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# Historical changes in the ecological continuity of the Seine River for diadromous and freshwater fish: focus on physical and chemical discontinuities since the middle of the 18th century

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## ► To cite this version:

Céline Le Pichon, Laurence Lestel, Emeric Courson, Evelyne Tales, Jérôme Belliard. Historical changes in the ecological continuity of the Seine River for diadromous and freshwater fish: focus on physical and chemical discontinuities since the middle of the 18th century. Riverine landscape as coupled socio-ecological systems, University of Natural Resources and Life Sciences, Vienna, Austria, Sep 2019, Vienna (AUSTRIA), Austria. hal-04192959

**HAL Id: hal-04192959**

**<https://hal.inrae.fr/hal-04192959>**

Submitted on 31 Aug 2023

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## Résumé pour congrès Vienne ISRS2019

SP12: Saving Large Rivers as Ecological Corridors - Management and Restoration  
*Convenors: Thomas Hein (Boku Vienna, Austria), Paul Meulenbroek (Boku Vienna, Austria), Daniel Trauner (Boku Vienna, Austria)*

Large river systems are lifelines connecting a multitude of countries and bioregions, characterizing landscapes, providing resources, and habitat for flora and fauna. They represent a historic, economic and natural heritage of human society. One of their natural characteristic is to act as a migration route and thus, as ecological corridor for biota along their watercourses and the adjacent wetlands. Especially fish are excellent bio-indicators for the functionality of ecological corridors. Their populations have suffered substantially from overfishing, pollution, habitat destruction and disruption of their migration routes. To counteract the destruction of these corridors concerted transnational investigations, management plans and actions for their restoration as well as supportive conservation measures are highly needed.

### **Historical changes in the ecological continuity of the Seine River for diadromous and freshwater fish: focus on physical and chemical discontinuities since the middle of the 18th century**

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Before human intervention, the native fish fauna of the Seine River basin was likely to include 23 strictly freshwater species and 11 diadromous species. The Seine River was also a migration route for diadromous and freshwater species to access growth or spawning habitats. The fish community of the Seine River, as in several other European Rivers, has evolved during centuries but has greatly suffered from overfishing, pollution, habitat destruction and disruption of their migration routes since the 18th century, followed by a dramatic decline of diadromous migratory fish. For nearly five decades now, thanks to regulation, planning and management efforts, water quality has improved and more recently, several fish passages have been built on the Seine River and its main tributaries. The fish diversity has improved and some salmonids and shads individuals are returning up to 450 km from the sea. The CONSACRE project “Ecological continuity of the Seine River and interest of stakeholders in its restoration” (2018-2021) aims to propose avenues of action to strengthen the sustainable recovery of migratory fish populations in the Seine Normandy Basin, which are included in numerous regional and national planning documents. One aspect focuses on understanding the historical evolution of the ecological continuity, with regard to major periods of fish species evolution, in order to propose concrete measures compatible with global change. Using historical written sources of multiple types (river engineering projects, navigation maps, paper-based database on oxygen and temperature, etc...), we conducted an historical analysis of physical and chemical discontinuities in the Seine River since 1750, from the sea to Paris. The technical modifications of the navigation dams and locks and the construction of fish passes have been documented in order to evaluate their potential impact on runs of several migratory fish species (salmon, shads, barbel...). Similarly, the evolution of oxygen availability and temperature is considered for the needs of fish migration. These data are integrated in a GIS-based database to calculate cumulative functional distances from the sea to upstream targets, integrating distance, costs and risk of travelling. This spatial analysis provides knowledge of the combined effects of physical and chemical barriers for five large periods and results will be confronted with fish species historical distribution.