

Low water level. The Autonomous Port of Strasbourg.

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Why did this extreme episode of low-water strike so strongly stakeholders having activities on the Rhine?

This episode of low-water level, which occurred in 2018 on the Rhine, was particularly impressive because of its duration and its impacts on the entire supply chain which include activities that they're using the river transport. This event motivated the PAS - the Territorial Direction of Waterways of France (*Direction Territoriale de Voies Navigables de France*) and the DREAL -the Regional Direction of the Environment, Arrangement and Housing (*Direction régionale de l'Environnement, de l'Aménagement et du Logement*), to initiate a process aimed at combining their knowledges and identifying actions to react in an efficient way and anticipate these phenomena. This reflection is also linked local transport operators as well as companies in order to charter all or part of their goods by barge.

When we study these hydrological phenomena from a chronological point of view, this partnership progress allowed to share and mix the elements of language, that were used in a different way before, from professionals of river navigation on the one side, and the scientists on the other.

Low-waters are a regular natural phenomenon which has been scientifically identified since the 20th century. But, despite its periodicity, the vulnerability of our human systems and the necessity to adapt them had deeply changed.

On a larger scale, the issue of low water is also investigated by the Central Commission for the Navigation of the Rhine (*Commission Centrale pour la Navigation du Rhin - CCNR*), which dedicated a seminar to the impacts on Rhine Navigation in Bonn, in 2019. These efforts highlighted the involvement of different levels of action in order to strengthen the resilience against these hazards and referred to technological, logistical and organizational changes.

The PAS joined the Clim'Ability and then the Clim'Ability Design projects...

The question of low water was raised during a cycle of two conferences organized by the stakeholders of the Clim'Ability program during its first phase. By taking advantage of the Clim'Ability Design program's continuation, it seemed interesting to us to enrich our reflections and knowledge, through a partnership with the program's leaders and a research laboratory of INSA Strasbourg.

The work deployed included the sampling of the actors concerned by these issues: inland navigation transport carriers (in bulk/ liquid/containers), river transport organizing authorities and managers of intermodal places (port authorities) where the goods are transferred, such as the PAS.

Every organization reacts at its own scale in order to structure this ecosystem, in which everyone is able to express their problems and needs.

How did you analyze these problems and searched for solutions?

Each structure often reacted on its own scale in order to structure solutions in response to its problems and needs. In order to overcome these partitions logics and to approach the question of low-water in a global and systematic way, we relied upon the research team to develop an inventive design method called TRIZ (Russian acronym for Theory of Problem Solving inventive). The interest of this approach is to develop a problem and its solutions, considering all the induced results that sometimes generate contradictions. When these contradictions occur, it is time to define other solutions. It was also important to take into consideration the ecological issues that were linked to the development options which seemed to be relevant, but have impacts on the environment.

Several intervention domains were specified at the end of this group work: strategic decisions focused to the development of the Rhine, ships' innovations allowing better loading efficiency including during low-water periods, organization of the information chains with digital systems that permit the best anticipation in case of decreased water levels in the Rhine, the operating conditions of companies, the organization of logistics channels, the development of alternative massive solutions which are aiming to offer the desired services even during low-water periods, etc...

For example, improvements to be made to existing equipment?

Currently, building new boats is being discussed. But these innovations entail significant costs which rest on the investment capacity of local operators. The adaptation of existing barges, which could be lengthened or widened to reduce the possibility to sink and to increase their loading capacity, is also being investigated thoroughly. However, these options remain restricted by the size of the locks (sluice gates) which limit the possibilities for evolution of the capacity of the navigation equipment.

What are the perspectives arising from all these workshops?

The discussion between the public actors, the operators and the loaders has stimulated a logic of dialogue and cooperation, which is one of the basic conditions in order to accomplish the challenge of successful adaptation. We want to follow this momentum and to make visible the issues expressed by this group for the local and international authorities, so that we can actively participate in the measures that can be implemented, in order to reduce the impacts of future episodes of low-water levels.

The PAS is also planning to strengthen the railroad service in the port of Strasbourg, which will facilitate modal transport when navigation conditions are highly limited. On September 30, 2021, the "Multimoday" day, organized at the port of Strasbourg, brought together nearly 200 actors, to discuss the subject of development and promotion of multimodal transport. The next edition will take place in 2023 and will give us the opportunity to follow the evolution of these ambitions in a permanent context of climate change.