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UNIVERSITY OF WEST HUNGARY

NEWSLETTER (1)

COMPLEX ASSESSMENT OF CLIMATE CHANGE IMPACTS - PREPARING INTERNATIONAL R&D PROJECTS IN THE UNIVERSITY OF WEST HUNGARY

TÁMOP-4.2.2.D-15/1/KONV-2015-0023

The “**CLIMATE IMPACTS – Complex assessment of climate change impacts - preparing international R&D projects in the University of West Hungary (TÁMOP-4.2.2.D-15/1/KONV-2015-0023)**” project has been launched in order to develop research, management, infrastructure and education of the Faculties. The duration of the project was 8 months, the consortium included two partners (University of West Hungary and the Hungarian Academy of Sciences, Centre of Ecological Research). The project was supported by the European Union, co-financed by the European Social Fund.

The scientific work was concentrating on climate change and its impacts on natural and agricultural ecosystems. The aim was to establish research groups who will be able to apply for R&D projects of the European Union, with focus on Horizon2020 projects.

The research has been carried out in 13 work packages, the main activities and results can be summarized as follows:

A) The impact of climate change on natural ecosystems

A1) Methods for analysing climate change and its impacts on forest ecosystems

The aim was to synthesize the available databases and methods applied to analyse climate change and its impacts on forest ecosystems. Case study areas were selected where forest dieback is already visible. Complex investigation of the site conditions has been carried out applying field observations, laboratory work, modelling and GIS-methods in order to find the causes of the health status decline and mortality as well as to project the frequency and severity of threatening climate conditions until 2100.

A2) The territory change of domestic insect species – direct and indirect effect of climate change

Native insect species were identified, whose area of distribution has being increased in the last decades. The possible reason of these changes and their effects on the natural ecosystems are investigated from different aspects.

B) The impact of climate change on agriculture

B1) Climate change impact on crop production

GPS-based field observations were carried out: soil sampling, soil moisture content, maize plant sampling (root, stem and leaves), penetration resistance and maize root force measurements with two-armed lever equipped with a dynamometer were determined on different soil conditions. Climate impact on corn production in different soil textures with variable water holding capacity and soil moisture content has been analyzed.

B2) Enhancement of crop safety and pesticide free crop protection – application of microalgae in crop production and protection

The researchers of the Institute of Plant Biology are working on microalgae biotechnology for agricultural purposes. Experimental results of the Institute approved that microalgae treatments ensure the safety of crop production by: (1) increasing crop yield, (2) improving plant water balance, (3) protecting crops against special plant fungal diseases and insects.

B3) IT system supporting clean production technologies

The SensorHUB system has been established. The staff got to know the various aspects of the structure, the operations and the capabilities of the system.

C) Application of renewable raw materials, renewable energy resources, life cycle analysis

C1) Effect of buildings on climate

The buildings could affect the environment by the manufacturing of building materials and the energy used during operation of buildings. High ratio of energy consumption related to the heating and cooling of buildings. From this amount of energy the residential consumption is dominating against public sector. The most damaging affect is coming from the fossil energy sources. The possibility of working out projects has been examined, which try to minimalize the environment damaging effect of buildings.

C2) Wide-range applications of renewable raw materials

Bacterial cellulose (BC) is an environmentally-friendly polymeric material that has high purity, high crystallinity, a high degree of polymerisation, high tensile strength and strong biological adaptability. Two different approaches in purifying BC were demonstrated, water and alkaline methods, and in the alkaline case followed by ultrasound treatment. The different approaches in BC purification and sonochemical processing has been shown to affect drastically the morphology of the BC fibrils, as seen from films by optical methods. Rheological investigation showed that there is a difference in manifestation of particle shape/crystallinity response and that sonicated samples show a rheological behaviour similar to that of liquid crystals in both linear and non-linear regimes.

C3) Dendromass production

The Bioenergy Research Group performed a pilot project on biomass-to-energy survey. The scope of the pilot project was to develop a measurement protocol for quantity- and quality-surveys on biomass-to-energy potential on non-cultivated (natural or semi-natural) areas. Biomass potential survey protocols for such areas with wild-growing and varying mix of plants was not available so far. The new measurement protocol will be performed so that it could increase the reliability of the surveys on natural or nature-like areas with high heterogeneity of wild plants.

C4) Life cycle assessment

The possibilities of the application of climate protection aspects in life cycle assessment have been investigated. LCA development in Hungary and its application in environmental impact assessment has been reviewed. The GaBi softver has been adapted and tested.

D) Preparing biodiversity indicators and organizing a monitoring system for Hungarian forests

The forest sub-compartments were investigated and classified according to their composition, structure, extent, condition and usage, based on forestry database information. Landscape level analysis of the biodiversity was performed in the sense of composition, structure and function.

E) Interdisciplinary research for identification of biodiversity in forest

The main aim of the work package was the preparation of scientific manuscripts within two scientific working groups: (1) exploration the relationships between environmental variables and the biodiversity of different organism groups in mixed forests and (2) comparative study of Hungarian oak dominated forests.

F) Effects of climate change on ecosystems – monitoring system development

Measurements and data collection were carried out in different fields e.g. aerial photography at dolinas for the effects of heavy rains and monitoring of dust pollution in the atmosphere. Examining environmental changes, botanical and zoological studies were conducted in areas exposed to varying degrees of environmental change in the Carpathian Basin. The breeding bird fauna was monitored with the standard mark-recapture method. New methods were developed and applied to analyze environmental DNA structure in lake ecosystem. New e-learning material has been edited on climate change.

G) Social awareness, conflict management, challenges related to climate change

A range of project ideas have been developed related to the social and economic issues of climate change and general environmental conflicts. These issues are the global environmental conflicts, environmental scarcity and the knowledge controversies in society; global monetary system and sustainability issues; global climate change and the Hungarian economy; agricultural adaptation to climate change; low carbon urban strategies; green logistics and migration-based social conflicts.

In the frame of the project international summer schools, seminars and workshops were organised as well as more than 20 new research groups have been established. Beyond researchers with various disciplines from the University, involvement of young scientists, PhD students and researchers from international research centres was especially supported. These inter- and multidisciplinary research groups and new partnerships will contribute to the enhancement of the research potential as well as to the sustainable knowledge transfer in the University.

For detailed information please visit <http://klimahatas.nyme.hu>