Daily report: Monday, September 24th 2012

Presentations in the morning:

Microbial processes in wetlands (Santruckova)

-What is wetland? Typical processes in wetland
-Interesting question: What do you think is the largest/biggest organism in the world?
Answer: *Armillaria ostyae*
- 1g soil – 1 billion of bacteria
-Microbial processes – elements cycling

Plant growth in wetlands (Kazda)

-Terminology
-Carbon cycle
-Denitrification
-Fermentation
-Methanogenesis
-Nitrogen cycle
-Methane emissions globally

How are these cycles/processes taking place in nature? What is needed for that, how elements are changing and what is the result of these processes? How are these processes affecting plants and microorganisms?

Excursions in the afternoon:

Trebon Basin Biosphere Reserve

This region of 700km_2 in South Bohemia is 1977 declared as Protected Landscape Area by UNESCO. The climate there is moderately warm with a mean annual temperature of 7,8°C and a mean precipitation of 650 mm per year.
During a long time it's landscape was modified by human activities like fish-farming, forestry, agriculture and more. Following today 0,1 - 500 ha of the area are unnatural lakes and concretely you can find 460 artificial fishponds, which were built in the 15th and 16th century and interconnected by ditches and canals.
As 13% of the reserve are covered with water, this area is called „the wet meadows“ and the important ecosystems there are wetlands. On the fishpond littoral zones you can find reed and sedges belts, marshes, alder and willow carrs, wet meadows as well as floodplain forests (50% of the area is forest). 10% of the area consists of various types of mires, which form the peatland - peat bogs and acidic fens but there are more bogs than fen. The grasland was managed by regional farmers, who used the wetlands only for hay because it's too wet for normal agriculture. But the management stopped and most of the haylofts disappeared ~1950 because the soil was too wet for modern machines. Pigfarms changed the conditions from mesotrophic to eutrophic what is dangerous for rare species there. In the wetlands there is an ecosystem research and therefore they analyze the primary production by decomposition and the carbon balance. Since 1976 years there are mesodynamic data collected.

For the global research in the Czech Republic there is a wetland station, where they collect microclimatic parameters. To calculate the flux they use a 3-dimensional sonic anometer as well as an infrared analyzer of CO_2 and water table. They wind speed and with a soil chamber the increasing content of CO_2, CH_4 and carbon. During the last 30 years there was an increase in temperature of 0.1°C per year observed. The concentration of methane is 1.75 ppm and of carbon it is 360 ppm. There are 0,36 ml CO_2 in 1L air and the carbon store in a soil depth of 0 - 80 cm is 53,52 kg/m_2 .This high carbon content due to the humus is visible by the darkness of the soil. To prevent the escape of fish in the ponds they keep the water level high. If the water increases the weather station is able to rise too. For example there was a flood in 2002 which furthermore reduced the nutrient supply and suppressed the origin dominant species *Carex versicaria*.

Trebon fish pond Rozmberg

The Trebon fish pond, the dam Rozmberg. It is the largest fish pond in Czechia and was owned by the family Rozmberg in the 16th and 17th century, which died out in 1611. The fish pond was built from 1584 to 1590. The water comes from the rivers of this region and the fish you can find there are carps, the most fished fish, catfish and more rarely pike.
The fish pond holds about 5, 5 m_3 of water and the water surface is 489 ha. The length of the dam, which is filled up with sand, is 2430 m. The average salary fish of the dam Rozmberg is about 800 kg/ ha, but still it is not very productive: annually only 350 kg fish are fished there. To empty the pond, the water has to be drained. After that the fish pond is almost empty and the fishermen are able to fish the fish out.

Slavosovice

The *Korenova cistirna Slavosovice* is a constructed wetland for wastewater treatment. The idea of this system is that the microorganisms clean the waste water under oxygen consumption, so the Bacteria eat the “waste”. In a wastewater treatment plant disadvantage could be the huge amount of electricity demand, but here the water comes to the system by natural flow, so the costs for some pumps are manageable. It is important to know that the water goes through the different tanks by gravitation. A pretreatment is necessary because of the bigger particles of the solid that must be removed. After that the water moves into the second tank, where the bigger particles, which still are in the water, sink to the ground. In the third tank the water flow is stopped for two to three days, because there the sedimentation takes place – small particles settle on the bottom of the tank. Sometimes also some organic matter and nitrogen are taken out by microbial decomposition. The fourth tank divides the water into the fifth and the sixth tank. The ground of these two tanks consists of some layer of clay and plastic so that the water doesn´t go to the groundwater. Later the water flows into a field of plants, which support microorganisms with oxygen and thus accelerate the cleaning of the water. Moreover they are taking some nutrients out of the water. These plants are wetland plants like reed, for example *Phragmites*, *Phalaris* etc. In the winter the water-level is increased and left to freeze. The ice and some air between isolates the treatment bed and because of that it does not freeze. If the water- level is not increased, it is not so bad: usually the ice is not that thick so that the water flow is not stopped and the water may flow through the treatment bed anyway. The treatment efficiency for organic matter is about 82, 2% and for solids about 65%; whereas the efficiency for nitrogen and phosphorus is much lower.

At long last you can say that this excursion taught us a lot about wetlands and the plants and organisms that are living in there. Not only the plants but also the animals must be extremely adapted to much water, for example plants built aerenchyma in their roots. Here you can see again, that water is not only a live donor, the plants and organisms cannot live without, but also some kind of a curse in very large quantities.