

Lithuania

Smeltalė river: restoration of biopond system and habitat improvement



Country	Lithuania
River	Smeltalė
Site	Švepeliai biopond and Jakų park
Type of sea trout population	Unique population, self-reproducing
Type of restoration	Restoration of biopond for nutrient reduction and habitat improvement
Temporal scale of the restoration	Long term
Spatial scale of the restoration	Biopond 500 m, park 200 m, 1 km apart
Responsible organization	Klaipėda District Municipality Administration
Duration of the project	1 year
Geographical location WGS84	55-42,2000N 21-15,2833E (Park) and 55-41,8500N 21-14,5667E (Biopond)
Total budget	

Background

The Smeltalė river flows into the Klaipėda Strait, which connects the Baltic Sea and the Curonian Lagoon and has a catchment area of 124 km² (Figure 27). The tributary Smiltaitė joins the Smeltalė river 15 km from the mouth. The river has a self-sustaining production of an original strain of sea trout, but the reproduction has decreased during the last years (Figure 28). Water quality is classified as poor due to eutrophication, a possible reason for the low trout production.

Two restoration demonstration cases were planned. One restoration of an overgrown biopond, one established to reduce nutrient load on the river, and one habitat improvement activity in a meandering stretch in the same tributary (Figure 27). Responsible for the restoration activities were Klaipėda District Municipality Administration with technical/scientific supervision from Klaipėda University. A construction company was procured to carry out the activities.

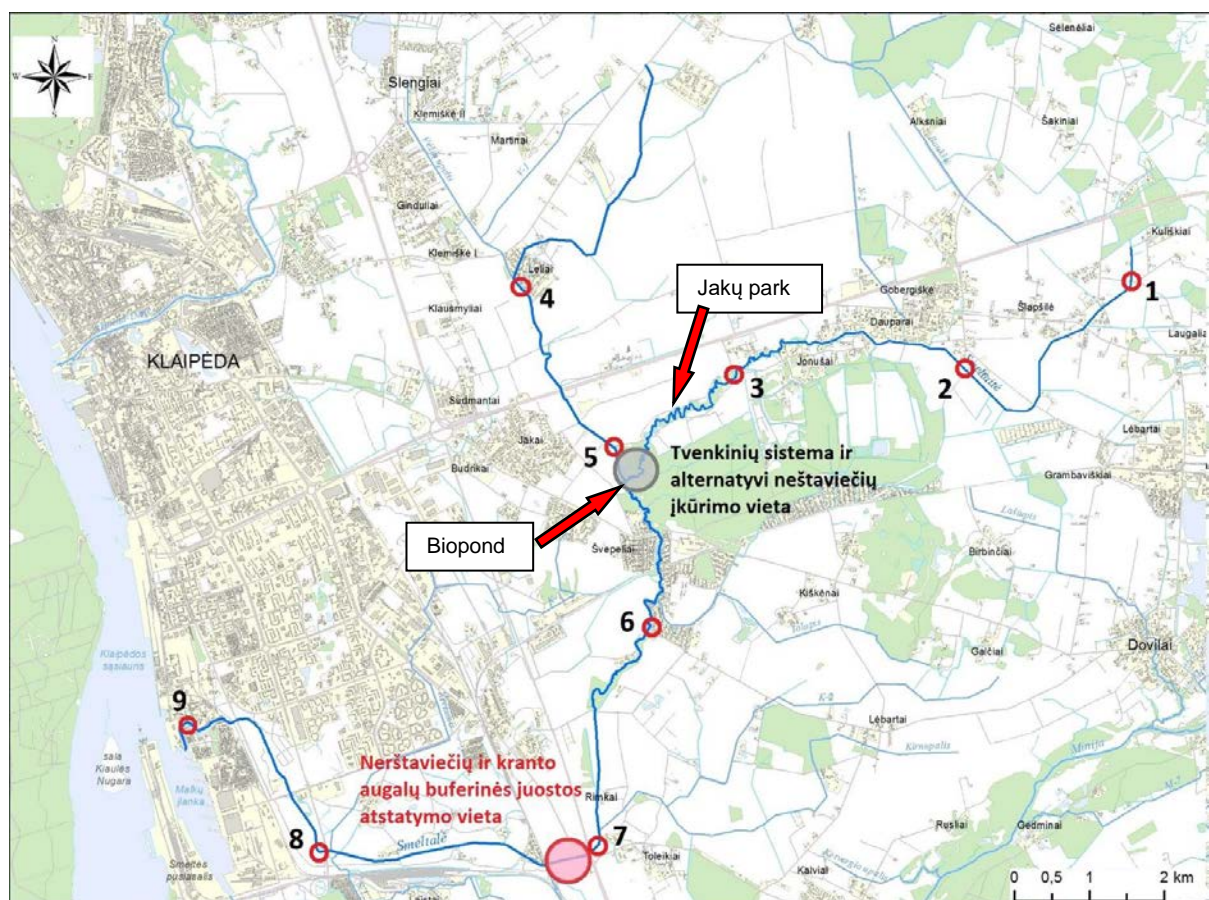


Figure 27. Smeltalė river, overview. Indicated are the site for the biopond and the Jakų park where habitat improvement measures were implemented.

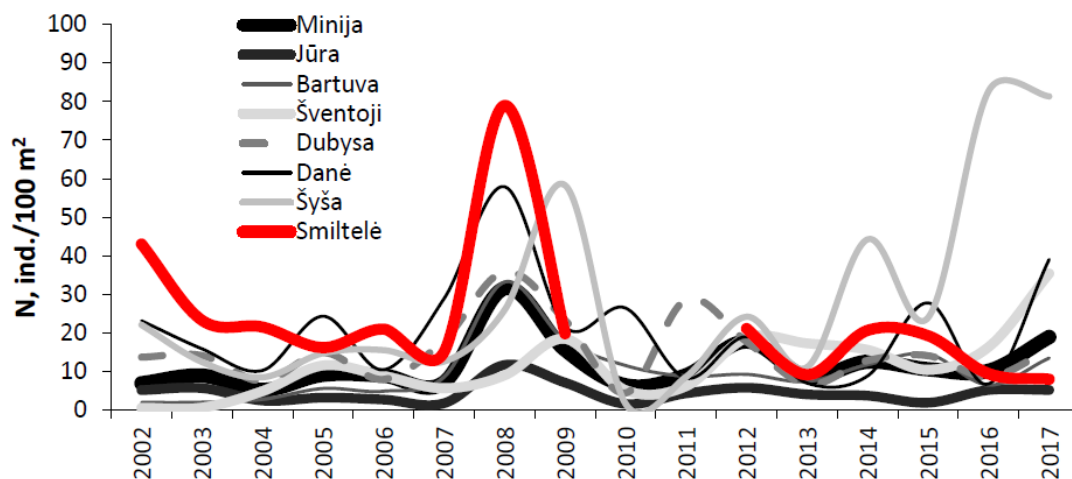


Figure 28. *Salmo trutta* population status dynamics in westerns Lithuanian rivers (Klaipeda University 2017).

Biopond restoration

A biopond-system was established in 1996 at the confluence of the Smiltaitė and Smeltalė rivers to improve the water quality (Figure 27). Two hectares of land was turned into a wetland for river water treatment. It consists of several sedimentation ponds, anaerobic ponds, and aerobic ponds. Since then it has not been managed properly and it was suspected that the nutrient reducing efficiency had decreased. In 2018 the pond was completely overgrown (Figure 29).

Initial phase

To evaluate the efficiency of the biopond an intensive pre-restoration survey was carried out. Nutrient flux was analysed in intact sediment cores from the biopond. Spatial and temporal distribution of nutrient load was studied by analysing water chemistry every two to four weeks for one year. Water was sampled from 13 stations in the whole Smeltalė catchment including the pond system. The study found that reduction of the total phosphorous concentration was only 1-4 % as compared with the expected 10-15%.

Planning phase

Based on the findings from the study of the nutrient reduction a plan for restoring the function of the biopond was designed. The design included removal of sediments from two first sedimentation ponds, clearing the surroundings from trees and shrubs, adaptation of area for educational purposes and restoring of an artificial weir.

Permit for the activities had to be applied for because the area is protected by the law of waterbodies protection zone.

Implementation phase

During the restoration 3300 m³ of sediment was removed from the pond and much of the overgrowth was cleared (Figure 30) the artificial weir was restored. The area is now used for recreation and education. A follow-up study of the nutrient reduction has not yet been performed.



Figure 29. The Biopond system four years after construction (left) and 21 years after (right).



Figure 30. The Biopond system before (left) the restoration and after (right).

Habitat improvement measures

In the Smiltaitė tributary restoration measures were applied to a stretch running through a small park, Jakų (Figure 27). This part of the rivers is a 4 km long meandering stretch lined with a 100 m wide forest strip. In this stretch the river has a large potential for trout spawning and constructed habitats were judged to be able to withstand both high flows and sedimentation (Figure 31). The land is privately owned but water in Lithuania is state owned, which facilitates restoration activities. In

Smiltelē, all measures were planned to be applied in the water. The landowner was consulted and was positive to the activities. The site is easily accessible for the heavy machinery that would be used.

A possible problem with the selected site is that there are two poorly maintained road culverts in Smiltaitē tributary 1.5 km downstream the restoration site. One of the culverts is open for migratory fish only during high flow conditions, the other has a concrete block blocking passage (Figure 33).

Planning phase

To improve the suitability of the site for sea trout the riverbed has been modified because of lack of stones and gravel. A site which is known to be suitable for sea trout upstream the restoration site was used as a target (Figure 31). The planned actions included three sites, together 150 m and 600 m² where spawning grounds and nursery areas would be created (Figure 32). To ensure accessibility to the site, plans to remove the road culvert downstream the restoration site was made.



Figure 31. The restoration site (left) and the target site (right). The target site represents a habitat suitable for sea trout situated a few km upstream the restoration site.

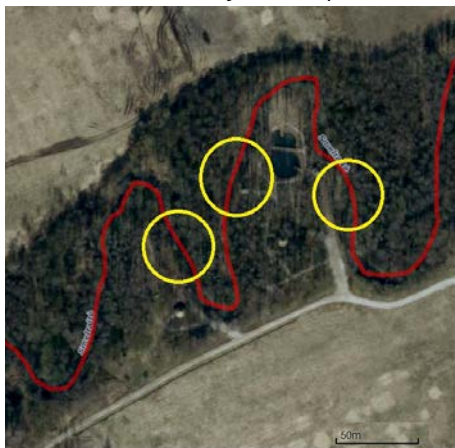


Figure 32. The three restoration sites in Smiltaitē river.



Figure 33. The two culverts that constitute migration obstacles.

Implementation phase

Sea trout spawning and juvenile rearing habitats were created in the stretch by adding stones and gravel to the riverbed. Used material:

- 90 m³ gravel, a 1:1 mixture of natural gravel and washed pebble (fr. 16-70 mm)
- 24 m³ cobble

- 5 m³ stones (25-35 cm)
- Logs

3 x 50m sections were modified adding up to 500 m² productive area for salmonids and lampreys. The river before and after the restoration activities is shown in Figure 34.

The culverts forming migration obstacles were opened by removing the blocking concrete with the help of an excavator.



Figure 34. Two river stretches that flows through the Jakų park where habitat improvement activities have been implemented. Before (left) and after (right) the restoration activities.

Evaluation of the project

This was the first ever creation of spawning grounds in Lithuania and it proved to be a great success: 13 spawning redds were found in 60 m of restored habitat. Now, visitors of the park can see trout spawning in the middle of the park.

The restoration activities in Smeltalė river have already influenced restoration outside the project. The first ever dam removal in Lithuania has been carried through. This was a small dam that was not a migration obstacle, but the removal has a symbolic value by showing that dams can be removed. The second ever dam removal is planned this coming summer in Salantas river. The dam removal will also be combined with habitat improvement activities.

To conclude, the Smeltalé project has created greater knowledge among stakeholder groups about the importance of river restoration.