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Final report of the Summer School "Soil & Water" 2017

1. Structure and agenda

The Summer School 2017 took place in Estonia from 25th June to 8th July 2017. The Summer School took place mainly in Tartu region at the Estonian University of Life Sciences (EMU). Lectures and practical works were carried out in facilities of EMU. Last two study days (6-7th July) were in Tallinn. In addition there were thematic excursions to different regions of Estonia. The main idea of this Summer School was to demonstrate the soil-plant-water relations under different environmental and socio-economic conditions. Summer School had interdisciplinary approach where various topics across soil-plant-water system were covered by lectures, seminars, excursions, group and independent work in respect to human use and nature protection.

In total, 27 students were participating, 2 students from the Estonian University of Life Sciences (Estonia), 6 students from the University of South Bohemia (Czech Republic), 4 students from the Aix-Marseille University (France) and 15 students from Ulm University (Germany). The participating students did not come only from these four countries, but also other nations were represented by a few foreign students studying at these universities, which even extended the international impact of the Summer School. For example, students from Columbia, Russia and Nigeria attended the Summer School.

In the evening of arrival day (25th June) there was welcome and ice-breaking event combined with several get-to-know games which created relaxing atmosphere between participants. In first study day there was introduction section leaded by Marian Kazda and Alar Astover. International study coordinator at EMU Eda Tursk encouraged students to use ERASMUS exchange possibilities. Morning session ended with overview presentation of Estonian nature.

In afternoon we formed 4-6 students groups for mini-research projects. Groups were mixed by universities with motivation to increase student's international communication experience. There was six mini-research projects: 1) Plant stress (responsible supervisor Tiina Tosens); 2) Soil oxygen measurements (Marian Kazda); 3) Soil zoology (Petr Hedenec); 4) Soil properties influenced by land use (Alar Astover); 5) Fast plant test with composts (Merrit Shanskiy); 6) Allelopathy experiment (Virginie Baldy). Activities and their time plans were variable across topics but all of them included practical work (sampling, laboratory analysis etc), data evaluation, discussion and presentation. Students had self-study with 2-3 research papers related to their group work and each group was making presentation based on research papers in seminar at 1 July. Students were in action with mini-research projects through all time of the summer school up to the last study day in 7 July when they made academic presentations of their project. Afterwards students had obligation to compose and submit written report of the mini-research project. These projects allowed them to focus deeper on one topic during whole Summer School.

Generally in morning were lectures and afternoon program was covered by group works or by excursions. In 27th June afternoon we visited several agricultural field experiments at Estonian University of Life Sciences and previous peat excavation area near of Tartu. Importance of long-term

field experiments was highlighted to study changes in agro-ecosystem. Excursion to mined bog which is nowadays partly used for blueberry cultivation revealed extremely huge human impact on wetland ecosystem and was very well linked to lectures in first week about bog restoration (Hermann Mühle) and wetland carbon fluxes (Zuzana Urbanova).

In 29 June afternoon was excursion to forest research sites at Järvselja. At first we visited FAHM (Free Air Humidity Manipulation) site. This experimental site is created by ecophysiologists and applied ecologists of the University of Tartu to investigate the impact of elevated air humidity on trees and forest ecosystem functioning. The air humidity is manipulated in young deciduous (silver birch and hybrid aspen) forest stands through misting water under high pressure. Experimental site was introduced by Priit Kupper and others (University of Tartu). More wide examples and views of methodological challenges around world in climate change studies (including FAHM) was given in lecture by Ilja Reiter in 1 July. After FAHM we visited SMEAR (Station for Measuring Ecosystem-Atmosphere Relations) facilities introduced by Dmitrii Krasnov and Alisa Krasnova. Motivation of SMEAR is to measure concentrations and fluxes of energy and matter in the atmosphere—biosphere system. Excursion at Järvselja ended with guided (Hardo Becker) walk through various native forest types.

In 30 June was full-day excursion to North-East Estonia. Visit to oil-shale mining area and power plant revealed extreme examples of the human impact on ecosystem and other way socio-economic importance of this activity. Soil-plant-water relations and restoration ecology lecture topics were tightly linked to this experience. We visited Batlic Sea area in city of Sillamäe and Saka klint area. Klint area is very specific and in Saka nature hiking track we could see high ecosystem variability in very small area. Day ended with joint dinner at Alatskivi.

In second week lectures were also focused to processes which are directly invisible to human eyes: soil microbial processes by Hana Strancuckova, secondary metabolism of plants by Jordane Gavinet, plant stress adaption (Tiina Tosens).

In 5th July afternoon was guided excursion to Endla nature reserve. The area is rich in protected species as well as in their habitats. The diversity of ecosystems is of major relevance to the area (Various marshes, fens, quaking bogs, lakes, canebrakes, wellsprings, rivers, fen forests, fens and mesotrophic mires, marsh forests, meadows, diverse flora and fauna). The reserve was created in 1985 and since 1997 it is one of the wetlands of international importance (Ramisar wetlands) and since 2004 one of the Natura 2000 bird and nature areas.

In 6th July morning was departure from Tartu and last days summer school was in Tallinn. In 6th July was excursion to karst area in Kostivere. It's the place where the Jõelähtme River flows under the ground, is one of the largest karst areas in Estonia. I afternoon students had time for self-study and preparing presentation of group works.

In 7th July students made by groups presentation of their mini-research projects which was followed by academic discussion. Alar Astover made synthesis and leaded discussion with the aim to interlink all interdisciplinary lectures and project topics. In afternoon was feedback session and students made short presentation "Why you should go to …". We inter-changed countries, so in example Czech students made presentations "We you should go to Estonia/Tartu". Idea is to have increase in knowledge of other countries/culture and study possibilities in abroad with "Erasmus mobility".

2. Content

The teachers from the different partner universities held their lectures, which were incorporating the experience of the previous Summer Schools. In addition there were several "external" experts involved as a guides during excursions. Teachers in the common line of sustainable management and nature

conservation were unifying their expertise from the following fields: soil science, ecology, plant science, zoology etc. The interdisciplinary of lectures increased the students' knowledge regarding multiple interactions in soil-plant-water system in context of various ecosystems.
As in previous summer school the lecture "How to write reports and give presentations" was given by Eva Keppner in order to improve the formal features of students' contributions (seminar talks, protocols and daily reports). Students' presentations were very good, and it was beneficial that compared to previous years students had more time for self-study (incl. preparing of presentations). In this year students were involved to group work from first to last day of summer school which enabled them to have deeper experience and knowledge in specific topic.

3. Didactics

The Center for Teaching and Learning of Ulm University gave us some suggestions on how to improve the teaching during the Summer School. We followed these in the structure of the teaching and also experience and students feedback from previous Summer Schools.
An important issue for an intensive teaching program like our Summer School is the interaction between the teachers and the students. All teachers were well motivated to involve the students in their lectures, e.g. by asking questions. This created an open-minded atmosphere and the students asked many questions. We implemented short breaks after 45 – 60 min of teaching in order to increase the attention of the students. This also enabled informal contacts between the respective teacher and the participants. In mini-experiment projects students had to chance work in 4-6 people international group trough two weeks, it probably developed their learning and working habitats.
We tried to make strong links between most of lectures and excursion. These interconnections were highlighted by teachers during excursions (using time of bus drive) and also in lectures followed by excursion.