Latvia

River Rīva: remains of old paper mill dam

Country	Latvia
River	Rīva
Site	Labrags
Type of sea trout population	Original population
Type of restoration	Construction of natural like fish pass across the remains of old paper mill dam to ensure the access to spawning and rearing grounds upstream this barrier
Temporal scale of the restoration	Long term
Spatial scale of the restoration	All river
Responsible organisation	Kurzeme Planning Region and Ventspils Regional Municipality
Duration of the project	2 years
Geographical location WGS84	56.973351N, 21.348703E
Total budget	220 000 €

General information

Construction of the fish pass on Rīva River in Jūrkalnes parish, Ventspils county, Latvia.

- The sea trout population in Rīva river is fully natural. No information of stocking of this species in Rīva river was found.
- The type of the restoration is 'construction of a fish pass'. Building of fish pass is a long-term solution for this particular case.
- The project aims to facilitate fish migration to the greatest part of the river. A migration barrier, in form of the remains of an old paper mill dam (Figure 19), is located approximately 1.2 km from the sea (Figures 20–21). Approximately 98 % of the riverbed is located upstream this barrier.
- Kurzeme planning region has been responsible for elaboration of the technical design documentation for the fish pass construction on Rīva river.
- Ventspils county municipality has been responsible for the construction of the fish pass on Rīva river.
- BIOR institute has provided expert support and consultation throughout the project.
- Project implementation phase: 36 months, from 01/10/2017 till 09/12/2020.
- Geographical location of the site for the fish pass in Rīva river: N 56 58.402 E 21 20.923.
- Budgetary information:
    - Kurzeme planning region: 40 000.00 EUR for elaboration of technical documentation for Rīva river restoration.
    - Ventspils county municipality: 124 365.00 EUR were planned for building works only. Fish pass installation on the River Rīva, total budget for realization of the pilot activity in the project budget (planned) EUR 164 365.00. Real costs after the purchase procedures on building, construction supervision and author supervision are 176 099.88 EUR.

Figure 19. Photos of the Rīva river restoration site before the restoration was started. Photo credit: Ventspils county municipality.

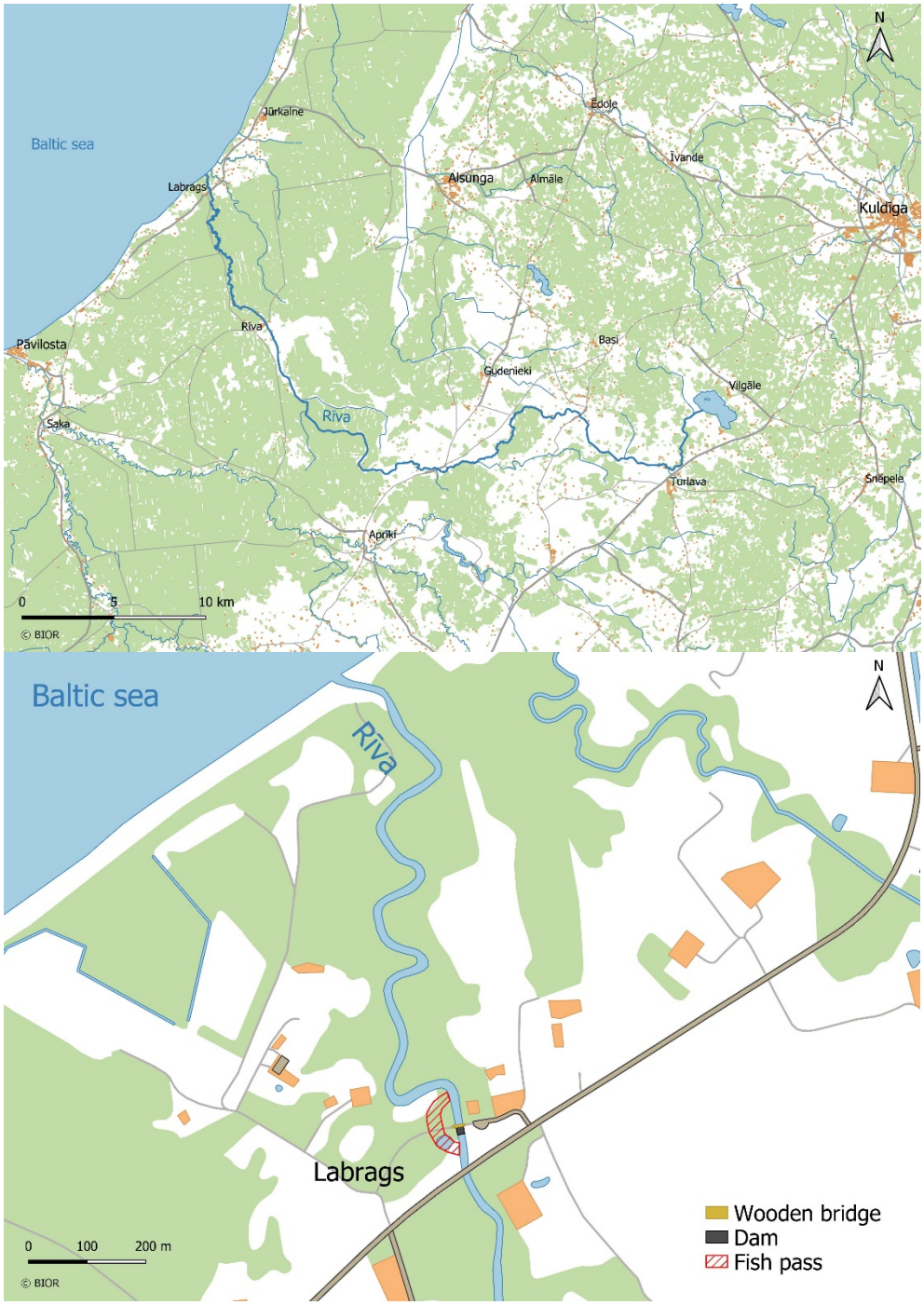

Figure 20–21. Overview and detailed location of the Rīva river restoration site.

Background for the project

Rīva is a river rich of fish species. In addition to sea trout and brown trout (*Salmo trutta*), 20 other fish species and both river and brook lampreys (*Lampetra fluviatilis* and *L. planeri*) have been found in this river. The most widespread species are stone loach (*Barbatula barbatula*), minnow (*Phoxinus phoxinus*) and gudgeon (*Gobio gobio*), often found in small fast flowing streams. These species are accompanied by roach (*Rutilus rutilus*), perch (*Perca fluviatilis*) and other species dwelling in deeper and calmer rivers. A noteworthy phenomenon is the regular occurrence of European flounder (*Platichthys flesus*) downstream the barrier. There are no records of stocking of trout or other fish species in Rīva river, and hence, the trout stock should be considered as original.

The fish fauna of Rīva river has been monitored since 2007. Regular electrofishing surveys (2007–2009 and 2016–2019) have been carried out downstream of the migration barrier. Occasionally, electrofishing has been performed also in other sites located in downstream and upstream reaches of the river. The middle section of the river has not been monitored. In 2018, two new monitoring sites were established in potential spawning sites upstream the barrier and regular monitoring every year or every second year is planned in these sites to evaluate changes in trout reproduction after the completion of the fish pass. In the monitoring downstream the barrier, sea trout parr has been caught in all years except 2019, but the parr density varied from 5 to 80 individuals per 100 m^2. Upstream the barrier, density of trout parr was much lower (usually 2 to 7 ind./100 m^2), in only one occasion reaching 31 individuals per 100 m^2.

The barrier also affects other migratory species than sea trout. Until 2009, regular reproduction of Atlantic salmon (*Salmo salar*) was found below the barrier and during recent years fish fauna monitoring have shown relatively high densities of eel in this part of the river. Rīva river is one of 17 Latvian Rivers where commercial fisheries for River lamprey takes place, which confirms that this species enters the river in noteworthy numbers.

Detailed information on hydrology and water quality was not available before the restoration project. However, general data on these issues are collected and stored by State limited liability company "Latvian Environment, Geology and Meteorology Centre". Additional data were collected and stored by State limited liability company “Meliorprojekts” that several years ago was involved in evaluation of the possibility of construction of a Hydroelectric Power Plant (HPP) next to remains of the dam.

For migratory fish species, the most significant problem was the remains of a dam of an unfinished paper mill located only 1.2 km from the river mouth. Remains of this dam block access to approximately 98 % of the riverbed of Rīva river. The most effective solution would be the complete removal of the obstacle, which, however, cannot be done due to opposition of stakeholders. Therefore, as a plausible solution, building of a natural-like fish pass, or fauna passage, was chosen. The other option was to build a technical fish pass suitable mostly for salmonids. The latter solution would have also been cheaper. However, it needs to be taken into account that in addition to sea trout and salmon, which often are able to negotiate technical fish passes, Rīva river is important also for River lamprey and other species that often fail to overcome such constructions. An important additional problem in Rīva river is the loss of habitats due to straightening of the river channel in great part of the river. Good habitats can be found in an approximately 13 km long section between the barrier and most downstream located straightened reach and in some other sections of the river. In the future after restoring the migration possibilities, further steps in restoration of this river should be considered.

Initial phase

Approximately 1.2 km from the river mouth of Rīva river is the 19th century-built ruins of a paper mill. A 3-stage concrete (masonry) barrier has been preserved along the entire width of the riverbed. As the dam does not allow migration of several fish species, a solution to overcome the barrier was needed. Therefore, the primary aim of the initiative was to ensure migration of anadromous and other fishes to the part of Rīva river and its tributaries currently blocked by the remains of a paper mill dam. A re-establishment of migration possibilities provides immediate opportunities for migratory fish, such as sea trout, to reach and utilise much larger river areas with suitable spawning and rearing habitats. In addition, opening of a migration route paves the way for future projects of restoration of sea trout and River lamprey spawning and rearing habitats upstream the dam. The project for restoring the migration possibility became possible through financial support of the EU INTERREG BSR programme project “Development, promotion and sustainable management of the Baltic Sea Region as a coastal fishing tourism destination” (RETROUT).

During the initial phase it became clear that the Municipality, the inhabitants of Jūrkalne parish and also the tourism enterprises were against the demolition and complete removal of the dam because of cultural heritage and recreational values and related economic interests. Hence, another solution, eventually as the construction of a fish pass, was required. Just beside the paper mill ruins there is a café with the views over the river and its waterfall (Figure 22). Also, the Rīva river wooden bridge across the dam site is a popular sightseeing place for tourists and locals. As one of few, if not the only of its type, this fairly large wooden bridge constructed with diagonal braces, is unique in Latvia (Figure 22). The bridge is in a convenient and easily accessed place. The existing artificial waterfall, a scenic river valley and the historic bridge create an attractive tourism destination in the Kurzeme region.

In the beginning, the project faced some legal difficulties, as the funding programme regulations allowed investments only in public properties. Part of the territory where the fish pass was planned to be placed was private owned. This problem was successfully solved by making use of a long-term lease agreement between the owner of the land and Ventspils county municipality being a public body. As a result, the concerned land area is now the property of Ventspils county municipality on which the fish pass has been allowed to be established.

Figure 22. Pictures of the restoration site in Rīva river, with the artificial waterfall and the wooden bridge. Photo credit: Ventspils county municipality.

Potential stakeholders were identified in the initial stage of the project during discussions among the project team – Kurzeme planning region, Ventspils county municipality and BIOR. It was agreed that one of the most important stakeholders are the property owners at and around the site. It was noted that the dam site is a tourism attraction object and owners of the properties are interested in development of the place, and a fish pass potentially could be a very attractive object for tourists. The identified stakeholders were then approached, and involved in the process e.g., through project meetings to discuss the possibilities of and around the fish pass and by involvement in the development of the plans.

Planning phase

Initially involved in the planning process were only the project partners, Kurzeme planning region, Ventspils county municipality and BIOR as a supervising partner (some stages of the planning), as well as the owner of property now leased on the long-term agreement to Ventspils county municipality. In later stage also the designing company was involved in the process.

There was a public procurement for the elaboration of a technical design of the fish pass in Rīva river. The winner of the tender was the State limited liability company "Meliorprojekts". Topographic surveying was performed and the necessary optimal parameters for the fish pass design were determined. The first draft solution was a technical fish pass ensuring migration only over the lowest part of the barrier. Based on experiences from other countries and after consultation among the restoration project team as well as REROUT project partners, the first alternative solution with different design variants was found to be unsuitable to provide migration opportunities to lampreys and other fish species with poorer swimming capabilities, Hence, this solution was considered insufficient in relation to the project aims and needed to be improved. The restoration project team in cooperation with the designing company agreed to look for another solution. To ensure the migration for as many species as possible, the type of the fish pass was decided to be changed from a technical fish pass to a natural-like fish pass. After agreement on building of natural like fish pass, it turned out that there is not enough land leased according to lease agreement to execute the construction of this type of passage. Therefore, an addendum to the existing agreement was discussed with the landowner, and a lease for the necessary additional land area was signed. In later stage of the final specific designing of the natural-like fish pass construction, there was some confusion in communication, leading to advancement without a full comprehension of the situation by BIOR and international RETROUT partners. This allowed a suboptimal and problematic design that was finally constructed (see section 'Implementation phase').

Important lessons learned were that the project team needs to be coherent and well-functioning, good cooperation and active supervision is needed in the relation between the project team and the designing company, all interest groups should be involved in all key stages of the planning process, and finally, all complications can be solved through transparent practices and active cooperation where all involved actors together focus on finding the overall best possible solutions.

In 2018, parallel to the planning work for the fish pass, also two new monitoring sites were established in potential spawning sites above barrier. Regular monitoring in these sites will enable assessment of changes in trout reproduction after the completion of the fish pass and can hence be used to evaluate the effect and success of restoration measure. In addition, several lamprey larvae monitoring sites were established upstream the barrier in 2020 to assess changes in river lamprey reproduction, and to evaluate restoration effect and success.

Preparation phase

Environmental impact assessment (EIA) was not applicable according to national regulations. Hence, EIA was not carried out.

In the beginning of planning phase, a request for guidelines on the technical conditions for the fish pass construction was sent to Ventspils regional environment authority. The technical conditions were received and included in the terms of reference of the design tender to be taken into account in the design by the chosen company. The produced technical design documents of the fish pass on Rīva

river were again submitted to Ventspils regional environment authority for approval that was granted on 20th March 2020.

The procurement process for the construction work was organized according to the National Law on Public procurement and regulations of INTERREG BSR programme. The winner of the tender was the applicant who offered the lowest price on conditions mentioned in terms of reference – "Venta-1" Ltd. that is a specialist in road building but also in hydraulic structures.

A price survey was carried out to get the lowest price for the construction supervision. A special requirement for the construction supervisor was a certificate for the supervision of construction works of hydraulic structures. The contract for the author supervision was signed with the State limited liability company "Meliorprojekts".

Implementation phase

Ventspils County municipality was responsible for the construction phase of the fish pass. According to the procurement procedure the contract with the building company "Venta-1" Ltd. was signed on 18th May 2020. To enable the start of the construction work and avoid delays, the building expenses in amount of 164 423.38 EUR (including VAT 21%) were first pre-financed using a loan at State Treasury, until the funding-technical issues of the regular project funding was solved.

As the planned budget for building work was much smaller than the contracted sum that was chosen after the procurement procedure, a challenge to find lacking funds for financing the project emerged. Also, additional payments for construction and author supervision services were required. The state policy stipulates that the Treasury loan can be received only to cover the eligible costs of the project, and that was not enough to cover the difference between the planned and realised costs. A solution was found when the RETROUT partnership reallocated the project budget, enabling unused financial resources of other partners to be directed to cover the construction costs of the Rīva river fish pass. By this, the municipality received an opportunity to request an additional loan from the Treasury. It is also important to emphasize the municipality's efforts to find and use financing from various sources, e.g., funds from the municipal fish fund budget were utilised to pre-finance construction costs. The construction work on the site started in June 2020 and was completed in September 2020 (Figure 23).

Figure 23. The fish pass site during construction in August 2020. Photo credit: Kaspars Abersons.

Regular meetings were held between the involved parties to control the building process and the issues connected to that. In the final stage of the construction works there were concerns brought up regarding the functionality of the fish pass during low flow conditions (Figure 24), based on some received information on potential discrepancy between the design and the realised construction. Information was received from locals that there was a risk that the fish pass would only work at high flow conditions. It was agreed that BIOR will investigate this issue further, and consecutively keep the restoration project group as well as RETROUT WP4 lead and lead coordinator informed.

Figure 24. The fish pass site after construction in September 2020 (Photo credit: Kaspars Abersons).

During further investigation it was made clear that the received alarmed signals from several parties about what is happening in the Rīva river were correct (Figure 25). So far, it had been announced with great confidence that the first natural fish pass in Latvia was being built in the Rīva river and it was to be suitable not only for sea trout but also for other fish and invertebrates. However, at this point the fish pass did not meet those expectations. It was found out that partly due to a faulty design and partly due to faulty construction work, the new fish pass had severe problems, inter alia in form of three new obstacles effectively obstructing fish migration. Also, 200 mm pipes had been laid in the channel controversially to aid fish migration. During low water conditions, there was extremely little water in the channel for the fish. It became clear that the design of fish pass in the late stage of the planning process had been changed without involvement or consultation of BIOR and RETROUT partners. The emerged concerns were expressed, and the involved parties started to search for a solution. Two meetings in the river side were held. A situation explanation and pictures were also sent to RETROUT project experts Martin Kesler (Estonia) and Robertas Staponkus (Lithuania), who also participated in a

meeting at Rīva river to provide external expert consultation. It was concluded that sufficient water in the fish pass was secured only during high flows (Figure 26); in medium and low flow conditions water flow over the obstacles is poor.

Figure 25. The fish pass site after construction in October 2020. Photo credit: Ventspils county municipality.

On 9th October 2020 a meeting was held with all Latvian restoration project partners, designers of the fish pass, constructors and local stakeholders. After long discussions, practical checking and measurements on the spot, a compromise solution that satisfied both scientists and local stakeholders was found. It was decided that the designers make the corrections in the design of the fish pass to ensure migration possibilities for different kinds of fish and at the same time secure enough water for the main channel to retain the artificial waterfall as a tourism attraction. Openings were to be made in both of the most crucial new obstacles. The dimensions of the openings were calculated so that the bottom of the opening was 10 cm lower than the bottom of pipe in the uppermost obstacle in the main river. And the width of the opening was calculated so that during the low flow the fish pass will consume approximately one half of the flow and other half will be left for the waterfall in the main river. In addition, parties agreed that the stone piles in the fish pass will be left unchanged and the upstream parts of the pipes in the stone piles will be clogged with smaller stones. The wooden shields in the uppermost part of the culvert were to be removed.

Changes in the construction were done properly and according to decided solutions and design. Additional costs caused by the situation were covered partly by the construction company within its responsibility and partly by the Ventspils County municipality. Thereafter the fish pass has been in operation. Further monitoring of the functionality of the fish pass in various conditions will be carried out during the coming seasons.

Figure 26. The fish pass during high flow conditions. Photo credit: Ventspils county municipality.

Evaluation of the project

Despite some difficulties, the project process so far can be rated as a success. During the first stage of project, potentially the most suitable solution was found, and actions were targeted towards its implementation. However, the real success depends on efficiency of fish pass which can be evaluated only after monitoring of its functionality and its impact on production of migratory fish.

To evaluate possible changes in sea trout (and salmon) production two additional electrofishing sampling sites were opened in 2018. In 2020, these sites were revisited. In addition, monitoring of lamprey larvae has started. The design of the fish pass allows also the installing of fish counter. However, due to considerable expenses of such devices it is hard to estimate if and when installing and operation of a fish counter will be possible. The results of fish monitoring in Rīva River downstream the construction site did not reveal noteworthy changes in fish fauna in 2020 if compared to previous years. However, electrofishing was conducted in July before the fish pass construction, and hence the evaluation of the effect of the fish pass can be evaluated only later based on monitoring results from the coming years.

Negative impact on fishes or another biota during the construction process was not observed. It can be expected that the existence of fish pass will not have a noteworthy impact on water level, discharge or other parameters of river itself. The only expected changes are improved river connectivity and better migration possibilities for fish and other river biota. Special monitoring for evaluation of the impact on other species is not planned but change in the fish fauna can be observed during monitoring of sea trout parr and lamprey larvae.

The restoration activity was not directly aimed towards provision of additional recreational objectives, yet it is likely that the fish pass itself will add some value to the site. The bridge over Rīva river is a replica of a wooden bridge which was included in list of national scale culture monuments. The bridge and to some extent also the ruins of unfinished paper mill and the dam itself is a popular tourism object. During planning and designing of fish pass great attention was paid to retain the value of site as much as possible, which was achieved. The fish pass will not have noteworthy impact on the bridge, ruins and dam. As it was insisted by the local landowner and other stakeholders, the remains of the dam will continue to function as an artificial waterfall. Special activities for monitoring the attractivity of the site for tourists is not planned.