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SUPPLEMENTARY MATERIAL TO

Seasonal variations of bisphenol A in the Danube River by the municipality of Novi Sad, Serbia

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COLLECTION OF WATER SAMPLES

The surface water samples (1 L) were collected in autumn (November 2012), winter (March 2013), spring (May 2013) and summer (September 2013), in amber glass bottles at eight representative locations (*RI, GC, GC2, RP, RO, DM, DL, DR*) along the Danube River of the Novi Sad municipality, Serbia and stored at 4 °C until the analysis were performed. Samples were collected on the same day in every season and the meteorological conditions were the same for all localities within a particular season. All 32 water samples were taken at a depth of 50 cm. The position of sampling points in relation to the flow of the river could be seen in Fig. S-1.

The sampling sites were selected according to the recommendations of the ICPDR's experts (The International Commission for the Protection of the Danube-ICPDR, www.icpdr.org), in order to estimate the level of violation of the ecological status of the Danube by the municipality of Novi Sad. Location RI was chosen in order to determine the status of the Danube prior to any local urban and canal tributary impact. Sampling points GC, GC2, RO and RP were positioned 100 m downstream, *i.e.*, transversely from the four sewage discharges of the city. The locations GC and GC2 were selected to determine the influence of two biggest untreated municipal wastewater discharges (with capacity of 400 L s^{-1} during the dry period). The location RO was chosen to determine the influence of untreated wastewater from the oil refinery and the rain and urban runoff water from the industrial (thermal-heating plant, oil refinery) and suburban underdeveloped area. Sampling point RP was selected in order to explore the

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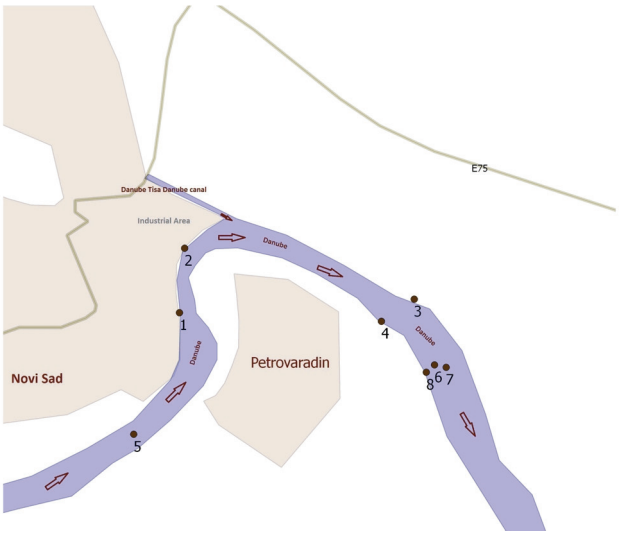
impact of untreated municipal wastewater from numerous illegal settlements with waste disposal sites and unauthorized traffic, as well as the influence of wastewater coming from two clinical centers. The sampling locations DM (central part of the river) and DL and DR (along the bank) were chosen as control sites in order to estimate the possible existence and impact intensity of the municipality of Novi Sad on the river water quality after some period (estimation of the impact of dilution, sorption and sedimentation processes).



No.	Location	Code	Norten latitude	Eastern longitude
1.	Cepelin	GC	45°15'5.40"N	19°51'22.53"E
2.	Beogradski kej	GC2	45°15'43.03"N	19°51'27.09"E
3.	Ratno ostrvo	RO	45°15'13.39"N	19°54'38.48"E
4.	Rokov potok	RP	45°15'0.47"N	19°54'11.33"E
5.	Ribarac	RI	45°13'54,25"N	19°50'44,62"E
6.	Danube middle	DM	45°14'34,91"N	19°54'55,53"E
7.	Danube left	DL	45°14'33,24"N	19°55'5,08"E
8.	Danube right	DR	45°14'30,61"N	19°54'48,52"E

Fig. S-1. Map of the Danube River sampling sites.

All the samples were filtered through regenerated cellulose 0.45 μm membrane filters (Agilent Technologies, Germany) and extracted within 24 h in the laboratory.

MAIN CHARACTERISTICS OF THE STUDIED AREA

The Danube flows through ten countries from the west to the east, passing through four capital cities before emptying into the Black Sea, and its drainage basin extends into the territories of nine more nations. Constantly, it is influenced by nutrients and other polluting substances. Therefore, continuous water quality monitoring of the Danube followed by pollution reduction steps is obligatory for all countries of the Danube Basin.

Novi Sad, the second largest town in Serbia, is located on the banks of the Danube and the DTD Canal. During the NATO bombing in 1999, Novi Sad was faced with the destruction of all bridges and the Oil Refinery and suffered an economic downturn.[29] However, during the last decade, the industry has been recovering.

The river pollution in the area of Novi Sad is caused by direct and indirect discharge of urban and industrial wastes and run-off. The acute problem is the emission of more than 95 % of the total industrial wastewater without any treatment. The dominating industries in this area are chemical and food industries and building materials production. The biggest polluters such as the Oil Refinery, meat processing plants and the production of chemicals and cosmetics are situated on the Danube and DTD Canal banks.[30] Additionally, Novi Sad has joint collector for both industrial and municipal wastewaters and no Urban Wastewater Treatment Plant.

The GC and GC2 sampling point are influenced by discharges of the two main sewers of the town, Cepelin and Beogradski kej. Furthermore, the Municipality Water Supply System uses mainly drinking water abstraction points Petrovaradinska ada (Petrovaradin fluvial island) and Ratno ostrvo (War island), that are positioned only a few kilometers downstream from these main municipal wastewater discharges.[22] The RO sampling site is located near the main water supply source Ratno ostrvo and is 100 m downstream from the discharge site of the sewage collector for collecting industrial wastewater from the big local oil refinery complex as well as rain and urban run-off water from the industrial zone and the underdeveloped suburban area with septic tanks. The most dangerous potential pollution sources near RO are the Oil Refinery and a Thermal Power Plant that are situated only a few hundred meters upstream.[31] Additionally, the influence of the extensive agricultural production in the backland cannot be ignored. The RP location is situated on the right riverbank near the water source supply Petrovaradinska ada. In the vicinity, there are numerous illegal settlements with septic tanks and waste disposal sites, unauthorized traffic and an old industrial complex.[22] Sampling points DL, DM and DR are outside direct anthropogenic influence. The intensity impact of the municipality and the possible harmful effect of the DTD Canal on the river water quality were examined at these sites. Previously, it was concluded that the DTD Canal has the worse water quality in Novi Sad, where increased concentrations of organic compounds, mineral forms of nitrogen phenols as well as mercury, manganese, copper and iron were recorded.[30] The RI sampling site is located upstream of the city before municipal discharge points. However, suburban and weekend settlements without a sewage system, together with septic tanks and an old industrial complex nearby could influence the surface water quality in this area.

According to all, the sampling sites (Fig. S-1) were chosen for seasonal analysis of BPA at kilometer 1255 of the Danube River in order to identify the primary source of the BPA emission (GC, GC2, RO, RP), the possible influence of incoming pollution (RI), the global impact of the city on the river status (DM, *DR, DL*) as well as the seasonal fluctuation of the BPA concentration. The pos-

sible pollution by the DTD Canal was examined at the DL, DM and DR sampling points.

REPRESENTATIVE GC–MS CHROMATOGRAM OF A SAMPLE

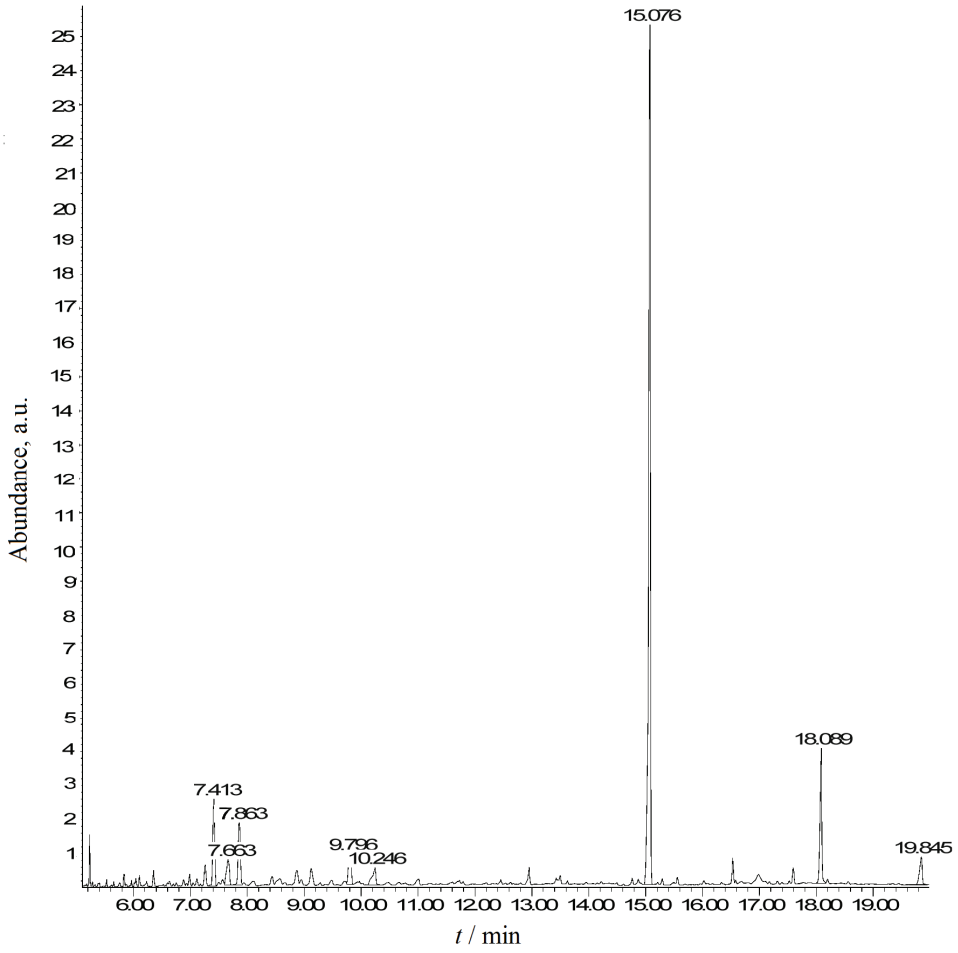


Fig. S-2. Representative GC–MS chromatogram of a Danube water sample extract after clean up and the derivatization procedure (SIM mode).