

Evolution of dredging on the Rhône River

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Introduction: As operator, the Compagnie Nationale du Rhône (CNR) is in charge of the maintenance of the Rhone river bed and certain tributaries within the limits of its concession area. In particular, CNR conducts regular maintenance dredging on local sedimentary deposit zones. These dredges remobilize a volume of sediments of the order of 1 to 3% of the annual sedimentary transit of the river. The small percentage of volumes dredged by CNR is explained by the transparency of the developments with respect to sedimentary flows. Dredging, however, remains imperative to ensure the passage of floods and ensure a sufficient flow section in the channel.

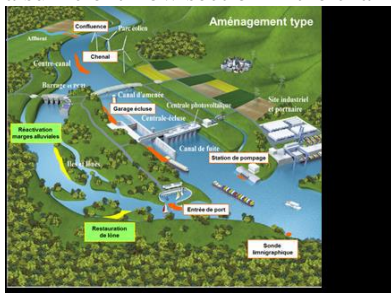


Fig. 1: Standard zones for maintenance dredging (orange).

Dredging at CNR today: The four main sediment contributors to the Rhône are Arve, Saône, Isère and Durance. The most frequently dredged sediments are silts with the exception of the particular case of the "Palier d'Arles" on which pebbles are still passing. This observation is consistent with the global study of the Rhone carried out by SOGREAH in 2001 [1] which estimated that the sediment thrusting is naturally very weak on the Rhone since the end of the small ice age by combination of reforestation phenomena and global warming. In addition, the development of the various tributaries of the Rhone and intensive extractions at the end of the 20th century also greatly contributed to the delay of coarse sediments reaching the Rhône.

Of the 19 hydro-electric developments in the Rhône River operated by CNR, dredging represents an annual budget of around 6 million euros for some 30 dredging sites and an average annual total volume since 2010 of 536,000m³. Administrative authorizations are issued after filing Dragage Impact Sheets that highlight the physical (quality of mobilized materials), biological (taken into account

of heritage species) and human (recreational areas, catchments, etc.) issues works and allow an adapted and followed realization in relation to these issues.

Conciliation of issues: The work is carried out with the objective of maintaining the section of the navigable channel or the conservation of the flow sections for the passage of floods. However, these works are expensive. It is therefore necessary to carry out the dredging work necessary but not excessively. Thus, the CNR regularly questions the relevance of the dredging carried out. As early as 1998, a study based on a physical model [2] demonstrated that the repeated dredging of Isère upstream from the confluence with the Rhone was in fact useless. In fact, the study revealed the natural capacity of Isère's floods to remobilize sediments in the historic dredging zone. Thus dredging, which allowed for a sufficient flow section, was in fact preventable, without compromising safety, as the sediments were naturally eroded during the rising flood.

Similarly, more recently, the historically trapezoidal dredging template has been adapted to better respect the morphology of the section concerned and limit the environmental impact of the work on the environment for example Doux and Drôme.

Conclusion: The practical difficulties and increasing costs of dredging operations have led CNR to change its dredging practices in order to reconcile safety issues, economic development and limiting environmental impacts.

References: [1] Hydratech, Sogreah, Minéa (2001). — Etude globale pour une stratégie de réduction des risques de crues du Rhône ; [2] Doutriaux E., Storck F. (2004). — La confluence Rhône Isère : exemple d'utilisation d'un modèle physique pour optimiser la gestion d'un aménagement fluvial à buts multiples. La Houille Blanche, 3 : 45-49.