Metals in the City: non-ferrous metals in Paris (1800-2010) and their leaks to the Seine River (1910-2010)

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Presentation:
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Until the late 1980s, the assessment of metal contamination for French rivers has been very limited, due to the lack of appropriate monitoring and, before the 1970s, due to the absence of any perception of metal contamination in aquatic systems. The analysis of sedimentary archives allowed us to reconstruct the evolution of metal contamination of the Seine from 1910 to today. To the surprise of all, these field data showed very high levels of rivers contamination since the beginning of the 20th century.

Our goal was to explore the use of retrospective material flow analysis to reconstruct the temporal evolution of the metal leaks to the river. The material flow of non-ferrous metals (lead, zinc, copper) has been derived from various series of economic data since the beginning of industrial statistics in the nineteenth century. We focused our research on the Paris area whose growth has generated a particularly high demand for metals since the early nineteenth century.

We therefore established: (i) the import of metals to the system from the early nineteenth century to the end of twentieth century, (ii) the constitution of stocks in infrastructures and urban buildings, waste disposals and contaminated soils, etc … since 1950, (iii) the corresponding leaks to the river.

This analysis encountered the following difficulties:

- The system boundary change, due to the development of the Paris conurbation which rose from 1.3 to 9.6M people from the early nineteenth century to the end of twentieth century. These limits are not those of administrative statistics.
- Each metal and its various forms (minerals, manufactured products, waste ...) have their own trajectories.
- Paris development has its own trajectory as compared to that of France.

All metal trends show the decrease of metal leaks from the anthropogenic sphere to the environment after the 1960s, while the metal demand was still growing.

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