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**MANAGING THE EFFECTS OF MULTIPLE
STRESSORS ON AQUATIC ECOSYSTEMS
UNDER WATER SCARCITY**

**1st GLOBAQUA International Conference
11-12 JANUARY 2016, FREISING (GERMANY)**



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Effect of floods on DNA damage of two cyprinid fishes in the Sava River

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Freshwater ecosystems are constantly deteriorated due to the multitude of human activities, intensification of the industrial processes, wastewater discharge and agricultural chemicals. Besides, climate change provokes extreme weather and hydrological conditions leading to prolonged periods of droughts and floods. Floods can cause movements of pollutants already present in the environment and introduce pathogenic bacteria in the flooded area. Many of the substances that reach environment could exhibit genotoxic potential on the genetic material of aquatic organisms, either alone or in complex mixtures of chemicals.

Unfavorable hydrological conditions during 2014 resulted in extensive flooding in May in the Sava River basin. Obrenovac city was one of the most affected settlements on the river with estimation that nearly 90% of town area was flooded. This led to evacuation of majority of inhabitants from the affected area. Our research was conducted from January to December 2014 on the Sava River, site Duboko, situated downstream of Obrenovac city. This is the area of intensive agricultural activity. Few km upstream the sampling site is the mouth of Kolubara river which is receiving untreated municipal wastewater of the town Obrenovac (50.000 inhabitants) and thermal power plant Nikola Tesla A with belonging ash field. On monthly basis we have performed the measurements of basic physico-chemical parameters, sampling water for microbiology analysis and fish tissue for the comet assay. Single Cell Gel Electrophoresis (SGCE) or Comet assay is widely accepted tool in ecogenotoxicology studies, in which DNA damage is measured on the level of a single eukaryotic cell. For the detection and quantification of *E. coli* and Enterococci we have used enzymatic methods and MPN approach. For comet assay analysis blood, liver and gill tissues were sampled from two cyprinid fishes.

The highest water level was observed in May 2014, when flooding occurred. Evacuation of inhabitants had led to exclusion of urban wastewater discharge which was reflected through the lowest concentration of faecal pollution indicator bacteria, *E. coli* and Enterococci. With return of inhabitants in June their concentration in water started to increase gradually. In contrast, with withdrawal of water from the flooded agricultural land and ash disposal field high amounts of potentially genotoxic substances were introduced into the Sava river, which was observed in sudden increase of DNA damage level in all three fish tissues during June. This study showed that flood occurrence had major impact on the microbiological quality and genotoxic potential of the Sava River. Faecal pollution is mainly under the impact of urban wastewater discharge. On the other hand, genotoxic substances are most likely of industrial and agricultural origin.

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