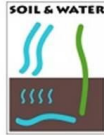




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## Final report of the Summer School “Soil & Water” 2016

### 1. Structure

The Summer School 2016 took place in the South Bohemia region in the Czech Republic from 4th to 17th September 2016. The Summer School took place in České Budějovice, at the Faculty of Science, University of South Bohemia and lectures and practical works were accompanied by thematic excursions. The main idea of this Summer School was to demonstrate the soil-plant-water relations and interactions under different environmental conditions and under different management. Based on the ecological background related to surplus water, harsh climatic conditions or specific ecosystem conditions, management objectives were discussed in respect to human use and nature protection.

In total, 35 students were participating, 7 students from the Aix-Marseille (France), 16 students from Ulm University (Germany), 5 students from the University of Life Sciences (Estonia) and 7 students from the University of South Bohemia (Czech Republic). 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 Slovakia, Russia, Spain and Nigeria attended the Summer School.

The first 5 days of the Summer School took place in the České Budějovice area, where the landscape is formed by long-term human management, when many wetlands characteristic for this basin were changed to artificial fishponds for carp breeding. Therefore, this region is very rich in different types of wetlands related to rivers or fishponds including the different types of management from very extensive to intensive forms. The lectures and excursion in the first week were focused mostly on the soil and water relations, wetland ecology, carbon fluxes in wetlands and importance of wetlands in the landscape and their management. The first excursion was guided in the margin of the České Budějovice town where the nature reserve “Vrbenske ponds” is located. It is valuable area due to the high diversity of wetland types, important nesting place for waterfowl, specific management approach and also an important recreational place for inhabitants of the town. It is a great example of artificially managed landscape, having a high natural value and at the same time it serves as a popular tourist area just on the margin of the big town.

The destination of the second excursion was a long-term research site on wet meadows in the Trebon Basin protected landscape area, guided by a world leading wetland scientist Jan Květ. This site is equipped for carbon fluxes measurement and the effect of climate and management changes on this ecosystem was discussed. In the second part of this excursion, students had the chance to see the use of constructed wetlands for wastewater treatment.

The following three days of the Summer School we moved in to the Sumava National Park (Bohemian forest, Böhmerwald). Two days were fulfilled by the whole day excursions and the third day was a free day for students to enjoy the nature in the National Park. During the excursions, restored cut-away peatland and restored streams were visited. This excursion was guided by the specialist from the National Park explaining all the perspectives of restoration planning and implementation. Then, a primeval forest was visited, with a unique mixed mountain forest ecosystem where all the properties

and ecosystem functions of natural forests with a focus on decomposition, nutrient fluxes and biodiversity, were discussed. The second whole day excursion was a long walk on the top of the Sumava mountain range directly on the border between Czechia, Germany and Austria. This is the zone of mountain spruce forests, which were attacked by bark beetle in the past. This walk offered to see different management approaches from non-interventional management to clear-cuts and also the spontaneous succession of the forest after the disturbance. In frame of this excursion, we visited also the glacial lake and the effect of acidification on the lake ecosystem and the mountain forests was explained by local specialists.

During the second week of Summer School, the topics of the lecture were more focused on microbial processes in soil, sustainable use of soils, plant-soil interactions and plant physiology. During the second week, the practical work was done and students worked in smaller groups on their topics and prepared the final presentation of their results. The last excursion was focused on specific environment, including sand pits used for sand mining and their management after mining. Different localities with different forms of management were visited to compare the approach of artificial re-cultivation or spontaneous succession on these sites in relation to their biodiversity, ecosystem functions and ecosystem stability.

On the students' recommendation from previous year, we organized a welcome event already the first evening on 4th September for the students and teachers to get to know each other. All the participants prepared some typical food from their country for this event, which made the atmosphere very friendly with strong international exchange between the students just right from the beginning of the Summer School.

There were almost no lectures in the afternoon (except one shorter lecture) and we focused on excursions, practical work or we offered the students the free time for studying in the afternoon. This approach was based on the previous year experiences and seems to be very effective. The order of the lectures was planned in the relation to excursion topic to give basic theoretical background first and then continue and extend the knowledge in the field with the help of real examples.

Students were working on the projects in the smaller groups of 5-6 students for the whole duration of the Summer School. These projects were introduced presented them to the students at the beginning of the course, they selected the topic and made created international groups mixing students from all countries. During the first week, they worked on theoretical parts of the project including reading of selected scientific papers and they made a short presentation about this topic with a focus on the most important information. During the excursions, they took the samples of soil, soil fauna or other material if necessary. In the second week, they continued with the practical part of their topic working in laboratory one afternoon. After the practical work, they had time during a second afternoon for data evaluation, discussion and preparation of presentation. They wrote a report about their project after the Summer School. These projects allowed them to focus deeper on one topic during whole Summer School.

During the "Erasmus mobility" session at the end of the Summer School, general information about the Erasmus exchange was given first. Thereafter each partner presented their university and the offer of courses for potential Erasmus exchange students.

## 2. Content

The teachers from the different partner universities held their lectures, which were incorporating the experience of the previous Summer Schools. Following the common line of sustainable management,

they were unifying their expertise from the following fields: soil science and ecology, plant sciences and zoology. The lectures increased the students' knowledge regarding interactions between soils, plants and soil organisms with special emphasis on soil processes, effects like drought and flooding on plants and soil organisms and the man-bound impact on soil degradation and ecosystem restoration. Additionally, to these lectures, there were several introductory lectures about the local landscapes, geology, vegetation and management practices.

Further, the lecture "How to write reports and give presentations" was introduced in order to improve the formal features of students' contributions (seminar talks, protocols and daily reports). In consequence of this, the students' presentations were very good, similarly as in the year 2015 and much better than in previous years although the students had less time to prepare their topics. However, this might also be due to the structure of the new student projects, because the students prepared their presentations together in their groups and discussed a lot about their respective topics.

### 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 in organisational matters regarding the whole Summer School.

An important issue for an intensive teaching programme 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. Since there are several different teachers with their specific lectures, it is important to establish connections between the lectures, the excursions and the practical work to have a golden thread throughout the whole Summer School. Therefore, each teacher tried to incorporate links to other lectures and to show the alignment of the lecture in the overall concept of the Summer School.