but construction has not started.

Apart from hydropower, China is also investing in coal power plants, which according to the national power sector plan, will play the second major role in the energy mix in the future after hydropower. Currently, three coal power plants are being constructed, two of which are reported to be financed by Chinese firms. The first plant is

<sup>27</sup> Author’s interview with the deputy director of the corporate and planning division, Electricity of Cambodia (EdC) on February 29, 2012.

<sup>28</sup> Council for the Development of Cambodia (2011), p 14

<sup>29</sup>Ibid. p 3

<sup>30</sup> Ibid. p 4

<sup>31</sup> Ibid. p 4

built in Stoeng Hav Industrial Zone in Sihanouk province by a joint venture between a local firm and an undisclosed Chinese company. The plant, which costs US\$362 million to build, has the capacity of 270 megawatts and is expected to be operational in 2014.<sup>32</sup> Another unnamed Chinese firm has also been reported to invest US\$370 million in a 300-megawatt coal power plant in Kampot province.<sup>33</sup> Once completed in 2015, the plant will provide electricity for the Kampot Special Economic Zone, the nearby Prey Nob oil-refinery and rice mills in Preah Sihanouk province.

In addition to the investment in electricity generation projects, China has assisted in the building of the power distribution system. For example in 2009, China provided US\$80 million in soft loans to EdC for building the Phnom Penh Loop Line Transmission System which brings electricity from all over Cambodia.<sup>34</sup> Recently, China also offered US\$53 million of concessional loan to Cambodia for the construction of a 22 kilovolt electricity transmission line that will run through four provinces: Kampong Cham, Prey Veng, Kampong Speu, and Preah Sihanouk. Built by China National Heavy Machinery Corporation, the project is to be completed in 2014 and is expected to benefit four million people who currently lack access to electricity.<sup>35</sup>

China is indeed a key driver for Cambodia's energy development, and is investing huge amount of capital compared with other countries. While the government is grateful for China's assistance, critics suggest that China's generous donation comes with strings attached such as business favors and political influence. Cambodia has been very supportive of Chinese investment. According to a report by Cambodian Center for Human Rights (CCHR), Chinese companies hold the largest share of the land concessions granted since 1994 (50 percent of 4.6 million hectares).<sup>36</sup> On the political front, Cambodia has been accused of being under the influence of China. Incidents such as the deportation of ethnic Uyghur asylum seekers in 2009,<sup>37</sup> and the preferential treatment given to China during the ASEAN meeting in 2012<sup>38</sup> suggest that China can count on Cambodia for political favor. Cambodia-China special relationship has raised the suspicion that Cambodia might have been easy with regard to regulations and standard imposed on Chinese investment projects.

Such suspicion arises from the fact that Chinese investment in the energy sector, especially in hydropower projects, has been notoriously known for the lack of transparency. Many China-funded dams remain a mystery until the construction starts. Little information is disclosed to the public while meaningful consultation with affected stakeholders is either absent or superficially conducted. To illustrate, a baseline study conducted by NGO Forum on the construction of the Lower Sesan 2 dam by a Chinese firm which environmentalists believe would affect 100,000 people suggested that there was no consultation with the

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<sup>32</sup>The Phnom Penh Post (2010), China-Cambodia deal to back power plant (13 December), website <http://www.phnompenhpost.com/index.php/2010121345324/Business/china-cambodia-deal-to-back-powerplant.html>

<sup>33</sup>The Phnom Penh Post (2012), China to back Kampot power plant (19 June). Website <http://www.phnompenhpost.com/index.php/2012061956867/Business/china-to-back-kampot-plant.html>

<sup>34</sup>The Phnom Penh Post (2009), EdC signs electricity line deal with China (04 September), website <http://www.phnompenhpost.com/index.php/2009090428196/Business/edc-signs-electricity-line-deal-withchina.html>

<sup>35</sup>Xinhuanet (2012), Work on China-funded power transmission line begins in eastern Cambodia (06 April), website [http://news.xinhuanet.com/english/world/2012-04/06/c\\_131509602.htm](http://news.xinhuanet.com/english/world/2012-04/06/c_131509602.htm)

<sup>36</sup>The Phnom Penh Post (2012), China Reaps Concession Windfalls (02 April), website <http://www.phnompenhpost.com/index.php/2012040255375/National-news/china-reaps-concessionwindfalls.html>

<sup>37</sup>BBC (2009), US Decries Cambodia's Uighur Move (20 December), website <http://news.bbc.co.uk/2/hi/8422022.stm>

<sup>38</sup>Reuters (2012), ASEAN Way: founders in South China Sea storm (17 July), website <http://www.reuters.com/article/2012/07/17/us-asean-china-idUSBRE86G09N20120717>



public. None of the nine communities affected by the dam have been given enough information on its impact.<sup>39</sup>

## **Discussion**

Obviously, energy is a primary concern for Cambodia. With the demand predicted to increase fivefold in the near future, the government has put forward an ambitious plan to boost domestic energy production, mainly through the construction of hydropower dams and coal power plants, and promise to bring electricity to 70 per cent of its population by 2030. Given the limited financial and institutional capacity of the government, the roles of bilateral, multilateral donors and the private sector are especially crucial in helping Cambodia to achieve its goal. China, in this regard, is seen to be the most prominent stakeholder in terms of their contribution to Cambodia's energy sector. When Cambodia needed money the most, China spent billions of dollar in form of investment, loans and grants to help improve domestic power generation, distribution and capacity building in the energy sector. In this way, China is seen to be transforming Cambodia's energy sector by helping to reduce reliance on foreign energy, increase electrification rate, and potentially bring down the energy cost.

China-funded energy projects help boost domestic electricity generation and contribute to improving electricity access for the rural people. This in turn translates into an economic gain for the community and households. With access to electricity, children can study at night; women can save time from going into the wood to collect firewood for cooking thus improving the productivity of their income generating activities. Communal health may also improve as health facilities can care for patients at night and medicines can be properly refrigerated.

Advantageous it may seem, China's roles need to be analyzed from a broader sustainability framework. As discussed in the previous section, energy is delicately linked to sustainable development. Energy is a multi-dimensional issue; hence, policies to achieve sustainable energy must reflect and address local context in such as a way there solving energy problems will not create new problems in other areas. Sustainable energy for Cambodia should mean more than having energy independence. It must satisfy the energy needs of current and future generations in a sustainable way which does not seriously harm the environment nor negatively affects the livelihood of the local people.

China-financed energy projects maybe economically beneficial and might have the potential to solve Cambodia's chronic power deficit but critics have expressed their concerns on the social and environmental consequences of such projects. Chinese investment in hydropower dams, in particular, is met with widespread criticism from local and international environmental activists. For example, the Kamchay hydropower project, which was built by China's largest hydropower company, Sinohydro Corporation, has flooded 2,000 hectares of forested land in Bakor national, home to a number of endangered species and an important resource to local communities. The construction of the dam had started long before the approval of the environmental impact assessment (IEA). Even until now, the project EIA is has still not been made available to the public. In the case of Stung Atay dam in Koh Kong province, it is estimated that around 5,000 hectares of protected forest in the Phnom Samkok Wildlife Sanctuary and the Cardamom Mountains would be flooded. According to an official of an international organization working closely with this case, the local forest was cleared, destroying the food source of the local community. Although the villagers were promised compensation, until now nothing has materialized.

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<sup>39</sup>The Phnom Penh Post (2013), Little information on Lower Sesan 2 dam: report (25 January), accessed at <http://phnompenhpost.com/2013012560978/National/little-information-on-lower-sesan-2-dam-report.html>

The affected families neither know when they will be compensated nor what kind of the compensation they will get.<sup>40</sup> Stung Tatay, another dam in the same province which is being built by a Chinese firm, also poses a major risk to more than 2,000 hectares of evergreen forest and animal habitat. The conservation groups warn that the project could devastate one of Cambodia's richest ecological sites for little gain.<sup>41</sup> Most notably, the proposed Sambo Dam in Kratie province, if built, would jeopardize fisheries, threaten the habitat of the critically endangered Irrawaddy dolphins and affect around 20,000 people who would be evicted from their homes and land.<sup>42</sup>

"It's a great loss because we do not have many places in the country like that left. So many forests have been destroyed. This area has the rare animals, the endangered species, the mountain crocodile – so many rare animals I have never seen before," says opposition Sam Rainsy Party MP Son Chhay after visiting the site for Stung Chhay Areng dam in Koh Kong province<sup>43</sup>

From the social perspective, China-funded dam projects have also affected people's livelihood. For example, the Lower Sesan 2 dam in Stung Treng, which is being built by Cambodia's Royal Group, in partnership with Chinese company Hydrolancang International Energy, would displace some 5,000 families and adversely affect the livelihoods of 100,000 more, who depend on the region's fisheries. According to a local NGO who study the impact of the dam, there was no consultation from the government. The people affected by the dam were given little, if any, official information about the dam. The Kamchay dam on Bokor mountain was also reported to have affected the livelihood the local people who depend on collecting and selling non-timber forest products (such as bamboo, medicinal plants, edible fruit) from the mountain forests.<sup>44</sup> The author's interviews with villagers reveal that after construction commenced, bamboo collectors suffered a drastic loss of income because access to the forests has been restricted.

"At the beginning they didn't allow us to go into the forest. After we protested, we were allowed access but we had to register our name before you went in. Now we can go in freely but we have to travel long distance, go higher up the mountain to cut the bamboo since the bamboo near to the mountain hill had been cleared for dam construction. Before we could make five to seven baskets a day but now we can only make two to four," Ms Chea Chheang, a villager in O'toch village, Kampot.<sup>45</sup>

While the economic benefits of China's energy project are yet to be seen, the social and environmental consequences are real and proven. It may not be fair to generalize on the negative effect of Chinese energy projects but recurring issues have been observed in many Chinese-led dam projects such as the lack of transparency and accountability, public consultation, and access to justice for those who are affected.

## **Conclusion**

With rising demand, energy will surely continue to be the key to Cambodia's development agenda for years to come. Various policies and plans have been developed and put into

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<sup>40</sup> Interview with the author on 15 July 2011

<sup>41</sup>The Phnom Penh Post (2012d), PM insists worries about dam overblown (10 July), website <http://www.phnompenhpost.com/index.php/2012071057322/National-news/worries-about-dam-overblown.htm>

<sup>42</sup> International Rivers, <http://www.internationalrivers.org/campaigns/sambordam>

<sup>43</sup> The Phnom Penh Post, supra note 62

<sup>44</sup>Carl Middleton (2008) p 56

<sup>45</sup> Interview with the author on 20 July 2011

place to expand generation capacity, increase energy access, and improve energy efficiency. However, the lack of institutional capacity, and human and financial resources remain the main challenges. With billions of dollars invested in energy projects, China is playing a vital role in helping Cambodia to achieve energy independence and this paper by no means intends to dispute this claim. However, the author argues that while China plays a crucial role in moving Cambodia out of its chronic energy crisis, Chinese companies pose serious threats on social and environmental sustainability.

Chinese companies have the potential to be a real catalyst for sustainable energy development in Cambodia if they, together with the local government, put more effort to embrace international best practices and significantly improve the transparency of their investment projects. To ensure that energy projects will benefit rather than harm, local governments must enhance their regulatory role by putting in place clear investment regulations especially on environmentally sensitive investment projects and compliance should be strictly monitored. A feasibility study should be comprehensively conducted before the implementation of energy projects to thoroughly assess their costs and benefits. Stakeholders, in particular the local communities, should be consulted and empowered to express their ideas and concerns and that their well-being is taken to consideration in the decision making. Moreover, Chinese investment can also be channeled to support energy efficient initiatives and fund less controversial renewable energy projects such as solar power, micro hydropower, biofuel and biogas. These off-grid energy projects will not only contribute to sustainable energy development of Cambodia but also significantly improve the livelihood of the poor rural population.

# URBAN WATER SUPPLY DEVELOPMENT TOWARD ACHIEVING LAO MDG

Noupheuak Virabouth

## Geography and Population



The Lao People's Democratic Republic (Lao PDR) is a small country located in South-East Asia, and shares borders with the People's Republic of China to the North, the Kingdom of Cambodia to the South, the Socialist Republic of Vietnam to the East, the Kingdom of Thailand to the West and the Union of Myanmar to the North-West. There is no access to seaports other than through Thailand or Vietnam. It has a total land area of 236,800 square kilometres.

The results of the past 3 censuses have shown that the Laotian population has increased about 1 million in each of the following 10 years such as in 1985. The Laotian population was about 3.5 million, in 1995, and there were 4.5 million people and in 2005 and this

increased to 5.6 million. With a population growth rate of 2% per year, it is estimated that by 2015 our country will have 6.9 million people and in 2020 the Laotian population will increased to 8 million, and in 2030 this figure will be about 10 million. In 2005, the urban population was 1.4 million, equivalent to 25% of the total country population. By 2020, it is estimated the urban population will be about 2.5 million which is about more than 33% of the country population and that reflects the average urbanization rhythm at 0.5% per year. The net population increase in urban areas between 2005 and 2020 will be about 1.1 million equal to 8%. As end of 2012, the urban population was about 1.76 million which equals 27% of the total country population of 6,514,432. About 42% of the urban population live in urban centres or small towns ranging from 2,000 to 20,000 people

## **Water Resource Situation**

The tropical climate of Lao PDR is dominated by southwest monsoons. The wet season starts in late April and lasts until mid-October; the rest of the year is generally dry. Average annual rainfall ranges from 1,300 mm in Xaiyaburi Province to more than 3,000 mm in the mountainous areas of the south. More than 90% of the rainfall is concentrated during the wet season. Mean temperatures range from 22.4°C to 29.1°C with the mean maximum temperatures of 32°C occurring towards the end of the dry-season. Mean minimum temperatures, during December and January, range from 10°C in the lowland areas to 0°C in the mountainous areas above 1,200m of elevation. The Mekong River flows the entire length of the country from the north to the south. Approximately 1,865 km of the Mekong River flows along the Lao PDR borders; there are more than 15 Mekong River tributaries. The annual surface water run-off is estimated at 60,307m<sup>3</sup> per capita. The total annual water flow of 270 billion m<sup>3</sup>, generated in Lao PDR, contributes 35% of the average annual flow of the whole Mekong basin. From this figure, only about 5.7 billion m<sup>3</sup> or 2% has been used for different industrial sectors (WREA 2012) with agriculture use accounting for 82%, industry 10% and 8% being used for domestic purposes. The remaining balance of 264.3 billion m<sup>3</sup> flows into natural rivers to enhance ecosystem services and functioning. Unlike the areas of Lao PDR served by the Mekong River and its major tributaries, the remote northern part of the country relies on streams having much smaller, and often very small, catchment areas. It is common for streams served by small catchments to completely dry up towards the end of the dry season. Catchment deforestation has also impacted on stream flows with reported higher and shorter flood peaks in the wet season and lower flows for longer periods during the dry season. Groundwater conditions are not documented and the deep aquifers have, in the past, been generally unknown and untapped. Dug wells are occasionally used to tap shallow aquifers for domestic and agricultural use. Because these shallow aquifers can be tapped manually, the community is usually aware of their presence. Springs exist on the mountain sides particularly in limestone country and these may or may not be perennial. If perennial, the flow from the springs is usually significantly depleted during the dry season.

## **Economy**

The economy of the Lao PDR continues to grow, with Gross Domestic Product (GDP) growth of about 7.9% annually during a whole period of the Sixth National Socio-economic Development Plan, 2006-2010. Nevertheless, the challenge is to ensure that its development is broad-based, equitable, and sustainable. The economic structure changes as an economy transforms from a subsistence agriculture and raw material-based economy to a processing and market-oriented economy. This also has the positive impact on the domestic natural resources. Economic structure and value added in each sector has exhibited an increase, which is in accordance with set direction. The sectorial composition of the GDP suggests that agriculture and forestry sector accounted for 30.4%, industry 26.1%, and services 37.2%. The Seventh National Socioeconomic Development Plan, 2011-2015, envisions moving closer to meeting the income and non-income Millennium Development Goals and adopting the appropriate technology, skills, and policy environment to enable the Lao PDR to graduate from its least developed country status by 2020. A key strategy of the plan involves identifying provinces and urban centres with the highest potential for rapid growth, improving their planning systems, and providing them with efficient infrastructure and services.

## **Health Indicators**

Mortality among infants under the age of 5 was 98 per 1,000 live births and the 0-5 years age group made up 12.5% of the total population in 2005. The Seventh National Socioeconomic Development Plan has set targets for the under 5 years of age infant mortality rate at 80/1,000 for 2015. Almost three million cases of diarrheal were attributed to poor sanitation and hygiene in 2006. Of these, 800,800 were attributed to children under the age of 5 years. Apart from diarrheal, other water related diseases reported for 2006 included typhoid; hepatitis; dysentery; malaria; and acute lower respiratory infection. In Lao PDR, life expectancy at birth is low (61 years), child malnutrition is high (30%) and maternal mortality rates (350 per 100,000 live births) are high compared with other countries in the region. Diarrheal disease is the second biggest cause of mortality in children and the third among adults. In 2000, malaria was ranked the number one cause of mortality and morbidity (70% of the population at risk). The poor are more vulnerable to health shocks due to the high cost of treating disease and lost work days for recovery. School children (ages 5-14) are especially prone to intestinal health problems (62% prevalence among schoolchildren), resulting in school absences.

## **Lao Millennium Development Goals**

In 2000, the United Nations General Assembly adopted the Millennium Development Goals (MDGs). MDG7 target 10 calls on countries to "halve, by 2015, the proportion of people without sustainable access to clean drinking water and basic sanitation." The MDG adopted in Lao PDR target 80% of the population with access to clean water and 75% of the population with access to improved sanitation facilities. The Seventh National Five-year Socio-economic Development Plan outlines development goals for the period 2011-2015 and sets targets for 2015. Among these targets are:

- Ratio of the population having access to clean water would be 80% of total population;
- Ratio of the rural population having access to clean water would be 75% of total population;
- Ratio of the population having access to hygienic toilets would be increased to 60% of the total population.

## **Legal Framework**

The legal framework for urban water supply in Lao PDR is contained in about 130 pieces of separate legislation, together with various guidelines and policy documents. The new water supply law, approved by the national assembly and promulgated by the President of LAO PDR in July 2009, aims to consolidate the water supply legislation and strengthen the legal basis for the provision of sanitary services. The law also aims to clarify (i) the regulatory environment for water supply, enabling greater private sector participation and stronger community management of water supply systems; and (ii) responsibilities and establish the right of access to basic water supply, sanitation and wastewater services. In September 2008, the government endorsed the roadmap and action list for sector strategic planning, including sector regulation and corporatization of the provincial water supply state enterprises. The action plan is implemented with assistance of ADB. A sector investment plan (SIP) for the period 1998-2020 for water supply was attached to Decision 37/PM of 1999: Management and Development of Water Supply Sector. The SIP is updated annually to re-emphasize equitable development by improving small towns and continues to be the document upon which urban water supply development in Lao PDR is based.

## **Urban Water Supply and Sanitation Development**

Since 1963, substantial financial support to infrastructure development has been provided for urban water supply in Lao PDR. This has included loan and grant funds from multilateral and bilateral financiers. Multilateral support has included ADB, the World Bank, OPEC, WHO and UN agencies. Countries providing bilateral support have included Japan, Korea, Germany, France, Norway, Belgium and Thailand. To date, more than \$250 million has been invested in the improvement of water supplies in urban areas. This has enabled the Government to serve about 61% of the 2013 urban population or about 1,003,500 inhabitants.

In addition to the MDGs and the Seventh National Five-year Socio-economic Development Plan targets, the urban water supply and sanitation strategy set the following targets:

- up to 67% of the urban population by the year 2015 will have 24-hour per day access to safe drinking water, up to 80% by the year 2020 and up to 90% by the year 2030; and
- up to 80% of the urban population by the year 2015 will have access to hygienic toilet, up to 90% by the year 2020 and up to 100% by the year 2030.

In order to meet the vision “Safe, reliable and accessible Water Supplies and sanitation for all” and the overall target of this strategy, 10 specific goals have been identified:

- Goal 1: Appropriate legal framework**
- Goal 2: Appropriate institutional framework and raising status and boost capacity of the sector organization**
- Goal 3: Appropriate regulatory system for higher efficiency**
- Goal 4: Water supply and urban sanitation integrated with urban development**
- Goal 5: Expanding the water supply and sanitation development and service delivery to small towns in rural areas**
- Goal 6: Strong, efficient, sustainable, customer-oriented public water supplies**
- Goal 7: Active participation of the private sector in the water supply and sanitation development and service delivery**
- Goal 8: Adequate, competent staff for the development and management of the sector**
- Goal 9: Promote gender mainstreaming in the water supply and urban sanitation sector**
- Goal 10 : Promote development and use of appropriate techniques and technologies**

In order to realize and implement successfully the urban water supply and sanitation strategy, the following four (4) programmes and twelve (12) priority projects have been identified:

### **Programme 1 : Improvement of organizational structure and human resource development**

- Project 1: Organizational Improvement and strengthening capacity of water supply authorities for planning, development and management of water supply and sanitation operations.
- Project 2: Strengthening capacity of regulatory authorities so they become more competent and are better able to regulate both state and private water suppliers.
- Project 3: Strengthening capacity of the water works training center in terms of training and research
- Project 4: Promotion of gender mainstreaming in the water supply and urban sanitation sector.

**Programme 2: Preparation and revision of legislative documents and technical standards related to development, management and regulation of water supply and sanitation**

- Project 5: Continued revision of policy and legislative documents related to water supply and sanitation for higher effectiveness and attraction of investment from all economic sectors.
- Project 6: Continued preparation of technical standards regarding management and development of water supply and sanitation.

**Programme 3 : Development of water supply and sanitation infrastructure**

- Project 7: Continued rehabilitation and development of the water supply system in provincial and district towns.
- Project 8: Expanded development of water supply systems to big villages and small towns in rural areas
- Project 9: continued promotion of on-site sanitation and DEWATS in towns.
- Project 10: Study about centralized sanitary systems for bigger towns.

**Programme 4: Improved efficiency of water supply operations**

- Project 11: Promotion of preparation and implementation of a corporate plan
- Project 12: Strengthening capacity on organizational aspect and water supply operations.

By developing water supply and sanitation infrastructure (Programme 3), the Government seeks to reduce poverty through economic growth and to improve geographical equity in the urban social infrastructure. The latest SIP as attachment to the urban water supply and sanitation strategy to 2030 estimates investment needs to be about \$266.8 million.





# CHANGE AND TRANSFORMATION IN MYANMAR: CRITICAL ROLE OF THE ENERGY SECTOR

Thaung Tun

## Introduction

Myanmar is on the threshold of a new era. After half a century of stagnation, the country has opted for wide-ranging reforms. It has potential to join ranks of rapidly growing economies if it can sustain the current pace of change and transformation.

Myanmar's growth potential has often been compared with "Asian Tigers." However, it faces a far more challenging environment. In the world today, a number of countries are registering impressive growth rates. With the middle class in these countries expected to grow substantially, agricultural output and energy supply will have to keep pace with population growth, changing life-style and increasing demand.

## Food Security

The demand for food is expected to rise significantly in the coming decades as the world population exceeds 9 billion and the growing middle class can afford to make choices with regard to the food they consume. A few weeks ago, the UN Food and Agriculture Organization warned that the world would need to increase its food production by 60% by 2050 to match population growth and the expected demand for food. The challenge would be even greater for developing countries like Myanmar, as they would need to boost food production by a massive 77%.

## Water resources

There are also growing concerns as to how long water will be available in insufficient quantity to support agriculture and the need of growing populations everywhere. Water is a limited resource. Shortage of water may be the most serious problem that mankind could face in the future as it touches on the very survival of humans. Many countries are already threatened by persistent droughts that make it impossible for them to turn to irrigation to increase agricultural output.

A United Nations report published on 21 March, on the eve of World Water Day, warned that the growing demand for water could strain Earth's limited resources. It pointed out that Asia would be the biggest hotspot for disputes over water resources. The Mekong River Basin figures high as a region of possible conflict.

## Energy Security

Global energy demand is expected to grow by more than a third by 2035, within China, India and the Middle East accounting for 60% of the increase. In the short term, countries would need to focus on how to cope with sudden changes in the supply-demand balance. In the long-term, they would need to make timely investments to supply energy in keeping with economic

growth and environmental requirements. Food, water and energy security are critical issues that need to be dealt with both at the national level and the regional level.

## **The Myanmar Experience**

Myanmar stands out as an interesting case study given its abundant natural resources, strategic location and the wide-ranging reforms.

Myanmar has several strengths that include its rich endowment of gas, oil, minerals, and forest and water resources. It also has the world's 25<sup>th</sup> largest endowment of arable land and is estimated to have water resources that are ten times the per capita water endowment of its two giant neighbors, China and India put together. (According to a recent local media report, Myanmar has 1081.885 cubic Km above ground fresh water resources and 494.713 cubic Km underground) In the past, Myanmar was well known as the world's largest exporter of rice. Rice exports have fallen considerably since 1950s. But now that the efforts are being made to increase production, Myanmar has the potential to be the rice bowl of Asia.

Myanmar's undeniable strength is its strategic location. It is located between China and India, the two fastest growing economies in the world. It borders Bangladesh, Laos and Thailand, countries that present a huge potential market of more than half a billion people. It is a land-bridge between the countries of Southeast Asia and South Asia.

Over the past three years, President Thein Sein's government has undertaken wide-ranging political, economic and administrative reforms. The tectonic shift in policy has paved the way for better relations with developed countries. World leaders from the US President Barrack Obama to the UK Prime Minister David Cameron have paid important visits to Nay Pyi Taw. Western countries have lifted almost all sanctions, cancelled outstanding debts and have begun to extend aid and assistance.

According to a report on Myanmar issued by the McKinsey Global Institute last year, the country has the potential to achieve rapid economic growth equivalent to 8% per annum. However, to fully realize its potential, Myanmar would need to improve key sectors of the economy. In this regard, it can do no better than to start with the energy sector. Without power, Myanmar cannot achieve its development goals.

## **Current Situation**

Myanmar has a significant renewable energy potential from hydropower, biomass, wind and solar power. At present, only hydropower is being commercially exploited and other forms of renewable energy remain at the research and development stage.

Myanmar's hydropower potential from the four main river basins – the Ayeyawaddy, Chindwin, Sittaung and Thanlwin--is estimated at more than 100,000 megawatts (MW). However, the installed hydropower capacity is only 2,520 MW. The Government has identified around 300 large-scale potential hydropower projects with an estimated capacity of approximately 46,331 MW.

Presently, biomass accounts for 75% of total primary energy supply in Myanmar. This dependence on biomass is largely due to the fact that 70% of the population lives in rural areas. This dependence on fuel wood is contributing significantly to deforestation.

Myanmar has proven natural gas reserves of 7.8 trillion cubic feet (TCF) and exports totaled 303 billion cubic feet (BCF) in 2011. The majority of Myanmar's production is accounted

for by two offshore fields: Yadana (5.7 TCF) and Yetagun (3.16 TCF). Both fields have been supplying natural gas to Thailand since 2000.

The Shwe gas field, off the coast of Rakhine was discovered in 2004. Purchasing rights to the gas from this field were awarded to China in June 2008. Under the bilateral agreement, Myanmar is to supply 6.5 TCF to China over a period of 30 years. The gas has started to be piped overland to Yunnan Province in China Province.

It is ironic that although that Myanmar has significant gas reserves, only about 26 % of the population has access to electricity. Even then supply is intermittent at best. The problem is compounded by the fact that Myanmar's electricity network suffers from high transmission and distribution losses--estimated to be as high as 27%.

The country's current installed capacity is 4, 000MW. The bulk of it is supplied by hydro-electric stations (68%). Gas-fired stations provide another 23%and thermal stations 9%. As hydro-power stations depends on seasonal rains, the grid experiences a sharp fall in supply during the dry season.

According to reports in the local media, Myanmar is planning to build 45 new hydropower dams. On the Thanlwin River alone, upto12 dams are planned. The implementation of these projects however could pose a challenge as there is widespread opposition to construction of large dams by the people. They consider that such dams would have adverse effects on the environment. The controversies surrounding the Myitsone Dam project reflect the strong opposition to large dams in the country.

The Myitsone Dam project-- a partnership between Asia World Company, a private Myanmar Company and the China Power Investment Corporation-- was suspended by President Thein Sein on 30 September 2011. The dam was scheduled for completion in 2017. Upon completion, it would have been the fifteenth largest hydroelectric generating station in the world.

The dam would have covered 447 km<sup>2</sup> and inundated 47 villages. Around 11800 locals would have had to be relocated to newly-built resettlement areas. Environmentalists contend that the construction of the dam would alter the hydrological characteristics of the river and negatively affect agricultural lands downstream.

A major complaint was that the dam would benefit the Chinese more than locals as the bulk of the electricity generated --as much as 90% -- was destined for China.

Concerns have also been raised regarding the construction of dams on the Thanlwin River as it runs through ethnic areas (Shan, Kayah, Karen and Mon). Moreover, as many of the proposed dam's sites are close to conflict areas, peace agreements would have to be negotiated before the projects can be launched. In addition, agreements with riparian states concerned -- Myanmar, China and Thailand-- would need to be concluded to ensure the sustainable management of the water resources.

## **Conclusion**

Winds of change are sweeping Myanmar. As it seeks to diversify its economy and accelerate economic growth, Myanmar needs to give high priority to the energy sector.

World Bank President Jim Yong Kim on his first visit to Myanmar last January underlined the importance of electricity for Myanmar's future when he said, "Expanding access to electricity in a country like Myanmar can help transform a society -- children will be able to study at night, shops will stay open, and health clinics will have lights and energy to power life-saving technology. Electricity helps bring an end to poverty."

Infrastructure development is critical to provide electricity to the people. But such undertakings are cost prohibitive and typically takes years to achieve. However, The World Bank has shown that relatively quick improvements can be made in infrastructure by reducing power transmission and distribution losses (estimated at 28% in Myanmar), by upgrading the power system, through partnerships with international financial institutions and the private sector. In this regard, the World Bank has taken the lead. To increase access to electricity, the World Bank has provided the US \$140 million to finance a project to modernize and expand an existing electric power plant in Southern Myanmar. The revamped plant will be able to produce 250% more energy with the same amount of gas. Notwithstanding the significant challenge it has in meeting growing demand for electricity at home, Myanmar has an important role to play in regional energy security. China now has the opportunity to transport gas to Yunnan by the Myanmar-China gas pipeline. A parallel pipeline will also provide China the possibility to bypass the Malacca Strait in importing oil from the Middle East. The Myanmar-China pipelines are expected to generate a significant amount of revenue for Myanmar--US\$ 1.8 billion per annum according to conservative estimates.

Myanmar is also an important source of natural gas for Thailand. Myanmar exports natural gas from the Yadana and Yedagun fields to Thailand via a 670 km pipeline. The new Zawtika field is expected to add 240 mmcf/d of export volume to Thailand. Myanmar as the ASEAN Chair also has the important role to play in leading ASEAN towards the ASEAN Economic Community (AEC) due to be established by 2015. The key energy component of the AEC is the ASEAN power grid and the ASEAN gas pipeline, each of which seeks to connect all 10 ASEAN countries through infrastructure. The challenge for Myanmar will be to achieve development growth in a sustainable manner, taking advantage of its strengths while managing its land, water and energy resources for the benefit of all its citizens and those of the region. Myanmar appears to be taking steps in the right direction. It recently began the formal process of joining the Extractive Industries Transparency Initiative (EITI). The initiative requires companies working in the oil, gas and mineral sectors to declare any payments to the government, while the government also has to declare its revenue from extractive industries. It is developed and overseen by a coalition of governments, companies, civil society, investors and international organizations. Thirty-nine countries are implementing EITI while a further 16 countries have applied to be EITI members. Myanmar's membership of EITI is expected to alleviate corruption in the sector and support democratic development and good governance.

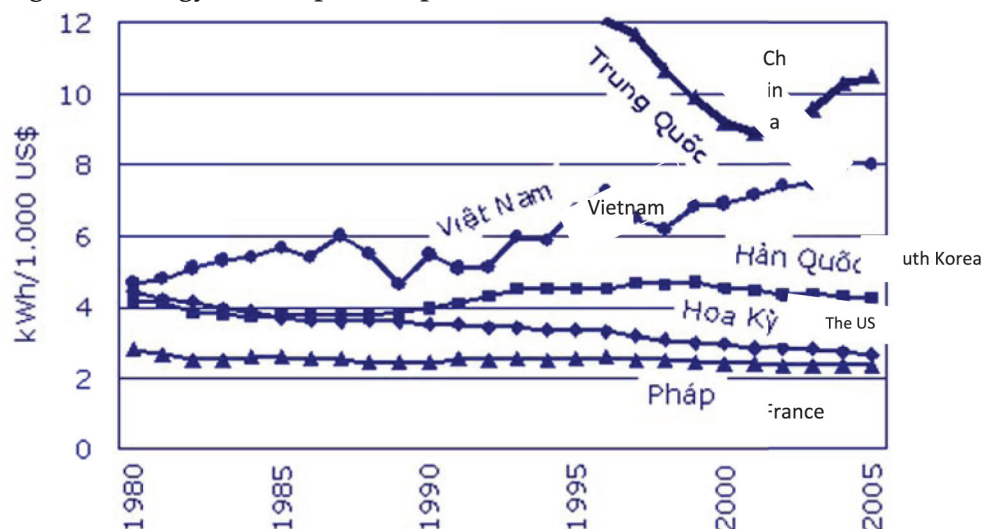
# CHALLENGES AND RESPONSES TO WATER, ENERGY AND FOOD SECURITY: THE CASE OF VIETNAM

Do Lien Huong

Vietnam is considered a country with a great potential and diversity of energy including hydro power, biomass energy, wind energy and solar energy. However, an unbalanced extraction and wasteful use of energy have led to depletion of non-renewable energy sources, creating a risk of energy shortages in the near future and environmental pollution.

According to the International Energy Agency (IEA), Vietnam uses 27,400 BTU (equivalent to 8.0 TWh) to produce a dollar of GDP. The intensity of energy consumption is nearly twice as much as South Korea's and three times as much as that of the US. While the intensity of energy consumption worldwide has shown a decline of 0.5% annually, Vietnam is one of the countries showing the increasing trend in energy consumption intensity.

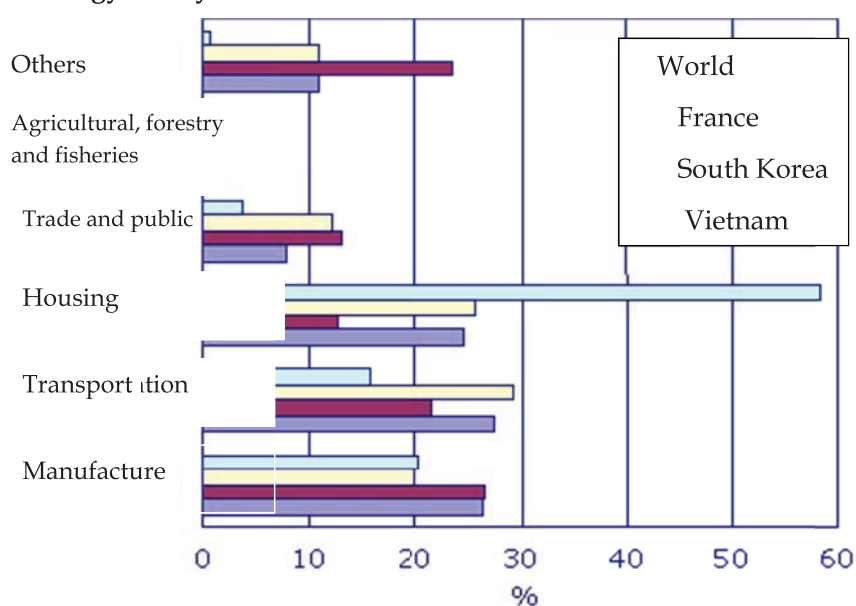
Figure 1: Energy consumption to produce a thousand dollar of GDP



Source: IEA, 2005

Renewable energy accounts for a small proportion of the total energy, and bio energy generated from agricultural by-products has hardly been exploited. In addition, 60% of the energy resources are used by households while the agricultural sector uses the very small proportion less than 5%, to some extent proving the underdevelopment of mechanization and modernization of the agricultural sector.

**Figure 2: Energy use by sectors**



Source: IEA, 2005

In contrast to the energy resources, water resources can be characterized as dependent and decreasing. More than 60% of the water supply in Vietnam is from rivers originating from other countries. The water supply in 2010 was 843 billion m<sup>3</sup> and it is anticipated to reduce to 807 billion m<sup>3</sup> in 2025. In addition, the annual water loss is increasing with the large and increasing amount of water evaporation recently. The rate of water evaporation in the agricultural sector is the highest with about 95%.

**Table 1: Water evaporation in some countries during 1997-2011**

Country	Year	Water evaporation by sector (%)			Water evaporation (% of total water supply)	Annual amount of evaporated water (billion m <sup>3</sup> )
		Agriculture	Household use	Industry		
Cambodia	2011	94	4.5	1.5	1.8	2.2
	1987	86.3	6.2	7.5	17.1	481.1
China	1997	77.6	4.8	17.6	18.7	525.4
	2011	64.6	12.2	23.2	19.7	554.1
Indonesia	1997	93.1	6.4	0.5	3.7	74.3
	2011	81.9	11.6	6.5	5.6	113.3
Lao PDR	2011	93	3.1	4	2.2	4.3
Malaysia	1997	60.2	17.9	21.9	1.3	7.5
	2011	34.2	29.5	36.3	2.3	13.2
Myanmar	1987	98.6	1	0.4	2.8	28.3
	1997	98.6	1	0.4	2.8	28.3
	2011	89	10	1	3.3	33.2
Thailand	2011	90.4	4.8	4.8	25.5	57.3

Country	Year	Water evaporation by sector (%)			Water evaporation (% of total water supply)	Annual amount of evaporated water (billion m <sup>3</sup> )
		Agriculture	Household use	Industry		
Vietnam	1987	89.8	3.9	6.3	12.6	45.3
	2002	89.8	3.9	6.3	12.6	45.3
	2007	94.8	1.5	3.7	22.8	82
	2011	94.8	1.5	3.7	22.8	82

Source: World Bank, 2012

Therefore, it is forecasted that there will be water shortage in the near future with water per head of under 4,000 m<sup>3</sup> per year in accordance with the standard set by the International Water Resources Association (IWRA).

**Table 2: Water Supply per head in 2010**

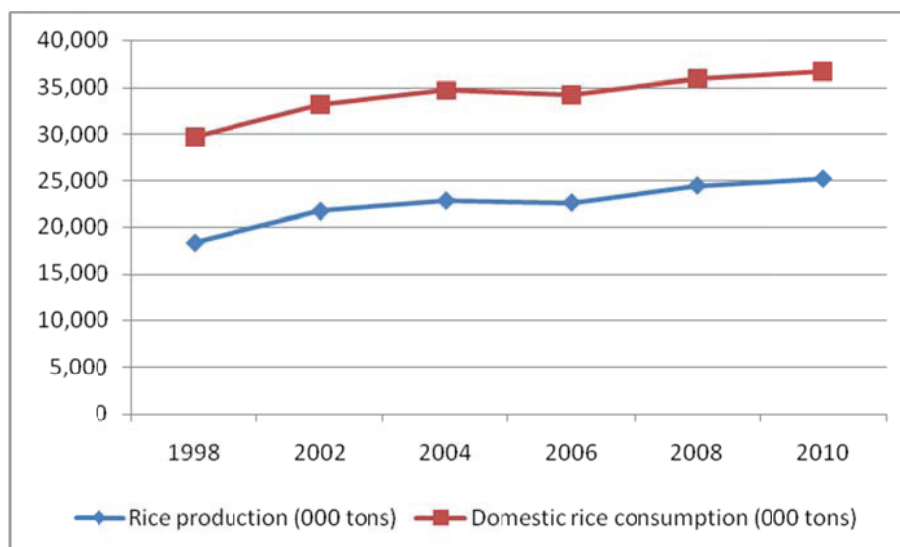
Indicator	Amount
- Vietnam	4,400 m <sup>3</sup> /year
- World average	7,400 m <sup>3</sup> /year

Source: IWRA, 2011

The wasteful use of water, the ignorance of reusing water, waste water treatment and the insufficient water resource protection are reasons for depletion of water resources in Vietnam. Sand mining, mineral exploitation and rampant exploitation of underground water (i.e. for shrimp farming in some provinces) have caused water resources degradation. Extensive construction of hydro power plants has led to deforestation and damaged natural water resources. Urbanization is also one of the causes of water shortages. Water used for agriculture has increased from 41 billion m<sup>3</sup> in 1985 to 46.9 billion m<sup>3</sup> in 1990, 60 billion m<sup>3</sup> in 2000, and currently it is estimated at over 80 billion m<sup>3</sup>. In the context of water scarcity, this is predicted to be a big challenge for Vietnam to maintain its place as a major agricultural producer in the future. The irrigation system has contributed much to agricultural development and has been useful for water management and agricultural production. There have been thousands of reservoirs, thousands of pumping stations and thousands of channel constructed so far, ensuring irrigation for agricultural production. However, the use of water is wasteful as up to 85% is used for irrigation comparing to 40% in other countries and has showed an increasing trend recently. Regarding food security, food availability is ensured because rice supply far exceeds domestic demand.



**Figure 3: Rice production exceeds consumption**



Source: GSO, 2011

It is forecasted that Vietnam can ensure food supply for domestic demand with only 3 million ha<sup>1</sup> of paddy land at the “worst case” with no improvement in rice productivity and no reduction in consumption which are least likely to occur.

**Table 3: Vietnam’s Rice Balance in 2030 in the Worst Scenario**

Scenarios	Projection in 2030		
	Paddy quantity	Rice consumption	Rice export
3.8 mil ha	40.3	12.7	5.2
3.6 mil ha	38.2	12.7	4.1
3.3 mil ha	35.0	12.7	2.4
3.0 mil ha	31.8	12.7	0.8

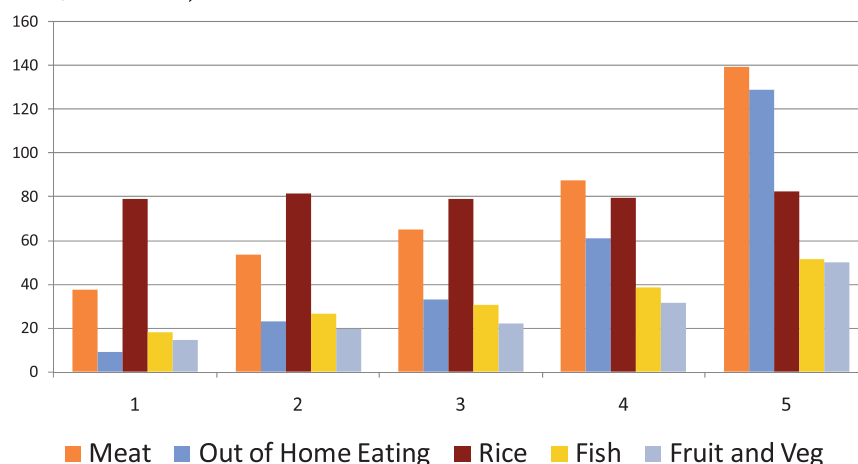
Source: World Bank, 2010

However, food accessibility is still problematic for some groups. Some ethnic minorities living in remote areas are suffering from food shortage during a certain period of time annually.

Food nutrition has become a big concern recently. There are big gaps among income quintiles in nutritional intakes. The figure below shows that the three lowest income quintile groups spend the largest proportion of their monthly expenditure for rice while meat accounts for the largest part of the two rich groups’ monthly income.

<sup>1</sup>Paddy land, under worst case scenario, will reduce at the rate of 5 percent consecutive years, it is estimated that paddy land area will end up with only 3 million ha by 2030.

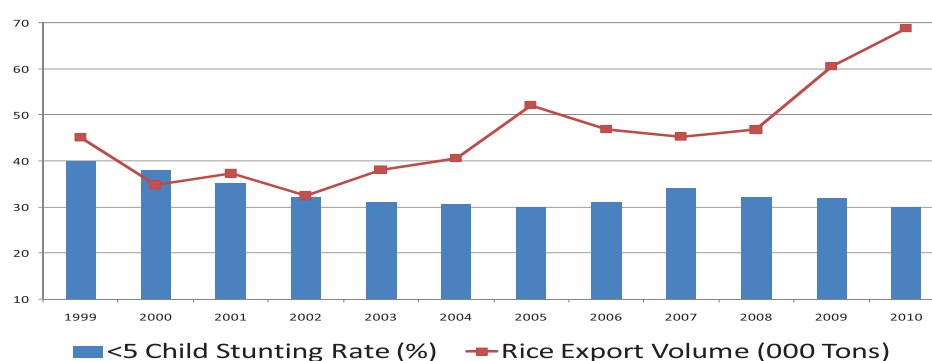
**Figure 4: Monthly expenditure per capita by income quintiles in Vietnam (1: poorest, 5: richest)**



Source: GSO (2009)

In addition, there is a disconnection between rice surplus and nutrition goals in Vietnam. While rice surplus has been increasing rather rapidly since 1999, the rate of stunting children’s growth under 5 years of age has gone down slowly and become stagnant for the last 8 years.

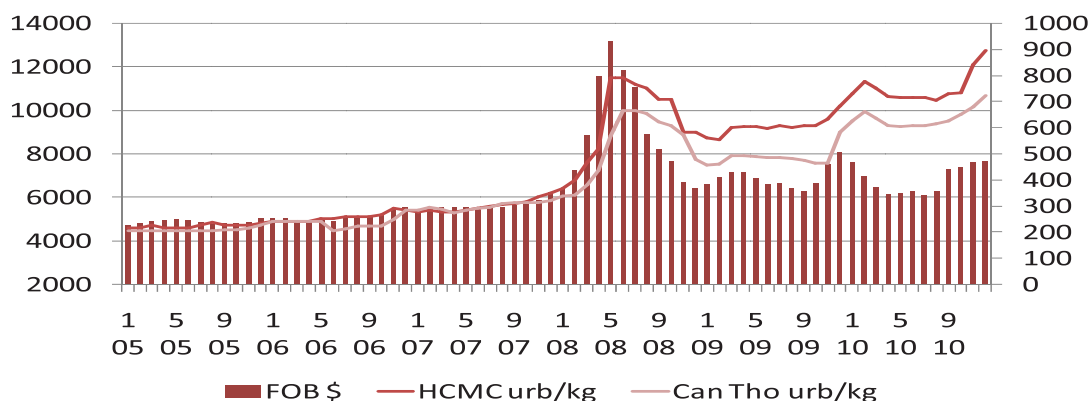
**Figure 5: Disconnection between Vietnam’s Rice Surplus and Nutrition-Related Goals**



Source: GSO, 2010

Moreover, there are still many factors that affect food stability such as the rising trend of food prices. The recent increases in global commodity prices including food products have posed a new set of challenges to Vietnam’s ability to maintain a path of sustainable and socially equitable growth. In the today’s globalized world, price changes in the international market are most likely to be transmitted to the domestic market sooner or later. Therefore, it is not surprising that food prices in Vietnam have fluctuated dramatically recently.

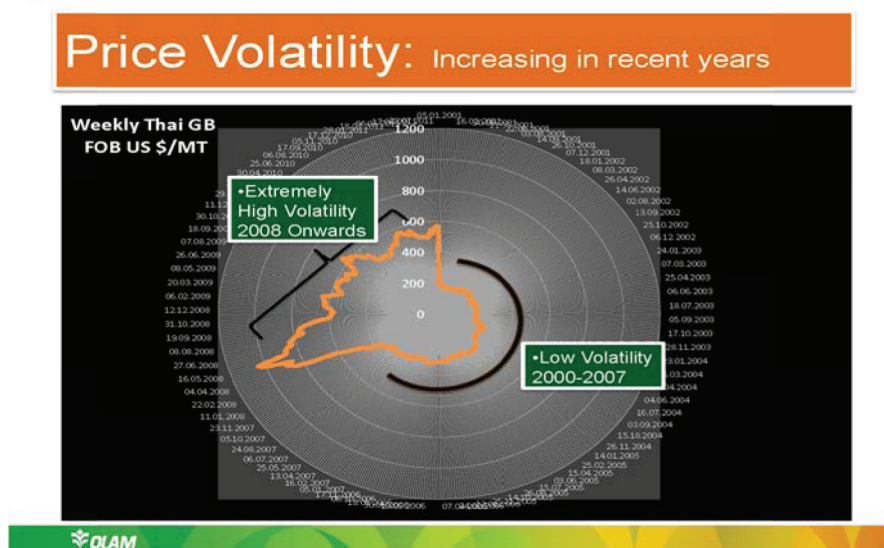
Figure 6: Rice price fluctuation



Source: Agroinfo, 2012

The significant rise in food prices has led to increasing vulnerability among specific groups. In the first place, the higher food prices exert downward pressure on households' purchasing power, especially in the context of high inflation rate in the economy. Households of low incomes, who spend the significant proportion of their income on food have received long adverse impacts due to the high food price. In addition, the high rice price has also increased the probability of households who had just overcome the poverty line falling back into it. In this way, the sustainability of the success of Viet Nam's poverty reduction efforts over the past 20 years could quickly be undermined.

Figure 7: Rice price Volatility



Source: OLAM, 2009

Therefore, it is high time for taking serious actions on the issue of water, energy and food security in Vietnam. To ensure energy security, it is necessary to build a large amount of renewable energy sources, but it links to multiple investment increase and irregular production of electricity at wind farms and solar power plants. The further development of hydropower is related to construction of medium and large hydropower plants and proper

maintenance of the prevailing large hydropower plants which will increase the number of hours of installed capacity use and efficiency of the power plant as a whole<sup>2</sup>. Regarding water security, water treatment and reuse should become leading solutions for enhancing the water use efficiency and coping with water scarcity in the future. Strengthening institutional capacity for sustainable management and use of water resources will serve as a basis for flexible coordination and synchronization between all related agencies. Currently, the irrigation system is managed by the Ministry of Agriculture and Rural Development while the river system is supervised by the Ministry of Transport Department, hydropower plants are managed by the Ministry of Industry and Trade, and the water supply for urban area is supervised by the Ministry of Construction. As functions and responsibilities are not clearly assigned among ministries, there have been conflicts and lack of coordination among them, leading to the ineffective management of water resources. Underground water management and the proper use of water for irrigation should be highly focused in the context of wasteful use of water for irrigation and the rapid decrease in underground water capacity. More importantly, water security needs regional collaboration, especially with upstream countries to ensure the extent of water availability to each country within the stream flow.

Energy and water security are prerequisites for food security because agriculture in general and the production of rice (the main staple food in Vietnam) in particular depend heavily on water resources. Although rice surplus is forecasted, agriculture or the rice sector particularly is the most vulnerable sector due to the serious adverse impacts of water shortage and climate change. Moreover, food accessibility and stability should receive more attention to avoid food shortages in some specific regions and of some specific groups and to ensure food nutrition and safety in the near future.

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<sup>2</sup><http://www.ies.vn/vi/tin-tuc-khoa-hoc-nang-luong/khoa-hoc-nang-luong/403-chien-luoc-phat-trien-nang-luong-xanh.html>



# UNDERSTANDING TRADEOFFS: HOW CAN SCENARIOS SUPPORT POLICY-MAKERS AND INVESTORS IN CLMV?

Rathana peou van den Heuvel

A multi-stakeholder scenario-guided policy recommendations exercise was facilitated by the scenarios team of the CGIAR programme on Climate Change, Agriculture and Food Security, composed of Dr. Joost Vervoort, Maliha Muzzamil and Dr. Rathana Peou. The exercise aimed at introducing scenarios methodology to the participants as well as going through the regional scenarios developed last November in HaLong in order to formulate policy and investment recommendations up to 2030 for CMLV.

The Session IV was composed as follows:

- Introduction of the scenarios method the regional scenarios for SEA
- Group discussions: visioning and policy recommendations up to 2030 and the main challenges and drivers in CMLV, in three groups; each group working in the context of one scenario, asking *how could we strengthen positive trends? How to prevent or mitigate the negative ones?*
- A presentation of the results of each group.

## In brief- the CCAFS regional scenarios for SEA

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Socio-economic and climate scenarios have been developed at the sub-continental (Cambodia, Laos and Viet Nam) level for Southeast Asia up to 2050 and used as a tool to guide policy development and investment proposal for public or private sectors. This process is organized by CCAFS, FAO, UNEP WCMC and NOMAFSI.

Rather than attempting to forecast a single future, scenarios represent multiple plausible directions that future drivers of change take (figure 1). The CCAFS scenarios process focuses on contextual drivers of change for agriculture and food security – climate change and socio-economic changes (e.g. in markets, governance, broad economic developments, infrastructure).

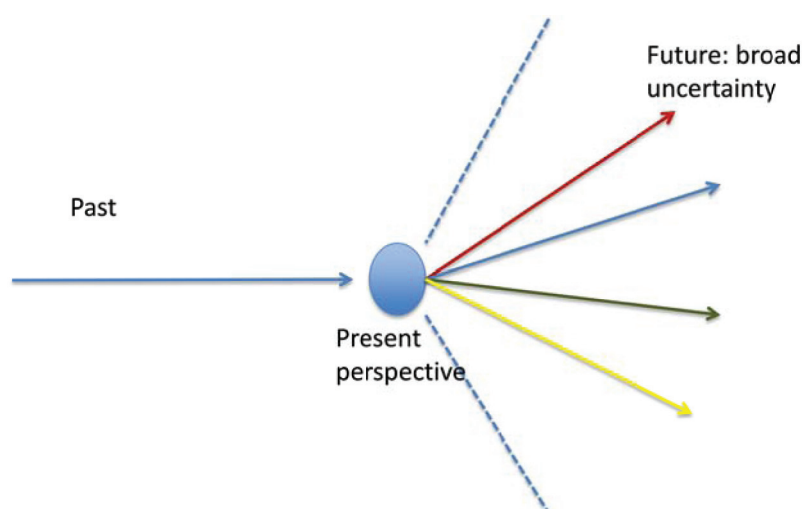


Figure 1.

The scenarios development process enables societal actors to participate in an analysis of the contextual factors of change for decision-making on food security, livelihoods and environments. Scenarios are an excellent tool for concrete policy and investment guidance - based on science-informed content, while also generating shared engagement and building relationships, knowledge exchange and commitments.

Three of the four scenarios are presented and discussed, one per group, in order to provide a context to explore future challenges and provide policy recommendations.

### Summary of the three regional scenarios

**Table 1. three regional scenarios discussed**

Factors	Markets	Enforcement capacity and regional collaboration	Agricultural investment	Land degradation through land use change
<i>Land of the Golden Mekong</i>	Common regulated market (good market governance enabling fair regional trade)	Strong enforcement and strong regional collaboration	High public and private	Low
<i>Buffalo, Buffalo</i>	Unregulated (described as a lack of effective governance; market monopolies)	Weak enforcement and weak regional collaboration	Unbalanced: high investment in business and research by some companies; lack of broad investment	High
<i>The Doreki Dragon</i>	Common regulated market (market governance favouring large industry)	Strong enforcement and strong regional collaboration	Unbalanced: high private investment in business and research in high-tech agriculture; not in pro-poor development	High

#### Land of the Golden Mekong

In this scenario, unification of Southeast Asia in terms of political, economic and environmental concerns slowly becomes a reality. Though challenges around urbanisation and migration initially increase, ultimately institutions become effective enough to enable improved development and environmental management. Aging populations and the lack of labour due to egalitarianism become a problem – migrants from poorer countries replace the regional population in the working class but are shunned and abused. Strength and inclusiveness of governance (at least for the autochthonic population) is the key source of the significant change in food security, livelihoods and environments that can be observed. Climate resilience is strong in that respect, though biophysical vulnerabilities remain significant, especially in the form of extreme events that still sometimes overwhelm the region’s adaptive capacity. The migrants become the most vulnerable groups.

### **Buffalo Buffalo; water flows uphill**

In this scenario we start out in 2013 looking up. ASEAN agreements appear to be going ahead. Myanmar is starting to produce more and be more economically active. Moving to 2020 we start to see more problems: there are major corruption scandals that greatly weaken national governments. High oil and food prices due to global as well as local situation and increased demand for biofuels increases pressure for private sector to acquire land – increasing pressure on population that is dependent on farming for their living. Logging concessions to private industry lead to massive deforestation. Environmental change creates incredible regional tensions. ASEAN closes borders and cooperation between countries is lost. Food production is significantly decreased – migration and conflicts increase. 2050 sees a situation of unsustainable agricultural intensification. There is a big plantation sector, greater emphasis on processed foods, but only the rich people in the country can afford it. There is huge environmental degradation. Social conflict is rampant. Local governance and civil society at times make some progress in solving problems, but they cannot overcome the overall declining situation.

### **The Doreki Dragon**

In this scenario, the ASEAN-facilitated development of a regional market and the increasingly effective political focus on big business in all sectors, including agriculture, drives significant change. GMOs become the norm and are no longer exceptional – it's all just "food." Agricultural industrialisation develops to the degree that agriculture, while a massive source of growth, is almost no longer recognizable as such. Smallholder farmers struggle more than ever, and very often fail, to maintain a livelihood – many become workers on highly industrial farms. Urbanisation is high. Environmental degradation and natural land conversion are extreme. Food security for the poor is very low, though food safety is stringent. The different societal classes are more divided than ever in terms of climate resilience with climate impacts being made significantly worse due to large-scale manipulation of the natural environment.

### **The recommendations per Scenario**

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The three groups discussed and suggested a large range of recommendations within the regional scenarios assigned per table. The participants discussed and elaborated 21 recommendations. Although working with different scenarios most of the recommendations could be grouped under five categories as below:

- ✓ Infrastructure
- ✓ Governance, Investment and Funding
- ✓ Innovation and Technology
- ✓ Rural development
- ✓ Climate Smart Agriculture

*Please note that the following notes are direct transcript of the recommendations by each of the groups. In general the recommendations are suggestions for reforms and investment plans to be supported by national political leaders with the support of the ASEAN as well as for historical bilateral funders such as the Chinese or Japanese ones.*

### **The land of Golden Mekong recommendations:**

*The Land of Golden Mekong is a future scenario with some positive elements that were aligned with the participant's own visions, and the discussion was guided by thinking about how these elements*



could be achieved. Please note that this group was mainly composed of Cambodian participants or international experts of Cambodia.

- Invest in the Justice system in Cambodia, allocate more national budget to the justice system, and build a legal framework that will enhance legislative power.
- Build an educated civil society by investing more in the national education system with a better balance with the investment in the rural areas through quality teachers in primary and secondary schools but as well a new curriculum promoting new skills and technologies related to agro-business.
- Promote a safe culture for investments (local/ international-private/ public) that will ease the access to funding or credit to all stakeholders from the agro-business (from small- owner farmers to businesses elsewhere in the food system).
- Promote climate smart agriculture in the country.
- Reform tax systems and the use and allocation of taxes across the different ministries
- The main investment on the irrigation system in Cambodia should cover remote areas and ensuring a fair access to water and energy.

**The Buffalo, Buffalo recommendations:**

*Buffalo, buffalo is a scenario where regional tensions, resource scarcity and a lack of effective governance have crippling effects. Proposals to avoid such a future were made.*

- There is a need to cultivate a better informed and better trained civil society.
- Better coordination and cooperation with the ASEAN.
- Better understanding between the ASEAN countries.
- Regional EIAs with regional stakeholders present and contribute for international rivers.
- Promotion of regional forum (track 1,2,3).
- Use of technology and best practices to mitigate water shortages.
- Ensure maximum farmer participation in decision-making.
- Better dissemination of training.
- Investors should be responsible for subsidizing/ providing training.
- Private investors should provide training on new practices to farmers.
- Prevent land grabbing from the smallholders.
- Move beyond giving out complete monopoly rights to select private sector groups.
- Ensure smallholders can have the same prices as big firms.

**The Doreki Dragon recommendations:**

*The Doreki Dragon is a scenario of strong economic growth but widespread inequality in Southeast Asia. Participants discussed ways to prevent and/or overcome such inequality in the future of the CMLV.*

**FOOD**

- Rice production high but low food security.
- Diverse views on food security- specialization? Self-sufficiency?
- Specialization=> Political power imbalance (vulnerability of non-food production).
- Rice Speculative commodity, this is a global issue, global financial sector too much power.

**WATER**

- Need to strengthen access to clean water.
- More investment in clean water, but barriers: high costs for rural areas.
- Need better regulation by water authorities.
- Need to think about integrative concept of human security-shift from state centered to people centered.
- Encourage government to follow UN resolutions in sustainable development.
- Persuade business sector that green business more profitable.
- Take a multi- stakeholder approach to water management (include private sector but not privatization).
- Focus on delivery to poor, small scale.
- Need regulation but issue is enforcement in Cambodia.
- Promote change in individual behavior.

## ENERGY

- Promote energy conservation and renewable.
- Beyond large hydropower dams- look to new innovations and how they can be adapted (small scale solar for rural use).
- Pro- poor policy on energy (e.g Laos).



# GROUP DISCUSSION

## SESSION IV. UNDERSTANDING THE TRADE-OFFS: HOW MULTI-STAKEHOLDERS SCENARIOS COULD SUPPORT POLICY-MAKERS AND INVESTORS IN CLMV?

### 1. Scenarios table

Factors	<b>M</b> arkets	<b>E</b> nforcement capacity and regional collaboration	<b>A</b> gricultural investment	<b>L</b> and degradation through land use change
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<i>Buffalo, Buffalo</i>	Unregulated	Weak enforcement and weak regional collaboration	Unbalanced: high private investment in business and research	High
<i>The Doreki Dragon</i>	Common regulated market	Strong enforcement and strong regional collaboration	Unbalanced: high private investment in business and research	High

### 2. Scenarios Summary

#### Land of the Golden Mekong

In this scenario, unification of Southeast Asia in terms of political, economic and environmental concerns slowly becomes a reality. Though challenges around urbanisation and migration initially increase, ultimately institutions become effective enough to enable improved development and environmental management. Aging populations and the lack of labour due to egalitarianism become a problem – migrants from poorer countries replace the regional population in the working class but are shunned and abused. Strength and inclusiveness of governance (at least for the autochthonic population) is the key source of the significant change in food security, livelihoods and environments that can be observed. Climate resilience is strong in that respect, though biophysical vulnerabilities remain significant, especially in the form of extreme events that still sometimes overwhelm the region’s adaptive capacity. The migrants become the most vulnerable groups.

A longer description and the semi-quantitative indicators can be found in annexes 1 and 5.

#### Buffalo Buffalo; water flows uphill

In this scenario we start out in 2013 looking up. ASEAN agreements appear to be going ahead. Myanmar is starting to produce more and be more economically active. Moving to 2020 we start to see more problems: there are major corruption scandals that greatly weaken national

governments. High oil and food prices due to global as well as local situation and increased demand for biofuels increases pressure for private sector to acquire land – increasing pressure on population that is dependent on farming for their living. Logging concessions to private industry lead to massive deforestation. Environmental change creates incredible regional tensions. ASEAN closes borders and cooperation between countries is lost. Food production is significantly decreased – migration and conflicts increase. 2050 sees a situation of unsustainable agricultural intensification. There is a big plantation sector, greater emphasis on processed foods, but only the rich people in the country can afford it. There is huge environmental degradation. Social conflict is rampant. Local governance and civil society at times make some progress in solving problems, but they cannot overcome the overall declining situation.

A longer description and the semi-quantitative indicators can be found in Annexes 2 and 6.

### The Doreki Dragon

In this scenario, the ASEAN-facilitated development of a regional market and the increasingly effective political focus on big business in all sectors, including agriculture, drives significant change. GMOs become the norm and are no longer exceptional – it's all just "food". Agricultural industrialisation develops to the degree that agriculture, while a massive source of growth, is almost no longer recognizable as such. Smallholder farmers struggle more than ever, and very often fail, to maintain a livelihood – many become workers on highly industrial farms. Urbanisation is high. Environmental degradation and natural land conversion are extreme. Food security for the poor is very low, though food safety is stringent. The different societal classes are more divided than ever in terms of climate resilience with climate impacts being made significantly worse due to large-scale manipulation of the natural environment.

## 3. Semi-quantitative assessments

Scenario 1: Land of the Golden Mekong

Sector	Change (--- to +++), up to 2020	Logic for change	Change (--- to +++), up to 2030	Logic for change	Change (--- to +++), up to 2040	Change (--- to +++), up to 2050
Gross domestic product/capita	+++	ASEAN-supported growth	++	Fairly sustainable growth continues	++	++
Technology effects on staple crop yields	+++	Initial improvements are made by government support	+	Slower once the first improvements have been made	+	+
Technology effects on cash crop yields	+++	Large investments	+++	Large investments	++	++
Area under protection	---	First decreases, but policies slow it	-	First decreases, but policies slow	-	-

Group Discussion

		down		it down		
Environmental consciousness	++	Increases with education	++	Increases with education	++	++
Infrastructure development	+++	Large investments	++	Large investments	++	++
Waste Management	0	Little attention given; increased economic development	0	Policies change	+	+
Food and availability of diets	+++	Fast improvement	0	Then steady, slow improvement	+	+
gap between rich and poor	+	Increased with more overall money available	+	Rising middle class	+	+
Water availability	-	Economic development puts pressure on water availability	--	Improved policies but still increased pressure	-	-
Urbanization	+	As current	+	As current	+	+
Migration	++	Increases to fill labour gaps	+++	Increases to fill labour gaps	+++	+++
Agricultural labour availability	-	Decreases with urbanisation	-	Decreases with increasing middle class	-	-
Education	+	Increased investment	+	Increased investment	+	+
Deforestation	++	Increases with economic development	++	Slowed by policies	+	+
Over fishing	+	Increases with economic development	++	Eventually mitigated by policy	+	+
Biodiversity	-	Decreases with land use change	--	Eventually mitigated by policy	-	0
Health	0	No initial increases	0	Eventually increased by health policies	+	+
Farm input costs	+++	Increase with increasing fuel costs	+++	Government regulations	++	++
Pollution	+	Largely unmitigated	++	Government struggles to mitigate pollution	++	++
Mining	0	No change	0	No change	0	0

Group Discussion

Industry development	++	Strong with development	++	Strong with development	++	++
Gender equality	0	Takes long to change culturally	0	Eventual changes through education	+	+
Rural/urban poverty levels	++	Rural areas left behind	+++	Eventually stabilizes	0	0
Diversification of rural incomes	+	Increases with more off-farm incomes	+	Increases with more off-farm incomes	+	+

Semi-quantitative assessment Scenario 2: Buffalo, Buffalo

Factor	2014-2020 (--- to +++)	Logic for change	2030-2050 (--- to +++)	Logic for change	Volatility	Do we agree? (--- to +++)	Are we confident we can outline this indicator (--- to +++)?
Gross domestic product/capita	+	there is positive economic growth but it isn't as fast as it could be because of global economic slow down	0	Initial growth cannot be sustained, so we have a plateauing out even though there is private sector investment because there are crises (environmental, food)	++	-	+
Technology effect on staple crop yields	+	Due to investment of private sector but not too much because they are already at the highest yield potentials in many places	-	Because of land degradation	+	-	++
Technology effects on cash crop yields	++	Due to investment of private sector but not too much because they are already at the highest	-	because of land degradation	+	-	++

Group Discussion

		yield potentials in many places but cash crops higher investment so trajectory is better than staple crops					
Area under protection	-	No enforcement capacity, private sector running rampant	--	Drought and disaster adding to lessened area under protection	++	+	++
Environmental Consciousness	-	Because people are out for themselves and do not have the resources to care about the environment	--	Because people are out for themselves and do not have the resources to care about the environment	+	+++	++
Infrastructure development	+	Things have not fallen apart yet	--	Private sector only does development for themselves, and there is no govt to develop	+	little disagreement	+
Waste management	-	Follows environmental consciousness, lack of education	--	People manage their own waste and do not have the capacity	0	some disagreement	+
food and availability of diet	+	we have slight increases in availability but nutrition starts to go down	-	With the food crises after the drought, there is a decrease in availability and nutrition continuous to go down	+	++	+++
gap between rich and poor	++	Already increasing, private sector out for themselves	+++	Situation getting worse with natural disaster	0	+++	+++
Water availability	-	China is damming, climate change	--	Further exacerbated by a major drought and conflict, mismanagement	++	+++	+++
urbanization	+	Already urbanization and it will	+++	With natural disasters, land degradation,	++	little disagreement	++



Group Discussion

		continue with people moving away from farming		people move to the city for employment opportunities			
migration	+	Some migration because of labour movement	++	Climate change, drought, land degradation, people move out	++	+++	++
Agricultural labour availability	-	Related to urbanization and yield, with people moving to the city less people working on farms	--	Increases because yields go down and so people cannot make profits from farm income	++	+++	++
education	0	People are education now but the govt cant invest	-	It decreases because the govt does not have the capacity to provide and the private sector does not invest, and people are in camps so vast majority does not have access to education, only the rich might	+	some disagreement	+
deforestation	++	No investment, no collaboration, lack of education hill tribes clearing trees	+++	Drought and so land pulled into whatever else is needed	0	+++	++
overfishing	++	High levels following deforestation, and it is already happening	+++	There will be no fish left by the end	0	+++	++
biodiversity	--	Correlated with deforestation, overfishing, and education	---	Correlated with deforestation, overfishing, and education	0	++	++
health	-	correlated with nutrition and waste management and sanitation, education and weak govt	---	correlated with nutrition and waste management and sanitation, education and weak govt	++	some disagreement	++

Group Discussion

farm input costs	+	Increasing lack of resources like water and land may lead to increased costs but this might only be offset somewhat with private investment for eg in the case of fertilizer	++	Increasing lack of resources like water and land may lead to increased costs but this might only be offset somewhat with private investment for eg in the case of fertilizer	+	+++	++
Pollution	++	High level of land degradation correlated and because private sector is out for profits	+++	High level of land degradation correlated and because private sector is out for profits	0	+++	+++
Mining	++	High levels of exploitation	+++	High levels until there is none left	0	some disagreement as to speed	++
Industry Development	+	Some industries will increase because of high private sector investment but those with low profits will decrease	+	Some industries will increase because of high private sector investment but those with low profits will decrease	+++	+++	++
Gender equality	0	Things will remain the same, not affected by economic conditions	0	Things will remain the same, not affected by economic conditions	0	+++	+
Rural/urban poverty levels	+	Because degradation of land and water resources	++	Because degradation of land and water resources	+	+++	++
Diversification of rural incomes	-	Only private the sector investment only in certain thing	---	Only private the sector investment only in certain thing	+	+++	++

Annex 3 Semi-quantitative assessments Scenario 3: the DoReKi Dragon

Group Discussion

Sector	Change (--- to +++), up to 2020	Logic for change	Change (--- to +++), up to 2030	Logic for change	Change (--- to +++), up to 2040	Change (--- to +++), up to 2050
Gross domestic product/capita	++	GDP increase driven by ASEAN	++	GDP increase driven by ASEAN	+++	+++
Technology effects on staple crop yields	0	No attention given to staple crops	0	No attention given to staple crops	0	0
Technology effects on cash crop yields	++	At that time the production requires modern techniques for larger scale farming. When we work in large scale we will need bigger companies who will provide inputs for production (fertilizers etc.) .	++	At that time the production requires modern techniques for larger scale farming. When we work in large scale we will need bigger companies who will provide inputs for production (fertilizers etc.) .	++	++
Area under protection	-	Decrease because of expansion of land use; lack of policies	--	Decrease because of expansion of land use; lack of policies	--	--
Environmental consciousness	-	There are protests against pollution	+	There are protests against pollution	+	+
Infrastructure development	++	Government + private investment into infrastructure	++	Government + private investment into infrastructure	++	++
Waste Management	--	Massive pollution	--	Massive pollution	--	--
Food and availability of diets	-	The poorest are still food insecure	-	The poorest are still food insecure	-	-
gap between rich and poor	++	Policies favour wealthy	++	Policies favour wealthy	++	++
Water availability	-	Water resources scarce	-	Water scarcity becomes a real problem	--	--

Group Discussion

Urbanization	++	Smallholders change livelihoods	++	Smallholders change livelihoods	++	++
Migration	++	Labour migration between the countries	++	Labour migration between the countries	++	++
Agricultural labour availability	-	Labour has migrated out of rural areas; ex-smallholders become labourers	--	Labour has migrated out of rural areas; ex-smallholders become labourers	--	--
Education	+	Not for the poorest	+	Not for the poorest	+	+
Deforestation	++	Because of land use expansion, lack of policies	++	Because of land use expansion, lack of policies	++	++
Over fishing	++		++		++	++
Biodiversity	--	No protection policies	--	No protection policies	--	--
Health	+	Not for the poorest	+	Not for the poorest	+	+
Farm input costs	+	Fuel prices, energy prices go up	+	Fuel prices, energy prices go up	+	+
Pollution	++	Air and soil pollution leads to protests	++	Air and soil pollution leads to protests	++	++
Mining	++	Goes up with industry	++	Goes up with industry	++	++
Industry development	++	Main focus of policies	++	Main focus of policies	++	++
Gender equality	0	No specific attention to this in policies	0	No specific attention to this in policies	+	+
Rural/urban poverty levels	+	Rural poverty remains high, gap with regard to urban poverty	+	Rural poverty remains high, gap with regard to urban poverty	+	+
Diversification of rural incomes	+	Farmers are forced to diversify	+	Farmers are forced to diversify	+	+

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