The majority of rivers worldwide are contaminated by various trace metal elements (TME) from different anthropogenic origins. Even if anthropogenic impacts are sometimes very old (e.g. Roman era), many studies agree that these impacts have been much more significant since 150 years and the beginning of industrial revolution. Anthropogenic inputs in particulate form, TME being adsorbed on Suspended Particulate Matter (SPM), from various sources can be transported through the watershed depending on hydraulic conditions, which can be lead to storage of these SPM in depositional zones (e.g. reservoirs behind dams, flood plains, ponds). These stored sediments, defined as legacy sediments, are considered as testimonies of past anthropogenic activities and reflect the trajectory of the studied watershed.

In major European watersheds Pb levels generally exhibit a similar temporal trends (with high concentrations during the 1940-1970s). The temporal trends of Pb in the Eure River Watershed (Normandie, France), the main tributary of the Seine Estuary, was reconstructed from sediment cores sampled in ponds located downstream of the watershed. Pb concentrations variations along the sediment cores were not correlated with grain size and Total Organic Carbon (TOC) variations. Unlike the major European watersheds, the Eure River, showed stable levels until the 1990-2000s, when Pb concentrations have increased significantly and reached a maximum of 859 mg kg$^{-1}$. Despite a decrease in concentrations during the 2010s, Pb contents for recent sediments deposits showed concentrations significantly higher (> 200 mg kg$^{-1}$) than the local geochemical background, estimated at 10.6 mg kg$^{-1}$.

Lead concentrations on SPM collected monthly with a Time-Integrated Mass-flux Sediments Samplers (TIMS Sampler) in 2017-2018 also showed high concentrations, whose monthly variations were not correlated with the hydro-sedimentary behaviour of the river resulting of non-natural inputs.
The current particular Pb fluxes estimated for the year 2017 would be the equivalent of 16% of the total Pb inputs to the Seine Estuary. Theoretical past Pb fluxes have been estimated annually from the Pb concentrations in sediment cores. These estimations showed that during the 1990s, Pb fluxes represented more than 50% of the total Pb inputs to the estuary and therefore the Eure River watershed was the main Pb contributor to the estuary.

Lead isotopes ratios confirmed the existence of an additional anthropogenic source, whose signature were more significant during the 1990-2000s. Three-isotope diagram ($^{208}\text{Pb}/^{206}\text{Pb}$ vs $^{206}\text{Pb}/^{207}\text{Pb}$) showed that the main source of Pb releases presented an industrial signature. The Pb additional releases have thus been linked with a cathode-ray tubes factory which started operating in 1956 and whose the production has been increased from 1990 to 2000s. The end of industrial activity in the late 2000s did not allow to a return to low concentrations, as evidenced by Pb concentrations in recent sediment deposits and SPM, and this likely related to Pb contaminated soils surroundings this factory and Pb contaminated sediments stored in the riverbanks and channel, which fed the river in Pb during erosion processes.