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of the European Union

UNIVERSITÉ DE NANTES

Report

International Mobility to the University of Nantes

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Period of Visit: 16th February – 17th March 2019

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Acknowledgement

First of all, I would like to express my gratitude to Pierre-Alexandre Mahieu, Associate Professor at the University of Nantes, for his valuable guidance and kind cooperation with me during the mobility period. Through frequent discussions with him, I was able to make a good progress on my research.

Many thanks goes to Professor Thomas Vallee, Coordinator of DOCKSIDE project, for his tremendous support before and during this mobility. He introduced Professor Mahieu to me and invited him to co-lead the project "Valuation of ecosystem services of mangrove forest in Cambodia". Moreover, he kindly made his time to meet me and provided directions for the subsequent field survey.

I also would like to greatly thank Ms. Ria Deniska for her great coordination and support throughout this mobility. This made it very convenient for me to stay and work on my research at the University of Nantes.

Last but not least, I would like to sincerely thanks to Dr. Malyne Neang and Dr. Chim Chay, representatives of DOCKSIDE project at the Royal University of Agriculture (RUA), for their kind support for this mobility. Dr. Neang Malyne has introduced the call for this mobility to me and provided continuous assistance so that I could successfully complete the mobility.

Thank you DOCKSIDE project co-funded by the Erasmus+ programme of the European Union for the opportunity to do work with the European colleagues

1. Introduction

DOCtoral program in Khmer universities Strengthening the International Development of Environmental and maritime research (DOCKSIDE) is a structural project between European and Cambodian universities, and the Cambodian Ministry of Education Youth and Sport. One of the missions of DOCKSIDE project is to encourage and facilitate the international mobility of Cambodian students, researchers and staff associated with the project's consortium members through research internships and training in European universities. The purpose of this international mobility is to improve the research capacity of PhD students and researchers.

Following the call for 3rd Mobility and guidance of Dr. Neang Malyne, DOCKSIDE project's representative at Royal University of Agriculture (RUA), I applied for this mobility. Then, I was selected and provided with the opportunity to conduct a research visit in the University of Nantes, France. The visit lasted for approximately one month from 16th February to 17th March 2019.

This report will describe the activities during the research visit, achievements and the plan upon returning to Cambodia.

2. Proposed Purposes and Activities

The main purpose of this mobility to the University of Nantes is to work on my proposed research project entitled 'Valuation of Ecosystem Services of Mangrove Forests in Cambodia' (http://www.dockside-kh.eu/rt_mangrove/). Specifically, the visit aims to develop methodology for valuation of mangrove ecosystem services and to discuss the possibility for collecting data in the field upon my return to Cambodia. All these activities will be under Professor Pierre-Alexandre Mahieu's supervision. The supplementary purpose is to visit some departments or laboratories in order to understand how they work so that I can learn the French way of teaching and researching.

The originally proposed schedule of activities is shown in the table below.

18 February	Meeting with Professor Pierre-Alexandre Mahieu and visiting the University of Nantes (UN), particularly Department of Business and Administration Management	Sophak Pok and Pierre-Alexandre Mahieu
19-25 February	Learn techniques to conduct valuation of market and non-market forest ecosystem services and test its application for mangrove forests in Cambodia	Sophak Pok under supervision of Pierre-Alexandre Mahieu
26 February – 12 March	Questionnaire design, sampling strategies, and survey administration considerations	Sophak Pok and Pierre-Alexandre Mahieu
13 March	Presentation of the work result to relevant people in UN	Sophak Pok
14 March	Discuss further work after returning to Cambodia and identify possibility of jointly publishing the research paper. Timetable for the forthcoming survey (data collection, etc…)	Sophak Pok and Pierre-Alexandre Mahieu

3. Actual Activities and Achievements

3.1 Meeting with Professor Pierre-Alexandre Mahieu

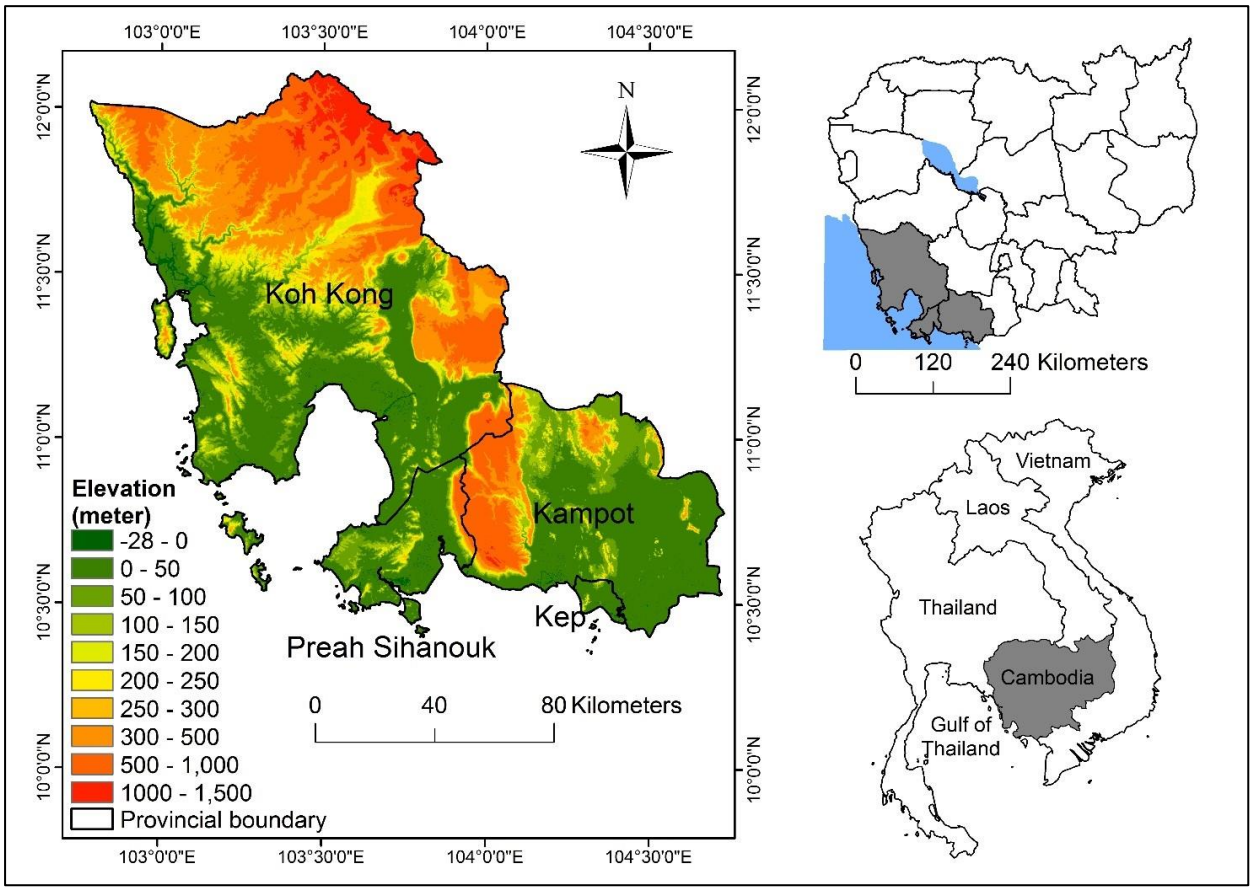
On the first day of at the office (18th February, 2019), I had a meeting with Professor Pierre-Alexandre Mahieu in a Campus Centre Ville, one of the building of the University of Nantes. We discussed methods to be applied in estimating economic value of mangrove ecosystem services in Cambodia. As a result, we agreed that choice experiment should be used in my research for the reason that this method has yet to be used for valuation of ecosystem services in Cambodia. Furthermore, we determined the specific activities to be achieved during my research visit as follows:

- Find the different ecosystem/cultural services associated to mangroves

- Determine who benefit from these services
- Compare/check this ecosystem services to the literature (other choice experiment) and discussion with colleagues
- Find 3 or 4 attributes (mainly ecosystem services)
- Define the level of the attributes
- Construct the choice set
- Design the questionnaire
- Discuss next steps upon returning to Cambodia

3.2 Identifying ecosystems services of mangrove forests in Cambodia

To find out more about mangrove ecosystem services in Cambodia. I conducted desk review by reading research papers and reports that are related to mangrove forest in Cambodia. In Cambodia mangroves exists in the coastal region which covers four provinces: Koh Kong, Preah Sihanouk, Kampot and Kep (see the map below). The majority of the mangrove forests are distributed in Koh Kong province (Bann, 1997). Mangrove forest areas in Cambodia are generally divided into two parts: mangroves located in the protected areas (i.e., Ream National Park, Botum Sakor National Park and Peam Krasoap Widlife Sanctuary), which are under the jurisdiction of the Ministry of Environment; and mangroves located outside the protected areas, which are under the jurisdiction of Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries. Sixteen species of mangroves are found in Cambodia (FAO, 2007). The most dominant species are Rhizophora apiculata, Rhizophora mucronata, Bruguiera gymnorhiza, Bruguiera sexangula, Lumnitzer littorea, Lumnitzera racemose.



According the Bann (1997), the ecosystem services of mangrove in Cambodia included livelihood support (charcoal, fuel wood and construction material, marine fisheries), recreation and tourism, biodiversity, groundwater recharge and discharge, flood and flow control, shoreline stabilization and erosion control, sediment retention, nutrient retention, water quality and maintenance, storm protection and climate regulation. They provide a lot of benefits to local people living in or near the forests.

Like the other parts of the world, in Cambodia mangroves have significantly been lost and degraded. The rate of annual loss of Cambodian mangrove forests was reported at up to 1.2 percent (FAO, 2007). Over the past decades, Cambodian mangroves have been threatened by illegal cutting, conversion to aquaculture farms, rapid urban and coastal development, lack of fund for conservation, and climate change. Cambodian government has already recognized that mangrove ecosystems played a significant role in the sustainable development of coastal region, and has worked with conservation organizations to protect and restore the mangrove forests.

3.3 Development of research methodology: choice experiment method

Choice experiment (CE) has become one of the key valuation methods for understanding public preferences for natural resource conservation and restoration (Chen et al., 2019). It is mainly used for valuing non-market goods and services. In the CE method, natural resource to be valued is defined in terms of its attributes and their levels. The attributes and levels are relevant to the study area and recognizable to the sample population (Tan et al., 2018). There is a cost associated with improvement of the levels of these attributes. Every choice experiment has five parts: 1) a description of the problem and potential solutions, 2) a set of questions about the environmental resource to get the respondents' thought about the resource, 3) a payment vehicle, 4) the choice sets, and 5) further questions including socioeconomic data (Rezende et al., 2015).

Through reading papers and discussions with Prof. Mahieu, three non-market services of mangrove ecosystems in Cambodia were identified. They are: biodiversity, water quality maintenance and climate regulation. These services are used as attributes in the choice experiment. The levels of each attribute were defined as "High", "Medium" and "Low". In addition, the payment vehicle for implementing the mangrove conservation program was monthly payment with levels set at 0.5 US dollar, 1.0 US dollar, 1.5 US dollars and 2.0 US dollars. To create choice sets, orthogonal design method was used to generate different combinations of attribute levels (3x3x3x4 = 108 combinations). 24 out of the 108 combinations of mangrove conservation scenarios were selected. These 24 scenarios were grouped into 12 choice sets. Each choice set has 2 scenarios and a no-action scenario (status quo). The status quo is the option that respondents do not need to pay any money, and thus there is no improvement made to the mangrove ecosystems. The table below shows an example of a choice set for the respondent to choose.

After the choice sets were produced, we successfully developed a complete questionnaire for survey. The target study area will be the mangrove area in Koh Kong province (refer the map above) and the target respondents are local residents of that area. The questionnaire is composed of three parts: brief explanation of the mangrove conservation program/scenario, all the choice sets for the respondents to choose and respondents' social status (e.g. age, education background…). We plan to implement the survey using this readily available

questionnaire in order to investigate local preferences for mangrove conservation programs in Cambodia and to provide information for policy makers.

		Program A	Program B	No action (status quo)
Biodiversity		Low	High	Low
Water quality		Medium	High	Low
Climate change		High	High	Low
Payment		1.5 USD	2.0 USD	0 USD
Your choice				

3.4 Other activities

Aside from the research activities, I took a chance to attend and observe a master program's environmental economics class taught by Prof. Pierre-Alexandre Mahieu. The class's content was about the statistical treatment of survey data using Microsoft Excel. I was impressed by how the students and professor interacted. Both were very active. The students used their own laptop and worked with the excel file of survey data following the teacher's instructions using the LCD projector. Students were not afraid to ask questions whenever they did not clearly understand what the professor explained. Since the class was conducted in the main campus

of the University of Nantes, I went on a university tour and had a brief look at graduate students' room in Laboratoire d'Économie et de Management de Nantes-Atlantique (LEMNA). Each graduate student has his/her own seat in the room. I also met other professors and had a nice lunch together.

3.5 Next steps

On the last day of my visit (14th March, 2019), I discussed my plan upon returning to Cambodia with Prof. Pierre-Alexandre Mahieu and Prof. Thomas Vallee. It was agreed that a survey should be conducted by using the developed questionnaire, and DOCKSIDE project will provide support for the survey. The next steps for my research are:

- Collect the data (questionnaire survey)
- Statistical treatment and analysis
- Mapping of mangrove forest
- Write the paper and prepare for a presentation at the DOCKSIDE Summer School 2019 in Phnom Penh.

4. Conclusion

The research visit to the University of Nantes has successfully completed as planned. Thanks to the DOCKSIDE mobility program, I was able to make a better progress of my research and work as a teacher in general. Firstly, a method for valuing mangrove ecosystem services was developed and questionnaire designed. Secondly, a plan for data collection, analysis, paper writing and possibility of presenting the research's results in the DOCKSIDE Summer School 2019 were discussed. In addition to research, during this visit I could to some extent learn and experience the European/French ways of education and research which I think can be adapted and shared with my colleagues upon returning to my university.

Finally, I would like to say that DOCKSIDE mobility and DOCKSIDE project as a whole is a very good platform for researchers of Cambodian and European universities to cooperate for a better academic and scientific contribution.