

Environmental distribution and bioaccumulation of POPs and Hg in temperate and Mediterranean river ecosystems

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The present study aimed to investigate the environmental distribution and the bioaccumulation of several Persistent Organic Pollutants (POPs: (PCBs, PBDEs, DDTs, HCHs, CHLs and HCB) and mercury (Hg) in water, sediment and biota samples from a temperate river system in Belgium and three Mediterranean river systems in Greece. Nitrogen stable isotopes were used to evaluate the bioaccumulation and trophic transfer of the detected contaminants between temperate and Mediterranean food webs and Trophic Magnification Factors (TMFs) were used to investigate the biomagnification of POPs and Hg in the trophic food webs. Finally in order to assess the potential human risk due to the consumption of contaminated fish, Minimal Risk Levels (MRLs), were applied. Overall, Hg concentrations in water and sediment were relatively low compared to high contaminated areas around the world and on the same order of magnitude as global mean values for unpolluted rivers. The highest Hg levels in sediments were detected in Demer (Belgium) (0.29 $\mu\text{g/g dw}$) and in Potami (Greece) (0.27 $\mu\text{g/g dw}$). In regards to biota samples, the highest levels were found in freshwater shrimp *Atyaephyra thyamensis* (0.21 $\mu\text{g/g ww}$), whereas concentrations for other species were almost at the same levels. Hg in fish samples were low compared to other studies with the exception of high levels detected in muscle of *Gobio gobio* (0.24 $\mu\text{g/g ww}$) sampled in Demer. Concerning POPs, almost every analysed compound was detected in samples from Demer, with PCBs, PBDEs, HCHs and DDX dominating in the overall profile, and with the former consisting the most dominant measured compounds in Greece. Trophic transfer of several PCB compounds, chlordanes, DDX and PBDEs were observed in Demer, while only Hg, CB 153, CB 138 and p,p-DDE were transferred in Greek rivers. Moreover, CB 153 and CB 138 were found to undergo higher biomagnification in Demer than in all of the Greek rivers. Finally, the consumption of fish from the studied rivers were found to be safe for most of the measured pollutants but some caution should be taken in regards to PCBs, DDX, Hg and γ -HCH ingestion.

Keywords: Persistent Organic Pollutants, Mercury, Bioaccumulation, Trophic Magnification Factors, Minimal Risk Levels

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