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Hydromorphological adjustments and re-adjustments of low energy rivers in a sub-urban catchment following historical engineering and recent urbanization

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The EU Water Framework Directive (WFD, October 2000) mandated that the Member States of the European Union achieve the general objective of protection of aquatic ecology by 2015. European rivers and streams have to attain “good ecological status” through the preservation and restoration of aquatic environments. Member will have to ensure environmental continuity through “the adequate distribution of fish species and transport of sediments”. In France, more than 61,000 transverse structures – mill dams, weirs, diversion gates – have been identified on rivers as being obstacles to ecological and sedimentary continuity. Because of their historical occupation by societies, rivers flowing in the Paris area have long been anthropized and artificialized. River courses, channel shape, sediment transport and hydrological regime modifications have tremendously transformed the hydrosystems surrounding the city of Paris. The Merantaise’s catchment is one of this low energy river watershed, near Paris, that have been modified by historical engineering, especially during medieval-modern times and by the building of the Versailles Castle (XVIIth century). The hydraulic infrastructures are still there and impact the hydromorphological conditions of the river (incision, lateral erosion, ...).

In addition to these ancient pressures a rapid and massive urbanization of the suburban areas has applied a new type of constraint to the hydrosystems in recent decades. This undermines the balance that was established following ancient engineering and disturbs the current functioning of the valley. These new types of land occupation have significantly altered the ecological circumstances and transformed the hydrological responses of rivers.

In this study, we therefore seek to understand these processes of successive adjustments (ancient and recent) of a small river from the urban margins of the Orge watershed (to the south of Paris). We use a multi-scalar spatial and temporal approach to reconstruct the hydromorphological circumstances ancient and current, by hydrological chronicles and archives documentation.