The AdaptNET project and its training program

An interactive training experience on Climate Change and agriculture for Indian teachers between Europe and India.

According to IPCC-2014 (http://www.ipcc.ch/), by the end of this century, the Earth's average temperature is expected to increase from 2 to 4.5 °C. With elevation in temperature, the production of major crops will be reduced evidently around the world. The population is supposed to grow to about 9 billion in 2050 and food requirements are expected to increase by about 85% (FAO). The growing demand of food at global scale and the increasingly harsh and challenging environmental conditions due to climate change constitute serious threats to Agriculture. Adaptation strategies to combat Climate Change must be developed particularly in developing countries where Climate Change is threatening for the food security of million people.

The AdaptNET project, an Erasmus+ project funded by the European Commission, fits into this context and is born with the aim of improving the professional competences in the areas of Climate Change Management (CCM) and Climate Smart Crop Development (CSCD) in southeast Asia. The project wants to achieve it by exchanging information and building capacities between higher education institutions of EU and India. A total of 8 institutions coming from Italy, Greece, and India are the partners participating in this project.

Institution	**Country**
Agricultural University of Athens (AUA)	Greece
University of Milano (UMIL)	Italy
Academy of Athens (AA)	Greece
Polytechnic University of Marche (UNIVPM)	Italy
Assam Agricultural University (AAU)	India
Tezpur University (TEZU)	India
International Crops Research Institute for Semi-Arid Tropics (ICRISAT)	India
University of Agricultural Sciences, Dharwad (UASD)	India

The approaches used in the project to improve teaching and research in the area of CCM and CSCD in India include updating existing graduate programs at targeted Indian institutions, developing of MSc programs as well as implementing blended learning (b-learning).

A main part of the project focuses on "training the trainers", as the teachers are the central pillar behind the development and update of the graduate programs. One-month training program for 30 Indian professors and researchers has been organized with the collaboration of 8 partner institutions. The 4 Indian partners, TEZU, UASD, ICRISAT, and AAU, led by the Assam Agricultural University, selected the participating trainees, while the Agricultural University of Athens coordinated the development of the training program at the three European Universities and at ICRISAT. The training program was organized in January-February 2020 and was subdivided in 4 modules.

Four 1-week workshops took place in Europe and India and were focused in the following subjects:

1) The philosophical, legal, economical and agronomical perspective on Climate Change. Held and organized at University of Milan (UMIL), Italy.
2) Genetic resources and Gene discovery for climate change mitigation. Held and organized at Università Politecnica delle Marche (UNIVPM), Italy.
3) Climate change and Agriculture. Held at Navarino Environmental Observatory (NEO) and organized by the Academy of Athens, Greece.
4) Next generation genomics for developing climate resilient crops. Held and organized at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India.

The training program ended few months ago, but we wanted to keep the cooperative spirit developed during the workshops alive. Accordingly, we interviewed some of the participants and we present here their responses in order to transmit the enthusiasm and the results obtained during the AdaptNET training program.

20 trainees out of the 29 participants were available to be interviewed. From these interviews, some interesting points emerge and are described, together with some responses collected during the interviews.

- The AdaptNET program meets the aim of Indian Universities in term of implementation of Climate Change policies. In addition, it has represented a good opportunity for the formation and career of the participants. The workshops were an occasion to meet scientists coming from different parts of India and from different countries. This could be instrumental for starting new research collaboration between research groups based in different countries.

Moloya Gohain

Project Scientist at DBT-Northeast Centre for Agricultural Biotechnology (DBT-NECAB), AAU.

The reasons behind my application to the AdaptNET training program were in line with the aim of the University to lead the implementation of policies on climate change. There has been a major push to promote precision agriculture, organic farming, use of artificial intelligence (AI), cloud computing, sensor driven automation and internet of things (IoT) to mechanize agriculture in the North Eastern region of India. At the same time, the DBT-NECAB has been facilitating public-public and public-private partnerships for technology transfers and parallel trainings on associated skills to widen the capacity of farmers through trained agri-graduates and scientists. As a Project Scientist at DBT-NECAB, I considered the AdaptNET training programme was a huge opportunity for the following reasons:

1. Formulation and Implementation of Climate Change awareness strategies for North East (NE) India.
There is an urgent need to sensitize local people about the direct, indirect and socio-economic impacts of climate change and bridge the gap between technology and farm. The AdaptNET training would help gain expertise in raising awareness, providing practical solutions and initiating young farmers and youth to attempt climate-smart agri-practices.

2. Promotion of precision agriculture.
Precision agriculture may be instrumental in coping up with rainfall variability which is predicted to have a more pronounced effect in eastern India particularly on rain fed crops. AAU could catalyze the much-needed paradigm shift in agricultural practices using high resolution, spatial and temporal climate change predictions to help optimize farming decisions and increase production output. The precise data may be accompanied with high quality agricultural inputs resilient to biotic and abiotic stresses for improving both quality and quantity of crops. The training could be instrumental in this regard.

3. Institutional mediator/resource person.
The training program would help us systematically understand strategies for dissemination of climate smart practices from experts specialized in Climate Change Management and Climate-Smart Crop Development. Becoming a master trainer after the program for e-labs was a promising way to implement the goals of the AdaptNET project and the University, simultaneously.

4. Potential collaborator.
The training could be instrumental in initiating collaborations for extensive leverage of climate-smart practices in the NE region, from organizations such as ICRISAT, Agricultural University of Athens, University of Milano, University of Marche that have already gained expertise and implemented projects on data driven digital agriculture. The NE region is capable of being transformed to a "Smart-Organic Hotspot" integrating precision and automation in cluster-based organic agriculture. For this capacity building programmes like AdaptNET has multifold benefits if well utilized and implemented. In addition, the idea of traveling across to an entirely different continent was also fascinating. It would help gain newer perspectives from how developed countries function, meet people and learn about different cultures."

- Researchers and teachers from different fields of education participated to the training program, but each of them benefited from the experience because of the large number of Climate Change aspects and disciplines that were discussed.

Nirmali Gogoi

Assistant Professor of Plant Physiology at the Department of Environmental Sciences, TEZU.

"I came to know different tools that are very much integral parts of CCM and CSCD for example how GSI and Remote sensing can be added to CCM, how Economics can be used with climate change, and about the International justice to climate change; apart from various new molecular tools like GWAS, population genomics, etc. Moreover, I got the opportunity to introduce with teachers and researchers from the area of CCM and CSCD from India and abroad that definitely will be helpful for me."

Rachit Saxena

Senior Scientist at ICRISAT

"We have several ongoing efforts to deliver insights and genomic tools which can fasten the process of developing climate-resilient pigeonpea varieties/hybrids. Therefore, I thought this training would greatly enhance my knowledge domain on climate change related issues, and will help me in implementing climate-change related research further.

It was a quite informative workshop that has enhanced my understanding of climate change and helps in further planning in Climate Smart Crops Development (CSCD)."

- The trainees have underlined the utility of the training program for their teaching, they valued the active learning approaches that they experienced, as well as the teaching material that was made available to them.

Spurthi N. Nayak

Assistant Professor, Department of Biotechnology, UASD.

"The aspects we learned from the workshops are very useful in our teaching. I provide classes for undergraduate and post-graduate levels and I am now using some of the interactive sessions along with the regular classroom teaching. This has improved my teaching skills. As climate change is a vast and needy subject, I quote examples of climate change wherever applicable. As my research is on high temperature stress tolerance, now I am able to guide my students more effectively.

We have learned many pedagogical approaches during the workshops. Unlike other regular workshops, the interactive sessions, group activities, practical sessions with analysis and visits to nearby historical places were of great help. The study materials shared with us are so handy and I tend to use them whenever I want to refer them. I have also shared some of the materials with my PG students.

The biggest lesson I learnt is that our teaching should be thought provocative and students should be able to freely think on different aspects and come up with answers and then we need to discuss regarding those issues!"

Eeshan Kalita

Assistant Professor, Department of Molecular Biology & Biotechnology, TEZU.

"So far as new content is concerned, the workshop was helpful in gaining exposure to some frontier areas which can be incorporated in new/existing curriculum. Regarding the pedagogical approaches used, the sessions on Climate Change Policy and CC negotiations deserve a special mention. These were remarkable examples of role-play for deliberating on a topic and proved to be a very quick and

effective means to educate a heterogeneous class of students with varied specializations and capacities, by means of a participatory activity. This happens to be a challenge we often face while teaching multidisciplinary biology subjects to non-biology students."

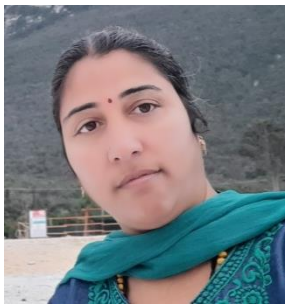
- The trainees are very convinced that the society and their institution benefited from their participation to AdaptNET. As a matter of fact, new courses have already been designed and will be soon offered at Indian Universities. In addition, awareness campaign for farmers will be soon organized at AAU.

Rajib Lochan Deka

Associate Professor of Agricultural Meteorology at AAU.

"As the impacts of climate change will be felt in diverse arenas, including Agriculture, energy, water resources, health and other economic sectors; the AdaptNET training workshops will definitely benefit my institution and society. For the purpose of practising climate smart agriculture, special attention needs to be paid to identify, evolve, demonstrate, and adopt agro-technologies which can cope with the difficult situations arising due to weather aberrations. As such, educating people of various spheres (staring from planners to end users) on climate change impacts and available technologies for building climate smart agriculture is of foremost importance. Therefore, sensitization and creating awareness about climate change and mitigation and adaptation options is not only useful for farmers, but also for planners, researchers, extension specialists and others. Therefore, to tackle such important issues of climate resilient agriculture in India with special reference to the state of Assam, the training workshops have been very much useful not only from the viewpoint of my career development, but also to my esteemed University and society.

In this context, a week-long hands-on training on "Crop Yield Forecasting and Preparation of Agro-advisories using Advanced Techniques" was planned utilizing the funds from India Meteorological Department (IMD), Ministry of Earth Sciences, Government of India whereby officers and researchers working in different parts of North East India in the field of Agricultural Meteorology would get a scope of acquiring productive skills and knowledge. With an aim to reach out directly to the farmers, two Awareness Programmes on Climate Change were also planned to be organized very soon where they could be hinted about the climate change issues of recent times as well as the upcoming adversities and how to cope up with them."



Arati Yadawad

Principal Investigator, DST-WOS-A Genetics and Plant breeding, UASD.

"We ten scientists from our institution participated to the AdaptNet training program, which will be a very proud part from UAS, Dharwad. All of us are into teaching and research. We have designed a new UG course on climate change and climate resilient agriculture. At the same time, we are focusing into revising of the syllabus of eight post graduate courses. Our colleagues are giving objectives on climate change to their PG/PhD students.

It was the best workshop I have ever participated. The knowledge shared between faculties and participants from Indian and European institutions made the workshop a GRAND SUCCESS with new avenues and hopes of mitigating climate change and development of climate smart crops."

We are very proud to be able to say that the training program was a successful way to improve the competencies of Indian teachers and researchers. After very few months from the end of the training program and during the second year of the project (started in 2018) many actions have already been implemented or will be soon completed. For instance, at the 3 Indian Universities (AAU, TEZU, and UASD) E-laboratories that will help to use the b-learning approaches have been established and will be inaugurated soon. New modules or courses for BSc and MSc students that will teach Climate Change topics related to agriculture have been developed in the Indian Universities and will be made available in the next months. Finally, a 3-months mobility period in Europe for 16 PhD students from the Indian Universities will be soon started. The students have been selected and they established contact with their supervisors at the European Universities.

We can conclude that the AdaptNET training program has been really appreciated and besides providing all the valuable information to researchers and teachers at the Indian Institutes of the projects, it has also enhanced the cooperation between European countries and India. This cooperation between Higher Education institutions is expected to provide long-term benefits to India in terms of education, research and innovation in the field of CCM and CSCD.

List of participants to the training program:

Participant	Institute
Priyadarshini Bhorali	Assam Agricultural University
Moloya Gohain	Assam Agricultural University
Rajib Lochan Deka	Assam Agricultural University
Tankeswar Nath	Assam Agricultural University
Ratna Kalita	Assam Agricultural University
Purnima Das	Assam Agricultural University
Naseema Rahman	Assam Agricultural University
Manashi Gogoi	Assam Agricultural University
Rashmi Baruah	Assam Agricultural University
Bonti Gogoi	Assam Agricultural University
Hima Bindu Kudapa	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)
Rachit Saxena	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)
Manish Roorkiwal	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)
Manish Kumar Pandey	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)
Mahendar Thudi	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)
Nirmali Gogoi	Tezpur University
Eeshan Kalita	Tezpur University
Shailen Deka	Tezpur University
Ratul Kumar Baruah	Tezpur University
Shivakumar Inamati	University of Agricultural Sciences, Dharwad
Spurthi Nagesh Nayak	University of Agricultural Sciences, Dharwad
Malagouda Patil	University of Agricultural Sciences, Dharwad
Somanagouda Patil	University of Agricultural Sciences, Dharwad
Kiran Basappa Olekar	University of Agricultural Sciences, Dharwad
Kumara Belagavadi Hombaiah	University of Agricultural Sciences, Dharwad
Basavaraj Bagewadi	University of Agricultural Sciences, Dharwad
Jagadish Melekote Rajanna	University of Agricultural Sciences, Dharwad
Basavaraj Jamkhandi	University of Agricultural Sciences, Dharwad
Arati Yadawad	University of Agricultural Sciences, Dharwad