Evaluation of climate change impacts and suitable adaptation strategies for crop production and its environmental and economic implications in vulnerable regions of Thailand and India

Evaluation of climate change impacts and suitable adaptation strategies for crop production and its environmental and economic implications in vulnerable regions of Thailand and India is a research project, sponsored by French Ministry of Foreign Affairs and International Development and was sanctioned in September 2016. The lead coordinator for the project is Prof. Mukand S. Babel, Climate Change Expert (Water Engineering & Management (WEM), Asian Institute of Technology (AIT)) and the members of the project are Dr. Sangam Shrestha, Climate Change Expert and Dr. Sanyogita Andriyas, Agriculture Expert (Water Engineering & Management (WEM), Asian Institute of Technology (AIT)), Dr. Damien Jourdain, Economist (G-EAU (Management of Water, Actors and Usage Research Unit, Agricultural research for Development (CIRAD), currently at AIT) and Dr. Anju Singh, LCA Expert (National Institute of Industrial Engineering (NITIE)). The project is for duration of 2 years with a budget allocation of 1.35 Million THB.

Project Summary-

Agriculture which is an integral part of Thailand and India's economy is known to have significant environmental impacts. Changing climate is certain to create serious consequences on natural and human systems. Global and regional circulation models (G/RCM) are used to project the future climate for assessing the impacts on specific economic sectors. Based on the anticipated impacts suitable mitigation/adaptation strategies/ measures can be evaluated and implemented.

The present study will project climate change scenarios and assess their effects on agriculture and subsequently its impacts on environment and socio-economy in the vulnerable regions of Thailand and India. Mitigation and adaptation measures will be suggested for coping with the future climate conditions. Alternatives like conservation agriculture, beneficial crop mix or tradeoffs for planting single crops will also be investigated with resultant environmental impact to give feasible solutions with regards to climate change. Same crop and similar agricultural practices will be studied in a similar region in India to improve understanding and suggest suitable mitigation and adaptation measures.

Project Context-

Rice is the most important food crop in Thailand and India. The general policy for rice production in Thailand is to produce rice for self-sufficiency and surplus for export to earn foreign exchange. In India there are various research institutes like Indian Agricultural Research Institute (IARI), Kerala Agricultural University, Central Rice Research Institute (CRRI) and many others working to develop hybrid variety of rice to lessen the difficulty that farmers face due to un even distribution of rainfall and other climatic adaptations.

The project proposes to explore the environmental and socioeconomic impacts of agriculture in the North Eastern region of Thailand as the region is most vulnerable to climate change. The average rice yield in the region is 1.9 t ha–1, which is the lowest in the country, with the country wide average being 2.5 t ha–1. In case of rice yields, in northern India, vulnerable regions are increasing from western side to eastern side. Indian southern peninsula and northeastern regions are also relatively more vulnerable to climate change and in future scenarios vulnerable areas in those regions are increasing.

Depending on crop, specific Life Cycle Analysis (LCA) of the agricultural practices and the resulting socioeconomic impacts, analysis will be done to evaluate the impacts of same and variable agricultural practices under different climatic conditions on the farm soil, water, water quality, income etc. Also major risks related to adopting different agricultural practices under climate change would be identified.

Also modeling techniques will be applied to agriculture to estimate the crop yield as affected by climatic and agricultural management practices under current and future conditions.

Research objectives -

1. To study the rice crop pattern of northeastern Thailand and southwest region in India using secondary data
2. To analyze the trend of historical climate and projection of future climate in Northeastern Thailand and South West India
3. To assess the environmental and health impacts due of agricultural practices with change in climate on Northeastern Thailand and India using LCA
4. To assess the socioeconomic impacts at farm and field level due to current and future agricultural practices in Northeastern Thailand using primary data from surveys and secondary data wherever required.
5. To analyze, evaluate and recommend strategies for adaptation and mitigation for future water availability in Northeastern Thailand and India using various analytical and statistical tools. Also suggest policy implications of the same

Expected Outcome-

1. Distribution of rice in Northeast Thailand and India assessed.
2. Future climate scenarios projected.
3. Environmental and health impacts of major crops studied.
4. Socioeconomic impacts of the two crops studied.
5. Environmental and socioeconomic impacts of current crop practices on the region predicted.
6. Mitigation and adaptation measures suggested with policy implications.