REPORT

RETROUT study visit in Estonia

September 18-19, 2019

North-Estonia

Rapporteurs:
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Participants:
In total 15 participants from Estonia, Latvia, Lithuania, Poland, Finland and Sweden – representatives from RETROUT project WP4 partner organisations and Coalition Clean Baltic.

Aim of the study visit:
To present and discuss Estonian RETROUT project sites where restoration works are planned. In addition, examples of previously constructed fish passes were visited and critical aspects of fish pass designs were presented.

Summary:

Linnamäe hydropower station on River Jägala (part of RETROUT project)

Linnamäe hydropower station, situated on the lower stretch of the Jägala River, was originally built in 1922-1924. In 1941 it was partially destroyed and only in 2002 restored to present state.
Linnamäe is the most powerful hydro-electric power station in Estonia. Characteristics: height 11 m, capacity 1.1 MW. There is no fish pass and it is deemed as a culturally valuable site.
The dam lost its water permit in August 2019 and the obligation to provide fish passage stands.

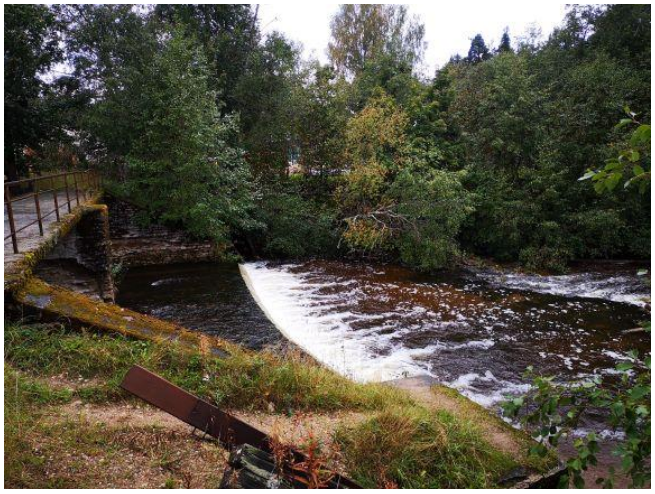
Photo 1. Linnamäe hydropower station (S. Oisalu)

Discussion on the site: the main discussion on the site was related to conflicting interests regarding the site. Part of the dam was classified as culturally valuable and therefore optimal solutions for fish passage are hard to achieve.

RETROUT project will provide plans how to remove the dam in a way that the cultural value is least affected. This work is currently in process.

Kotka dam on River Valgejõgi (part of RETROUT project)

Kotka dam was built in 1950 and operated as hydropower station until 1960. After that it provided water for a fish farm. The dam broke down in 2016 and it was not restored because it has no water permit.
Characteristics: original height was 3,5 m and present height is 1,1 m, capacity 200 kW.




Photos 2 & 3. Kotka dam (S. Oisalu)

Discussion on the site: the main discussion on the site was related to the cost of different proposed solutions. Secondly, it is evident that several local people are not satisfied with a loss of the lake and it was discussed how to communicate the solutions better so that the local community would appreciate the activities.

In frame of the RETROUT project two alternative solutions have been elaborated:

1. The dam construction will be removed and 76 m artificial rapid will be created. Estimated cost is 390 456 euros.

2. The dam construction will be removed and only banks are enforced.
   Estimated cost is 72 600 euros.

Nõmmeveski dam on River Valgejõgi (part of RETROUT project)

Nõmmeveski power station was built in 1924 and operated until 1964. The wooden components broke down in 2010. Characteristics: the remaining height of the dam is 1 m.
Since 2000 current owners of the dam have tried to get water permit to restore the hydropower station.

Discussion on the site: the site does not have major conflicting issues. The step under the bridge cannot be lowered because the bride structures could become unstable.

Photo 4. Nõmmeveski waterfall (S. Oisalu)

In frame of the RETROUT project the plan is to build 30 m long artificial rapid downstream from the bridge, enforce banks and deepen the concrete bottom under the bridge. Estimated cost is 223 344 euros

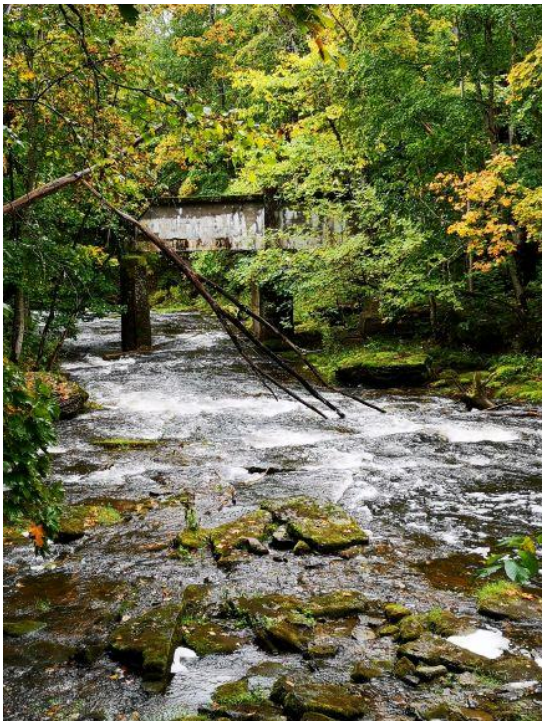


Photo 5. Remains of Nõmmeveski hydropower station (S. Oisalu)

Joaveski hydropower station on River Loobu (poor example)

Joaveski hydropower station was built in 1898 to supply the newly built cardboard factory. Next to the factory is Joaveski cascade (160 m with six 1,1 m - 1,5 m waterfalls) that was created from 4 m waterfall when limestone was excavated directly from the river to build the factory. Production in the factory was ended in 1994. In 2001 new owners started hydropower production there.

Photo 6. Joaveski cascade (S. Oisalu)

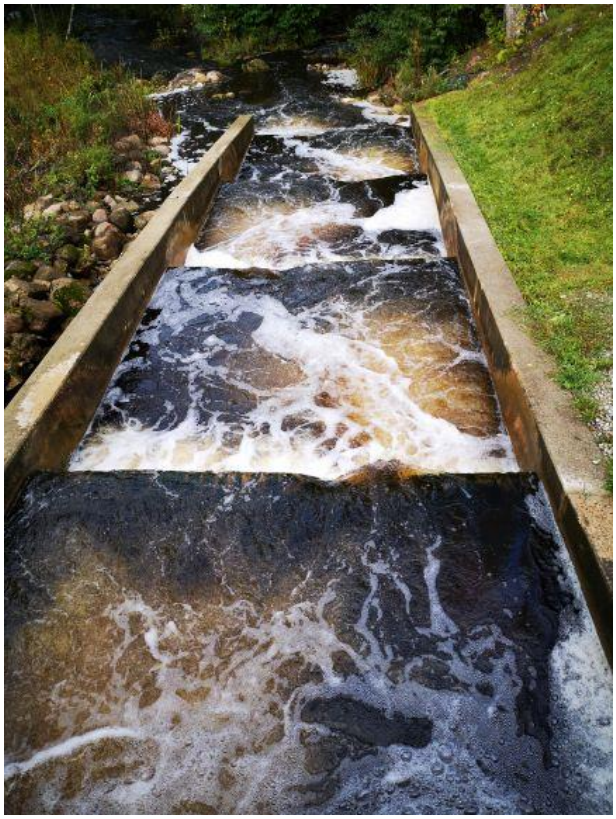


Photo 7. Joaveski fish pass (S. Oisalu)

In 2013 the fish pass was built which is a technical fish-pass with 5 pools. Each step of the fish pass is 0,45 m high. Characteristics: the height of the dam is 2,8 m. Cost of the fish pass was 165 681 euros.

Main problems related to the dam are:

1. The steps of the fish pass are too high and only good swimmers are able to pass it by jumping. There are no openings at the bottom of the pools.
2. Fish that migrate upstream are attracted to the turbine outlet channel if the HEP is working. The fence at in the end of the turbine outlet channel in ineffective.

Discussion on the site: the main issue is whether such fish-pass is functional enough to ensure recovery of migrating fish populations and how to improve the situation from now on.

Arbavere dam with natural like fish pass (good example)

The fish pass on Arbavere dam is the first natural like fish pass built in Estonia. It was constructed in 2011. Characteristics: length of the fish pass is 120 m and the height is 2.5 m. Cost of the fish pass was 304 000 euros. Note! The cost contained also a fish counter that alone costs about 50 000 euros.

Photo 8. Arbavere fish pass (S. Oisalu)

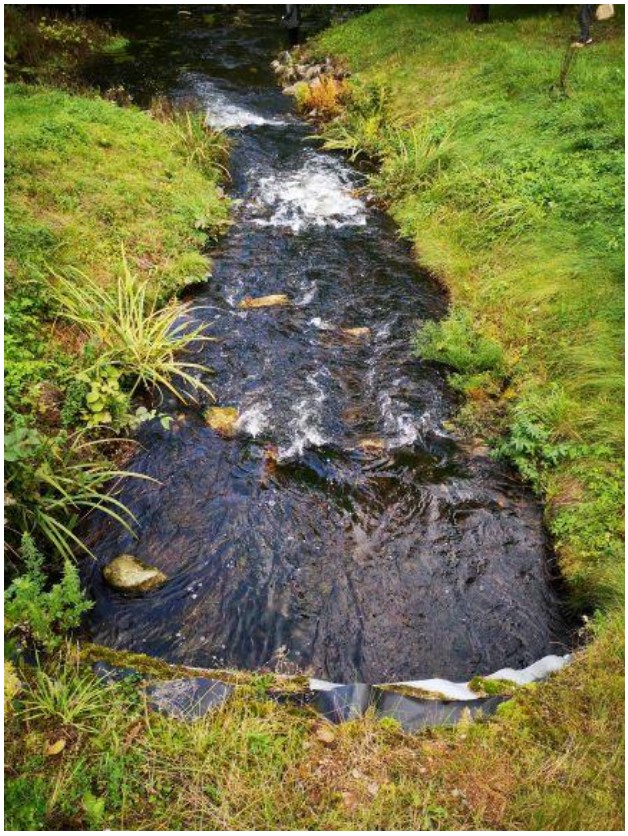


Photo 9. Arbavere fish pass (S. Oisalu)

Positive aspects of the fish pass are:

1. Natural like fish pass is passable for all fish species in river moth direction. The fish pass serves as a habitat for juvenile trout and other fish species.
2. Most of the flow is directed through the pass and that ensures that the migrating fish find the fish pass entrances.
3. Location of the lower fish pass entrance is close to the dam and is therefore easy to find.

The only negative aspect of such fish passes is that it takes up more space than other fish pass types. This means that such fish passes cannot be built in for example steep valleys.

Discussion on the site: ideally the planned fish pass to Aravuse will be similar type.

Tapa fish pass

Tapa dam was 1,2 m high and thus impassable migration barrier for most fish species. To ensure free passage for fish, the dam was demolished and a natural-like rapid was built instead. The rapid provides free passage for all fish in both directions. The rapid is also a habitat for juvenile trout. Cost of the fish pass is not available.

Discussion on the site: participants of the study visit concluded that the solution is a good example and all fish can pass the site freely.

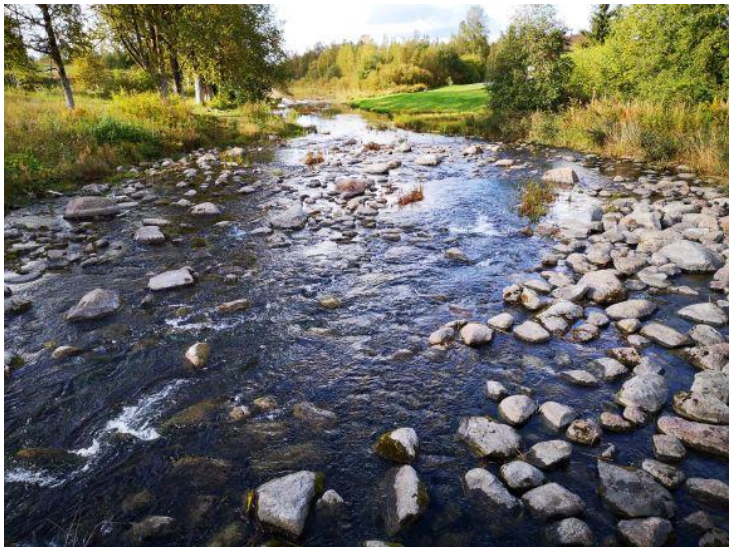


Photo 10. Tapa natural-like rapid (S. Oisalu)

Kunda lowermost hydropower station (part of RETROUT project)

Kunda lowermost hydropower station was built in 1893 and at present it is not operational. Characteristics: designed height was 9,3 m, now approximately 6,5 m. The dam has no water permit and fish passage is obligatory.

Discussion on the site: the site is located is a step valley and thus all activities are technically complicated.

RETROUT project will provide plans how to remove the dam in a way that the cultural value is least affected. This work is currently in process.

Photo 11. Kunda lowermost hydropower station (S. Oisalu)

Kunda second dam with a fish lift (example of a poor solution)

Kunda second hydropower station was built in 1870 and rebuilt in 2003. Characteristics: height is 6,4 m. The dam has no water permit and is not operational. The fish lift was built in 2013. Total cost 538 799 euros! State subsidy was 295 592 euros**.**

Main problems are:

1. The effectiveness of providing upstream passage is highly questionable.
2. Downstream migration is problematic. There is a high probability that the smolts enter the turbines.

Discussion on the site: participants of the srudy visit agreed that such fish lift is clearly ineffective and very expensive. In the future such solutions should be avoided.

Photo 12. Fish lift on Kunda river (S. Oisalu)

Old Kunda manor mill (part of RETROUT project)

The old Kunda manor mill was built in 1870 and the original height was 2,7 m. The dam is in ruins and the plan is to demolish it.

Discussion on the site: all participants of the study visit agreed that the best option would be to remove the concrete body of the dam and to give the site as natural appearance as possible.

RETROUT project will provide plans how to remove the dam. This work is currently in process.

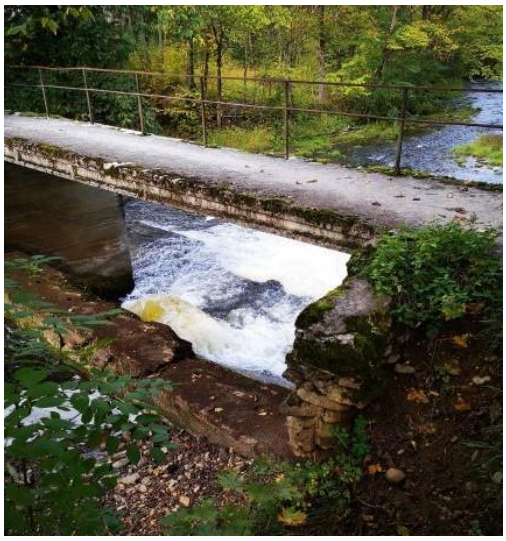


Photo 13. Dam of the old Kunda manor mill (S. Oisalu)

Aravuse fish farm and hatchery (part of RETROUT project) (site was not visited)

Aravuse fish farm was built in 1967 and the dam is part of the water supply system. The plan is to build a natural like fish-pass to the right bank of the river.

RETROUT project will provide plans how to remove the dam. This work is currently in process and the pass should be similar to The Arbavere pass.

Sillaoru hydropower station with a natural like fish pass on River Purtse (example of a partially functioning fish pass)

Photos 14 & 15. Sillaoru fish pass (S. Oisalu)

Sillaoru hydropower station has capability of ca 300 kW. The natural like fish pass was built in 2014. The fish pass is 175 m long and elevation is 3,5 m. The cost of the fish pass was 187 474 euros.

Main problems are:

1. Fish that migrate upstream are attracted to the turbine outlet channel if the HEP is working. The fence at in the end of the turbine outlet channel in ineffective.
2. Downstream migration is problematic. There is a high probability that the smolts enter the turbines.

Discussion on the site: most of the discussion was about the location of the fish pass and what should have been done differently or how to improve the effectiveness of the present fish pass. Adding more water to the original river channel would attract more fish towards the fish pass and that would in all likelihood improve the upstream passage.

Photo 16. Participants of the RETROUT Estonian study visit (A. Koppel)