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DOCKSIDE
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WORKSHOP 3

Sustainability of Natural Resources: The Case of the Tonle Sap

Trainers:

*Dr. Seng Ratha (UBB),
Dr. Neang Malyne (RUA),
Dr. Chea Ratha (UBB)*

The course describes the principles of ecosystem approach to fisheries management, ecosystem status and food web structure of Tonle Sap, co-management arrangement and community adaption to environmental change. The course intends to improve understanding of Tonle Sap's ecosystems by emphasizing on the status, the socio-ecological interactions and the responses to various drivers of change around the lake.

Keywords: Tonle Sap, ecosystem services, co-management, food web, community fisheries

Content - Key areas:

- Tropical flood pulse ecosystem – Tonle Sap Lake, Cambodia
- Ecosystem approach to fisheries management and agro-ecosystem approach to agricultural production
- Ecosystem Services (ES and Ecosystem Dis-services (EDS)
- Research objectives, methodology and research concept paper

Outcome of the course:

This course will train the participants to exhibit knowledge of ecosystem approach to fisheries management, and agro-ecosystem approach for agricultural production, ecosystem status and food web structure of Tonle Sap, co-management arrangement and community adaptation to environmental change. Participants will be expected to be able to use the theories, concepts,

and ecosystem understanding to develop potential research topics for their thesis and dissertation; identify areas of knowledge gap, future joint research, multidisciplinary research and other collaboration; and improve their existing research (topics, methodologies, etc.)

At the end of the training, participants will be able to:

- discuss the ecosystem approach to fisheries management, and agro-ecosystem approach for agricultural production;
- explain the Tonle Sap's ecosystem status, issues and threats; Ecosystem Services (ES and Ecosystem Dis-services (EDS));
- explain the role of Community Fisheries (co-management institution) in Tonle Sap, role of farmers in maintaining ES;
- describe the perception of fishers in the Lake in response to environmental change;
- Identify research topics relevant to Tonle Sap ecosystem, NRM, socioeconomics, governance, etc.

Teaching methodologies: As the training intends to provide both theoretical and practical perspectives on fisheries management especially relevant to the Tonle Sap, the training methods will consist of lecture presentation, brainstorming, group work, and oral presentation reflection from the participants. The group work and participant presentation aim to stimulate discussion and research topics around the Tonle Sap Lake. Therefore, participants are expected to have some preliminary thoughts on the research topics to enhance discussion. Feedback on research methods and analytical tools will be provided to participants during oral presentation.

Target participants: Undergraduate, Master and PhD students interested in ecosystem management, natural resource management, fisheries, agriculture, rural development, economics, Tonle Sap and the Mekong systems.

Prerequisites:

The participants are expected to have some basic knowledge of natural resource management, ecosystem services, research methods and analytical tools

Reading materials and lesson plan:

Pre-reading materials and the lecture plan will be send to all participants (via email or drop box). Participants are requested to read the documents before the training. Additional background readings will be provided during the training if necessary.

Date	Time	Activities	Lead person	Readings
1 October 2018 (Monday)	MORNING SESSION			
	10.45-11.15	Toward an ecological understanding of a tropical flood pulse ecosystem – Tonle Sap Lake, Cambodia	Ratha Chea	Reading list #1

Date	Time	Activities	Lead person	Readings
2 October 2018 (Tuesday)	MORNING SESSION			
	8.15-8.45	Welcome, self-introductions from the all trainers and participants, an overview on schedule, group formation and discussion on the practical issues	Ratha Seng Malyne Neang	
	8.45-9.15	1. Define research interest (your interest); stakeholders/partners; create connection 2. Define sources of funding 3. Communication and networks	Ratha Seng Malyne Neang	
	8.15-9.45	Introduction to Ecosystem Approach to Fisheries Management	Ratha Seng	Reading list #2
	9.45-10.15	Tea-break		
	10.15-11.30	Trade-offs between ecosystem services and opportunity costs of ES maintaining in the Tonle Sap Lake agro-ecosystem (Cambodia)	Malyne Neang	Reading list #3
	AFTERNOON SESSION			
	13.45-15h15	Group Work 1 – Research Objectives	Ratha Seng Malyne Neang	
	15.15-15.45	Tea-break		

	15.45-17.00	Participant Presentation 1 – Research Objectives	Ratha Seng Malyne Neang	
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Date	Time	Activities	Lead person	Readings	
MORNING SESSION					
3 October 2018 (Wednesday)	8.15-9.45	Co-management in small scale fisheries	Ratha Seng	Reading List #2	
	9.45-10.15	Tea-break			
	10.15-11.30	<ol style="list-style-type: none"> 1. Trade-offs between ecosystem services and opportunity costs of ES maintaining in the Tonle Sap Lake agro-ecosystem (Cambodia) 2. Exploring the potential of local market in remunerating water ecosystem services in Cambodia: an application for endogenous attribute non-attendance modelling. 	Malyne Neang	Reading List #3	
	AFTERNOON SESSION				
	13.45-15h15	Statistical and Modelling Methods: Regressions, Non-Metric Multidimensional Scaling (NMDS), Classification and Regression Tree (CART	Ratha Seng	Reading List #2	

	15.15-15.45	Tea-break		
	15.45-17.00	1. Landscape reading - agroecosystem analysis 2. Opportunity cost Analysis and Choice Experiment	Malyne Neang	Reading List #3

Date	Time	Activities	Lead person	Readings
4 October 2018 (Thursday)	MORNING SESSION			
	8.15-9.45	Group Work 2 – Research Methods	Ratha Seng Malyne Neang	
	9.45-10.15	Tea-break		
	10.15-11.30	Participant Presentation 2 – Research Methods	Ratha Seng Malyne Neang	
	AFTERNOON SESSION			
	13.45-15h15	Group Work 3 – Concept Paper	Ratha Seng Malyne Neang	
	15.15-15.45	Tea-break		
	15.45-17.00	Participant Presentation 3 – Concept Paper	Malyne Neang Ratha Seng	

All reading materials are shared in folder and below are link for selected readings (if the link does not work, please let us know):

Reading List #1

Ngor P.B., Oberdorff T., Phem C., Baehr C., Grenouillet G. & Lek S. (2018). Fish assemblage responses to flow seasonality and predictability in a tropical flood pulse system (in press)

Chea R., Chuanbo G., Grenouillet G. & Lek S. (2016). Toward an ecological understanding of a flood-pulse system lake in a tropical ecosystem: Food web structure and ecosystem health. *Ecological Modelling* doi:10.1016/j.ecolmodel.2015.11.014.

http://gael.grenouillet.free.fr/publi_pdf/Chea_2016_Ecomod.pdf

Ngor P.B., McCann K., Grenouillet G., So N., McMeans B., Fraser E. & Lek S. (2018). Evidence of indiscriminate fishing effects in one of the world's largest inland fisheries. *Scientific Reports* 8:8947.

<https://www.nature.com/articles/s41598-018-27340-1>

Ngor P.B., Grenouillet G., Phem S., So N. & Lek S. (2018). Spatial and temporal variation in fish community structure and diversity in the largest tropical flood-pulse system of Southeast Asia. *Ecology of Freshwater Fish* doi: 10.1111/eff.12417.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/eff.12417>

Heng Kong , Mathieu Chevalier , Pascal Laffaille, Sovan Lek 2017. Spatio-temporal variation of fish taxonomic composition in a South-East Asian flood-pulse system. doi.org/10.1371/journal.pone.0174582

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0174582>

Bunyeth Chan¹, Peng Bun Ngor, Nam So and Sovan Lek 2017. Spatial and temporal changes in fish yields and fish communities in the largest tropical floodplain lake in Asia. *Ann. Limnol. - Int. J. Lim.* 53: 485–493

<https://www.limnology-journal.org/articles/limn/abs/2017/01/limn170007/limn170007.html>

S Lek, M Delacoste, P Baran, I Dimopoulos, J Lauga, S Aulagnier 1996. Application of neural networks to modelling nonlinear relationships in ecology. *Ecological modelling* 90 (1), 39-52

<https://www.sciencedirect.com/science/article/pii/0304380095001425>

YS PARK, J Chang, S Lek, W Cao, S Brosse 2003. Conservation strategies for endemic fish species threatened by the Three Gorges Dam. *Conservation biology* 17 (6), 1748-1758

<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2003.00430.x>

Reading List #2

- Acheson, J. M. (2006). Institutional Failure in Resource Management. *Annual Review of Anthropology*, 35(1), 117–134.
- Evans, L., Cherrett, N., & Pemsil, D. (2011). Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. *Journal of Environmental Management*, 92(8), 1938–1949.
- FAO. (2016). *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all*. Rome. <http://www.fao.org/3/a-i3720e.pdf>
- Jones, B., & Scheiber, H. N. (2015). Fisheries Policies and the Problems of Instituting Sustainable Management: The Case of Occupied Japan. In H. Young & L. Goldman (Eds.), *Livelihoods, Natural Resources and Post-Conflict Building* (pp. 287–306). New York: Routledge.
- Keskinen, M., & Varis, O. (2012). Institutional cooperation at a basin level: For what, by *Climate Change*, 87–101.
- Pauly, D., Christensen, V., Guénette, S., Pitcher, T. J., Sumaila, U. R., Walters, C. J., ...
- Zeller, D. (2002). Towards sustainability in world fisheries. *Nature*, 418, 689–695.
- Pomeroy, R. S. (2012). Managing whom? Lessons learned from Cambodia's Tonle Sap Lake. *Natural Resources Forum*, 36(1), 50–60.
- KC, K., Seng R., Fraser E. (2018). Should I stay or should I go? Fishers' ability and willingness to adapt to environmental change in Cambodia's Tonle Sap Lake. *Fisheries Management and Ecology*.
- KC K., Pomeory R., Seng R., Schenkels J, Fraser E., Elliot V. (2017). Evaluating Community Fishery Management using fishers' perceptions in the Tonle Sap Lake of Cambodia. *Environmental Development*.
- Nuorteva, P., Keskinen, M., & Varis, O. (2010). Water, livelihoods and climate change adaptation in the tonle sap lake area, Cambodia: Learning from the past to understand the future. *Journal of Water and overcapacity in small-scale fisheries in Southeast Asia. Marine Policy*, 36(2), 520–527.
- Pomeroy, R., R. Brainard, M. Moews, A. Heenan, J. Shackeroff, and N. Armada. Coral Triangle Regional Ecosystem Approach to Fisheries Management (EAFM) Guidelines. Publication. Honolulu, Hawaii: The USAID Coral Triangle Support Partnership, 2013.
- Pomeroy, R. S., Katon, B. M., & Harkes, I. (2001). Conditions affecting the success of fisheries co-management: Lessons from Asia. *Marine Policy*, 25(3), 197–208.
- Kosamu, I. B. M. (2015). Conditions for sustainability of small-scale fisheries in developing countries. *Fisheries Research*, 161, 365–373.

Yohannes, Y., & Webb, P. (1999). *Classification and Regression Trees, CART: A User Manual for Identifying Indicators of Vulnerability to Famine and Chronic Food Insecurity*. Washington DC: International Food Policy Research Institute.

Reading List #3

Barral, S., T. *et al.* 2012. *Assessing Smallholder Farming: Diagnostic Analysis of Family-Based Agricultural Systems in a Small Region Illustrated with the Case Study of the Giham Pioneer Front, Sumatra, Indonesia*, Philippines, SEARCA.

Robertson, G. P. *et al.* 2015. Farming for Ecosystem Services: An ecological approach to production agriculture *BioSciences*, 64, 12. <http://bioscience.oxfordjournals.org>

Kahan, D. 2008. Economics for farm management extension. *In: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS* (ed.) *Farm management extension guide*. Rome: FAO. www.fao.org/publications

Vega, D. C. *et al.* 2011. Choice Experiments in Environmental Impact Assessment: The toro 3 hydroelectric project and the recreo verde tourist center. *Environment for Development* (ed.). www.efdinitiative.org

Zhang, W. *et al.* 2007. Ecosystem services and dis-services to agriculture. *Ecological Economics*, 64, 253-260.
<http://www.sciencedirect.com/science/article/pii/S0921800907001462>