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The collaborative project 'Climatic Water Stress – Southeast Asia' (CWSSEA) was selected for funding under the first JFS Call. Here, Dr Pantana of Chulalongkorn University in Thailand shares with us the details of the collaboration.

Dr Pantana, can you tell us something about the context for your project?

Climatic water stress, such as droughts and warmer temperatures, may accelerate forest mortality. Moreover, the frequency and intensity of drought events are predicted to increase in tropical monsoon forests of Southeast Asia; ecosystems which are known to be biodiversity hotspots and a persistent carbon sink in the global carbon cycle. Such increases could drive rapid and large-scale shifts in forest structure and species composition as well as cause dramatic decreases in the amount of carbon stored by these tropical forests.

The majority of forested areas in the tropics are secondary forests, yet compared to mature forests we know relatively little about the ecophysiology of secondary forest ecosystems. Differences in species composition of mature and secondary forests can further complicate our understanding of how forested ecosystems will respond to climatic water stress and thus highlights the need for a better understanding of the vulnerability of both mature and secondary forests to drought in order to more accurately predict global carbon and water cycling in light of future climate change.

What does the CWSSEA project aim to achieve?

In this study, we will measure canopy transpiration which is frequently used to estimate canopy stomatal conductance; a central variable in modeling the uptake of carbon by forests. Measurements will be made in both mature and secondary forests, which in turn will allow us to investigate species-specific responses to water stress by assessing tree hydraulics and drought vulnerability of the dominant species in each forest type.

We will also explore the degree of soil water partitioning among species within each forest to provide a more mechanistic understanding of how individual trees are able to overcome drought stress. Taken together, this study will be the first to our knowledge that quantifies canopy



transpiration, tree hydraulics and drought vulnerability as well as the mechanisms dominant tree species in both mature and secondary tropical forests use to overcome drought stress, which will provide the necessary information to more accurately predict how climate change will affect the carbon and water cycle in tropical forests.

Tell us a bit about the roles of you and your partners in the project. How was this partnership established or how did you find your partner?

This proposal builds upon the existing and new collaborations among partners. The Thai and Swedish teams have been working on long-term sap flow measurement of pine and spruce trees in a boreal forest to estimate canopy transpiration and to quantify the important role trees play in the boreal hydrologic cycle since 2016.

The Thai team includes experts in analyses of forest ecophysiology and community and ecological succession. The French team is led by an expert in tree hydraulics and physiological responses of water and carbon flows in forest. The Swedish team is led by an expert in isotope ecology, particularly the assessment of soil water partitioning and the cycling of water and carbon in forests. Together, the expertise of each partner will complement each other and create a stimulating research and learning environments among scientists and students from these countries.

The SEA-Europe JFS has a strong focus on impact. How could your research benefit the economy or society in SEA or Europe?

This study is unique in that it will fulfil the knowledge gaps in ecophysiological responses of tropical forests and improve predictions made by global vegetation and carbon models. In addition to studying the primary forest, our study will concentrate on secondary forests which are less studied in this region.

To our knowledge, this is the first attempt to investigate ecophysiological response to climatic changes in secondary tropical forests of Southeast Asia. This study will take advantage of already established and new collaborations among Thai, Swedish and French scientists who have strong and various research backgrounds in plant ecophysiology and will also strengthen the research capacity of Thai scientists and the competitiveness of European Union science.

Given that the European Union is currently a leader in finding solution for climate change, this study will provide information for guiding a global policy for European countries on this topic because contributions from ASEAN countries to overall EU scientific publications and citations



are relatively small¹. We expect that this project to build a network of stakeholders to tackle the impacts of climate change on tropical forest diversity and productivity.

Are there any specific advantages or challenges for you when working in this SEA-European project team?

There are more advantages than challenges working in this team. This is solely because of the already well-established collaboration among partners.

What has funding through the SEA-EU-JFS allowed you to do so far? What are the next steps your team plans to take?

With the provided funding, we purchased some equipment that is necessary for making measurements. We are still waiting for permission to construct weather towers in the forests which usually takes a considerable amount of time in Thailand. However, we have prepared all materials needed to conduct the study and are ready to implement them once the permission is granted.

CWSSEA was selected for funding under the 1st Call. How was your experience with the application process?

The application process was really easy. The instructions were clear and straightforward.

What advice would you give to researchers thinking about applying for the 2nd Call?

I would suggest them to start the application as soon as possible because there are many aspects to the research, besides the science, that needs to be established and elaborated. Good luck!

¹<https://unu.edu/publications/articles/analysing-asean-eu-research-collaboration.html#info>