Opening of the remains of the Staicele dam, Latvia

Feasibility of the opportunities of obstacle removal

Cooperation Dam Removal Europe & BIOR

Author: Isabelle Alten

Date: 30th June 2023

WORLD FISH MIGRATION FOUNDATION

TABLE OF CONTENT

INTRODUCTION AND BACKGROUND

PROJECT HISTORY: WHY REMOVAL OF DAM?

Over the last years, there is an ongoing movement of removing dams in Europe which are no longer in use. These barriers have significant influence on many important processes, like the in-stream ecology. There are many dams located in Latvia which are no longer in use and/or have significant ecological influence on the rivers.

One example of the large ecological influence a dam could have could be seen at the remains of the Staicele dam in Latvia. The fundaments of the dam structure block one of the main salmon migrating routes of the Baltic. It has a high position on the list of 70 dams in Latvia with high priority of removal, due to its negative influence on the environment and ecological potential (BIOR).

These remains of the **Staiceles Paper Factory Dam** have been selected in this feasibility study. The dam itself has been built in the Salacas river at the end of the 19th century for functionality of the paper factory. It shows high priority in removal, mainly due to the large positive impact removal would have on the river (e.g., naturally it is a Salmon migration river)

The remains of the dam in Staicele have been evaluated and discussed already repeatedly for at least 20 years. Until now there has been no further development in progress. Since there are many ecological reasons to change the current barrier in the Salacas river, this feasibility study combines the history of the previous challenges obtained to make concrete plans of successful restoration of the specific location at the Salacas river.

This project has both large ecologic and economic potential of the whole area and could be used as a clear step in further application.

PREVIOUS OBSTACLES & NEW PROJECT OBJECTIVES

The remains of the Staicele dam have been under attention for many years already. The progress of dam removal has failed repeatedly.

In a combined report about the success and failure of such river restoration projects in the Baltic (Retrout project, 2021), the conclusion of reasons of failure of the Staicele project were as follows:

1. Opposition from landowner
2. Lack of support from key stakeholders such as municipality
3. Legal - inability to transfer the land rights for implementing the project.
4. Conflict of stakeholder interests, largely economic versus nature conservation
5. Ineffective communication regarding river importance for salmonids and the benefits of restoration

Previously, the opening of the river seemed to mainly fail due to the lack of legal provisions to expropriate the bridge including dam (Sing et al., 2021). Due to the long extent of the process of this dam and the social need for a successful result, it is recommended to not continue in this same way. It may cause opposition for further dam removals in Latvia.

A more complex solution with attention to the needs of the rural city Staicele and the owner of the factory is expected to be needed. In this report more attention is drawn into these social aspects.

There is a lot of potential for the local area by this project. Only by removal of the dam, the potential of local success of the removal has already been described previously as: improving number and transportation fish species, increased attractiveness of tourists, improved conditions fishing and angling, stabilization riverbed (Lebenath & Badura, 2005). By making this project larger than only dam removal, a success for the environment and the local community is expected.

Furthermore, a new function of the whole could lead to a positive effect in creating more awareness of the importance of destructing more of those obsolete and environmentally damaging dams in Latvia.

The aim of the feasibility study is to figure out main questions and the feasibility of the dam removal, regarding to the technical, social, and economical feasibility of the removal.

METHODS

To be able to assess the feasibility of removal of the dam, the Dam Removal Europe network has been used to get into contact with experts around the globe. Based on a checklist provided by Dam Removal Expert Laura Wildman (Vice President of Ecological Restoration, Save the sound) the different important points have been evaluated.

The first part of the feasibility study entailed a detailed search into the background of the subject. There have been several investigations and many news articles about both the dam and the factory. With the use of Google Translate, news articles and reports about the river and the factory have been thoroughly read.

After 4 weeks, the research has been continued in Latvia. Together with the BIOR institute, connections with all relating organizations have been made. There has been contact with all stakeholders in the project, both stakeholders with influence and stakeholders with a smaller link. There has been regular contact with the owners, nearing the end of the project at least once a week.

Regarding the history of the subject, a few persons highly involved in those previous processes have been contacted for background information and an overview of the situation on Latvia regarding similar processes.

CONTACTED EXPERTS

In the first few weeks, contact has been made with several dam removal experts within the Dam Removal Europe network, to compare and share ideas of the Staicele project. Together with their experience, some new ideas and steps in the process have been made.

- **Herman Wanningen:**
  Director of World Fish Migration Foundation. Closely bound to the project and regular exchange of expert opionion on the process and link to other experts in the field.
- **Laura Wildman:** Vice President of Ecological Restoration. With expert knowledge about the processes of Dam removal, overview of main steps by checklist has been provided and support in several phases of the research has been provided.
- **Wouter Helmer:** Founder of Rewilding Europe. Large experience in rewilding projects and also with finding an economical binding towards it. With his ideas highly helped creating ideas for future functions of factory with restoration of the river as a theme.
- **Lisa Hollingsworth-Segedy:** Director River restoration. Shared support by looking at technical side of the dam removal and also shared experience on other projects with similar monumental status.
- **Pao Fernández Garrido** Dam Removal Europe Project Coordinator. With the help of the extensive network of Pao, contacts have been made to estimate the costs of the removal.

PERSONS AND ORGANIZATIONS CONTACTED IN LATVIA:

Organization	Contacted person	Aim
North Vidzeme Biosphere reserve	Andris Urtāns	Meeting about his involvements and history of the subject
GEF	Jānis Birzaks	Acquire technical report, however, did not know about it
Engineer	Leonids Lakmunds	Engineer involved in technical report, did not remember about full version
Fiskevårdsteknik	Mats Heberands	Mail contact about his previous expert opinion from 2009
Owner of dam	Verners Apins and Evija Dreimene	Regular meetings about progress and their vision
LEGMC	Jānis Šīre	Meeting and cooperation into further action points
Municipality	Head: Dagnis Straubergs	Talk about position of municipality in the process
	Department of Development and Projects	Talk about potential role of department in process
WWF	Magda Jentgena	Dam removal process in Latvia and previous and future struggles
Local school	Grade 1-4	Educate children about fish and migration in rivers
Angling club "Ūdensroze"	Toms Arnavs	Role of anglings organization, role local management in process and link with local people
Angling club "Salackrasti"	Atis Apelis & Edijs Leoke	Background of local river restoration involvement in Salaca river and potential involvement anglers association. Also talk about LIFE implementation of subject
Canoers		
NCA	Gita Strode	Potential role of NCA in process
Latvian Anglers Assosiation	Alvis Birkovs	Historic involvement in process and legal background river restoration Latvia
Latvian fund for nature	Girts Strazdins & Ojars Balcers	Experience dam removal in Latvia and vision into future dam removals Latvia

Baltic Environmental Forum	Anda Ruskule & Kristina Veidemane	Historic involvement in subject (provision documents) and potential involvement future
Owner Ligatne paper factory	Edgars Ricevs	Comparison reestablishment function factory in similar conditions in Latvia
Cultural heritage	Aivars Aigals	History of reasons of monumental status and first reactions on potential options
	Simona Cevere	Email contact about vision and option for meeting about river restoration.
Ministry of Agriculture	Normunds Riekstiņš	Personal and ministerial vision of several options of removal Staicele dam
Ministry of Environment	Iveta Teibe	Personal and ministerial vision of several options of removal Staicele dam
	Daiga Vilkaste	Personal and ministerial vision of several options of removal Staicele dam
Planning North Videzme	Laila Gercane & Krista Petersone	Option of role within process and information of knowledge regional situation
Nature Conservation Club	Aldis Anzini	History and new vision of dam removal

SUMMARY OF THE WORK CARRIED OUT IN LATVIA

From the findings of the first few weeks, it has become clear that there were a few organizations whose were highly involved in the previous processes. After every meeting, the persons mentioned which have been involved in previous or current processes have been contacted as well, to make sure of proper inclusion of all important stakeholders. Main findings of these talks can be found in the following paragraphs.

CHARACTERIZATION - ENVIRONMENTAL

OVERVIEW OF LOCATION

Staicele is located in the northwest of Latvia, in the Limbaži district which borders the Baltic Sea and Estonia. The city is located next to the Salacas river and belongs to the Limbazi municipality. The river is an important river which originates from the natural Lake Burtnieku, formed by a glacier tongue. Near Staicele, the river has a average flow velocity of 0.1m/s (Biedrība “Baltijas Vides forums”, 2005).

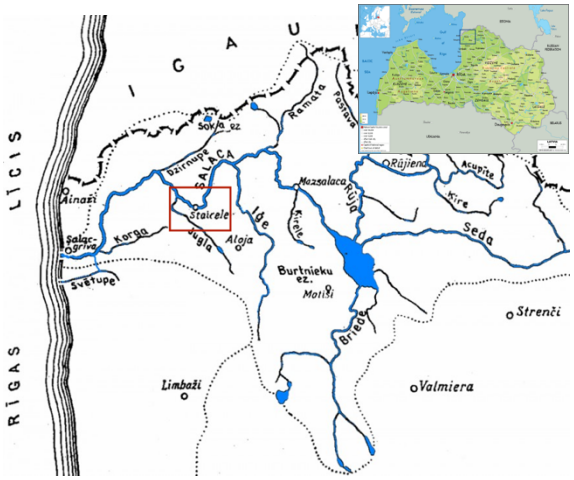


FIGURE 1 A) THE RIVER VALLEY OF THE SALACAS RIVER, B) LOCATION STAICELE

FIGURE 2 SATELLITE IMAGE OF THE AREA

HYDRO-MORPHOLOGICAL CHARACTERIZATION

The Salaca river is smoothly sloping towards the sea and has a total fall of 42m, 0.4m/km. The riverbed consists of manly sand, stones and gravel. The riverbed has been extensively assessed in the project research about establishment of a hydropower station in 2001.

The river has several important tributaries, which are mostly characterized polluted or highly polluted. The reason for this pollution near Staicele is the only partly purified wastewater from the towns Mazsalac and Staicele. The discharge of the river and the rapids on the steam contribute positively to the self-purification process.

Analysis of historic maps have shown the tendency of increasing forest area on the riverbanks. Historical maps do not show large changes in the hydro morphology since the placement of the dam. However, after the partly removal in 1984, the basin downstream of the dam decreased in size.

Close to the river there are some caves situated, which are expected to be formed after 1950 when the dolomite was exposed under the water level (*STAICELE*, n.d.)

ECOLOGICAL VALUE RIVER

The Salaca river is a salmon migrating river, the fourth most important one in the Baltic. The river potentially could entail 30.000 salmon smolts, at the moment this is

limited mainly due to the obstacle (BIOR). Also, the Salaca river has several scarce habitat sites, which are included in the EU Habitats Directive. Since 1999 the river slopes and riverbanks have become a national park: the Salaca River Valley Nature Park.

Also on national scale, the river is shown to be important due to its habitats and is under protection by the North Vidzeme Biosphere Reserve.

BIOR has characterized important rivers with its current ecological status and its potential. Currently for the Salaca river has an ecological importance value of 31.5 has been found, which could potentially become 45.5. Its expected benefit value will become 690-1850. These numbers indicate a large ecological potential of the river. For further explanations of the origin of the numbers, see BIOR website.

The current water quality status of the Salaca river is “moderate” (LEGMC, 2020).

NATURA 2000 SITE

The Salaca river valley is a Natura 2000 site (code LV0302200). This natura 2000 site has been evaluated and is under both the European Birds Directive and Habitats directive (*EUNIS -Site factsheet for Salacas ieleja*, n.d.). It contains 42 species under protection, wherefrom 24 bird species, 8 fishes, 1 plant, 6 invertebrates and 3 mammals. From analysis of the area, a list of threats and pressures of the area has been made (Appendix I). This includes fragmentation, caused by the dam.

KEY SPECIES AND MIGRATORY FISH

The distribution of migratory fish species (including Atlantic salmon *Salmo salara,* brown trout *Salmo trutta, Coregonus lavaretus,* zander *Stizostedion lucioperca,* vimba *Vimba vimba, European* eel *Anguilla anguilla*) in the upper reaches of Salaca is significantly restricted by the remains of the dam of the former Staicele paper factory (Biedrība “Baltijas Vides forums”, 2005). Of the mentioned species, only vimba *Vimba vimba* can successfully overcome this obstacle and successfully spawn in the upper reaches of Salaca. However, there are also known cases of individual salmon and sea trout being caught in Lake Burtniekas.

The following species are naturally occurring inside the river stream a have a protection status in the Bern convention or the EU habitats directive or nationally protected. Some of these are migratory fish, which are as mentioned before being blocked by the dam.

Specie	English name	National protection status	International Protection status
Alosa fallax	Twaid shad	MK Nr. 396, app 2	Habitat directive annex II, V
Cobitis taenia	Spined loach		Bern convention annex III Habitat directive annex II
Cottus gobio	Freshwater sculpin		Habitat directive annex II
Coregonus lavaretus		MK Nr. 396, app 2	Habitat directive II
Lampetra fluviatilis	River lamprey	MK Nr. 396, app 2	Bern convention annex III Habitat directive annex II, IV
Lampetra planeri	Brook lamprey		Bern convention annex III Habitat directive annex II, IV
Misgurnus fossilis	Mud loach		Bern convention annex III Habitat directive annex II, IV
Pelecus cultratus	Sichel	MK Nr. 396, app 2	Bern convention annex III Habitat directive annex II, IV
Rhodeus sericeus amarus	Bitterling		Bern convention annex III Habitat directive annex II, IV
Salmo salar	Atlantic salmon	MK Nr. 396, app 2 MK Nr. 45, app 3	Bern convention annex III Habitat directive annex II, IV
Salmo trutta	Brown trout	MK Nr. 396, app 2 MK Nr. 45, app 3	

The national protections are from the regulations of Ministers:

- MK number 396 (2000) "Īpaši aizsargājamo sugu un ierobežoti izmantojamo īpaši aizsargājamo sugu sarakstu" (List of specially protected species and restricted use of specially protected species); Appendix **2** – List of specially protected species with limited use.
- MK number 45 (2001) "Mikroliegumu izveidošanas, aizsardzības un apsaimniekošanas noteikumi" (Regulations for the establishment, protection and management of micro- reserves)

Possible Environmental risks of dam removal

Connected to dam removal, the following risks should be investigated: loss of wetland, change of habitat type, release of sediment and increased transport of nonnative species.

In the region upstream and downstream there are no wetlands observed which will lose their purpose by being removed. Also, the important and main habitat types are due to the rivers type of flow expected to stay the same. There is no data on nonnative species in the catchment.

Release of sediment

Since the dam used to be from an old paper factory, there is a possibility of the sediment being polluted with for example dioxins. Therefore, a sediment analysis should be carried out to further map these risks.

The depth of the sediment has been researched previously in a technical report by BGS. Due to the relatively shallow depth of sediment, no further implications are expected.

CHARACTERIZATION –LEGAL BACKGROUND

HISTORY ABOUT PAPER FACTORY

In the end of the 18th century a paper factory has been built and has had significant value for the inhabitants of Staicele. Some historic articles state the paper factory is the reason of the existence of the city. Due to its large historical value, the factory has been under monumental protection from 08.06.2011 (Mantojums, n.d.). For this reason, the dam is also under monumental protection. The factory had its blooming time in 1985, with many factory workers, which is also visible in a peak of inhabitants of Staicele of 1624 in the year 1989.

For functioning of the paper mill, a dam has been made in the Salacas river. The work in the factory has been stopped due to environmental reasons, as it would influence the salmons by polluting and blocking the river. Therefore, the dam itself has been removed and the production was limited. The fundaments of the dam are still there, blocking the river differently depending on the seasons (Ozoliņa, G., 1997).

The factory seems to be at large importance for the inhabitants of the village. Previous factoryworkers live there, and there is an active society working in retelling the history of the factory.

Lativia is working on promoting these industrial heritage sites, and interactive websites translated to English are made for showing these heritage sites. Surprisingly, the Staicele paper factory cannot be found under this category. Other similar sites or paper factories (Limbazu, Räpina) which are cultural heritage are findable and even have virtual tours. The state of the Staicele paper factory is too far degraded which makes it unsuitable for promoting. Restarting the usage of the factory could cause more visibility of the cultural heritage. There is already a lot of information gathered by the villagers, which could even potentially open a museum. The owners have talked to villagers about it, and there is a positive attitude towards it.

The current status of the factory is inappropriate. The factory has not been renovated for years. “The facade of the building is in ruins, the roof structures have collapsed, there are no roof coverings, the walls are cracked, the windows are broken, the building is not secured against the entry of unauthorized persons, the gate is open day and night.” (Matisone, 2021). The current new owners have made several attempts into restoring it, however their abilities over the very large property are limited.

CULTURAL HERITAGE STATUS DETAILS

Since 08.06.2011, the Staicele paper factory has been under monumental protection, which includes the bridge (*Mantojums*, n.d.). In Appendix II, the maintenance regulations of the monument are listed. This includes a need for hydrological regime for the monument. It is expected that this refers to the dam, further information is under documents which need an official request. These documents have been requested, however at the moment of publishing this report, there is no response available.

The monumental status could be problematic for removal of the dam. This causes the need of further investigations on the reasons of monumental protection. There might be an opportunity of splitting the bridge/ dam from the rest of the property of the factory.

This reason for splitting could be supported by the history of the bridge. For example, in previous articles was stated that “the Staicele bridge” has been destroyed during the war and afterwards rebuilt. If the Staicele bridge/dam construction was meant, this could cause it to have less of a heritage state then the rest of the property.

At location, there has been a talk with the cultural heritage office, showing the reasons the building is under monumental protection and the potential options how to deal with it. The details of this interview can be found under Appendix III.

Main conclusions from this interview were:

- The monument used to be at status from local importance, however in 2021 it changed to regional importance. This means the property qualifies for national funding for restoring and maintaining cultural heritage.
- The history and different rebuilding of the bridge are documented by the cultural heritage office.
- It would be possible to remove the monumental state of the bridge, this could be done through applying for it via a committee inside the cultural heritage board,
- There could be interest and more support for removing most of the bridge but keeping the signs. In this case, there could come a plaquette next to the river, stating the previous situation and the reasons for removal.

Legal background river management Latvia

Currently, the legal background and responsibilities of river quality is not clear yet. The rivers in general are under the final responsibility of the Ministry of Environment, where on the other hand the state of the fish is under the Ministry of Agriculture. The endangered species are then again however under the Ministry of Environment.

There is a division between private and public waters. Of all the rivers in Latvia, 42 are public. The rest is privately owned. However, this does not take away the final responsibility of the government to maintain a good quality of the rivers.

Important to notice, is that for the privately owned rivers, the riverbed is private, but the water itself is still public.

CHARACTERIZATION - SOCIAL

PREVIOUS OWNERS' OPINION OF THE DAM

As the paper factory origins from the Sovjet Union, the factory used to be communal. It is unknown who the owner has been afterwards, but it is known that businessman Alfred Aizbalts has bought the factory in 1997 for a symbolic amount of 1000 lats, with a depth of 67000 lats. Under the condition that the profile of the paper factory will be kept intact, these depths would be capitalized. The factory has a new name, with a number 2. (Ozoliņa, 1997). He already had plans to make a small hydropower plant with a fish road and canoe opportunity. The factory would serve as a fish farm, and many large institutions have helped with the planning.

In 2002, there were plans of the board of SIA «Salacas valevia» to buy the paper factory, with the aim to separate the factory and the dam. The management of the paper factory would be from a private investor and financiation from a loan from Salaca Valley and donation of a Danish Environmental fund (Šmite, 2002).

The current owners, Werners Apinš and Evija Dreimene, have been the most recent owners from 2016. In reports about their vision of the paper mill, they state to have a will for change and cooperation. They state to hope for a compromise solution where there is an advantage for all parties.

From recent news articles (4. Studija 2022), they also seem to hope on using the dam for a small hydropower station, with mentioning creating openings for jobs. The flow velocity of the Salacas river is quite constant which would cause 1.6 megawatts. However, in the 1990's there was already a plan of reconstructing the dam for a hydropower station. This was canceled, due to that fact that the Cabinet of Ministers put the Salacas on the list of rivers where construction or renovation of hydropower stations is forbidden.

RECENT CONTACT WITH THE OWNERS

The first interaction with the owners took place on April 19th 2023, at the location of the paper factory and dam itself. The conversation was together with Verners Apins, who is the partner of the official owner of the paper factory (Evija Dreimane). The main findings from this conversation were the willingness of the owners to do something with the factory, and the importance of the bridge for functioning of the factory. This is currently the only route for big trucks to come to the factory.

Afterwards, there have been several meetings organized online, together with both owners. Here, main attention was put into mainstreaming the vision of the owners together with the river objectives and look into long term visions closely linked to their desires. The owners have shown their involvement in the factory and all they have done already. They are open for several situations and mentioned that one of the options could be removal of the bridge in case they can be assured of another route into the factory.

"In 2018 we acquired full object (19 buildings and land (3.7185 ha)) with strong intention to restore hydroelectric power plant and produce alternative energy. However, times are changing and over time we understood, that this is not as doable as we thought.

Now we see the object more as a huge land plot in which in each of its corners some action shall be taken. Regarding buildings we are looking very critically due to their poor condition - some can stay, some needs to be completely demolished, some shall be rebuilt etc.."

They have made a presentation to show all options, together with their vision for the future and collaborate talked about it. These visions have been showed to several experts, which helped in further developing the goals.

Investigation societal status of dam

As mentioned in previous paragraphs, the paper factory is important for the society around it. As the blooming period of the factory was in the 1985, there are still many inhabitants who have a connection with the functioning of the factory. Also, repeatedly is stated that removal of the factory would cause an end for the village Staicele. Due to this fact, the state was willing to buy and cancel the depths of the factory, under the condition to keep the factory working with paper.

As rural areas in Latvia are economically challenged, this project will have a good potential with focusing on the need of the villagers. Therefore, it is expected that the focus on rural development with the project will be needed.

Currently, the minister of agriculture, Didzis Šmits has indicated to put action into removing small hydropower plants and creating suitable fishways in Latvian rivers, paid for by funds. His vision is to also attract tourists in this way with more fish in the surface waters. (*Šmits: Mazās HES Latvijas upēs ir jājauc nost*, 2023)

Previous investigations

GEF Biodiversity protection project

At 9th of April 2001, an international organization GEF has received a project plan for biodiversity protection in the North Vidzeme Biosphere Reserve. This organization provides grants and other financing to projects related to topics as biodiversity, and water in developing countries.

They had gathered almost 1.4 million dollars for the complete project, where one part of the plan was removal of the dam ("PROJECT EXECUTIVE SUMMARY", 2003). It is unclear what happened to this project. The project has been closed in 2010, around the same time the other investigations have ended from a different source, the Nature Management Plan together with EU. It is expected that the process of expropriation has been around that time and stopped all the processes related to it. This however does not explain the delay from 2003 when the project was approved, until 2010 when the project was closed. According to plan should have been completed in 2008.

Nature protection plan

As the Salaca river valley is a Natura 2000 site, in 2005 a nature protection plan has been made for the framework of management of Natura 2000 sites (Biedrība "Baltijas Vides forums", 2005). Staicele belongs to the nature protection plan of the section 'Mazsalaca – Staicele'. In the report, an elaborate plan with budgets and time planning has been made, including the dam removal.

The plans about the dam included the following steps:

1. Develop a technical project for the restoration of fish migration through the Staicele dam (by ZBRA by engaging a certified construction company)
2. Survey the Salaca tributary dams and prepare a proposal for their removal, where possible (Society "Latvijas Angler Association')
3. Eliminate the obstacle to fish migration in Staicele (by ZBRA by engaging a certified construction company)
4. Release juvenile salmon in the upper reaches of Salaca (Staicele above the dam, at the inlets of Iyë and Nikuce) (by LZRA)
5. Inform the public about fishing restrictions and opportunities, as well as the need to preserve fish resources. (by "Salacas velÿja", Municipalities, ZBRA Association "Latvian Fishermen's Association").

ZBRA is short for Ziemeļvidzemes Biosfēras Rezervāta Administrācija - Administration of North Vidzeme Biosphere Reserve.

According to the plan, the dam should have been removed in 2006/2007 and there should have been a budget of 58,300 LVL for it.

The step that has been carried out is the technical report, which is made in 2009. Due to reorganization of archives, the full report is still missing, however parts are still available.

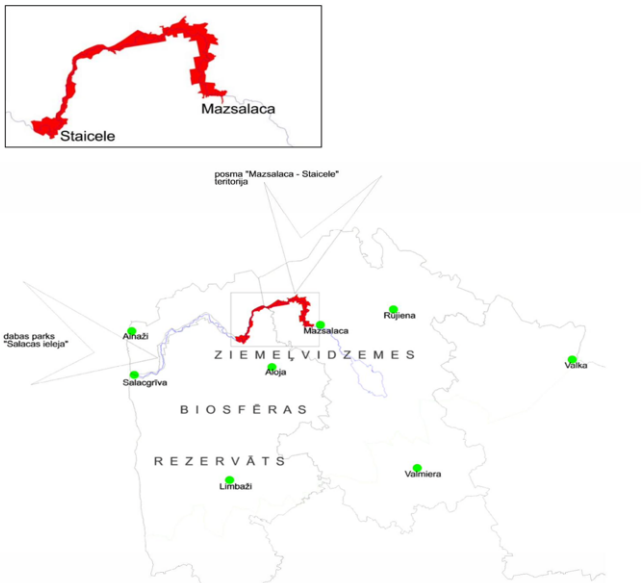


FIGURE 1 NATURE PARK "SALACAS VALLEY" AND THE POSITION OF THE SECTION "MAZSALACA - STAICELE" IN IT (BIEDRĪBA "BALTIJAS VIDES FORUMS", 2005)

TECHNICAL REPORT

The technical report has been made by BGS in 2008, which describes the technical situation of the dam (SIA "BGS", 2008). It concludes that the complete structure is in an unsatisfactory condition, with a degree of danger. They advised to hire an expert in searching a way how the bridge/dam complex could become safe again. Furthermore, the riverbank downstream of the dam is threatened by erosion. They recommend building a stone dam with special chambers to ensure passage of the fish.

Afterwards, a Swedish company ***Fiskevårdsteknik*** has been hired to follow up this technical report and show solutions for the situation (Herbrands, 2009).

He has mentioned four options in how to deal with the Staicele dam, with preference of total demolition and restoration. This would open the river for the fish and would also be most cost friendly. He has made a plan on how to enable this destruction.

Keeping and restoring the current dam which has been without maintenance for decades would be cost intensive.

The technical report has been made by the now bankrupt company BGS, and after contacting several people involved back in 2008 from all different institutions, no one has any knowledge anymore about the exact full content of the report. Even the engineer who wrote the conclusion did not have it. Two last options could be the national archive or the BIOR archive.

OVERVIEW STAKEHOLDERS

Within this project, the main stakeholders and their position are as follows: (ordered from large to small influence)

Dam owners

- The current owners of the whole property are a highly important stakeholder. Therefore, during the whole process they have been incorporated in the decisions. They are open for changes and show care for the local community. They have large visions of possibilities and have put a lot of effort into facilitating it. The need of opening of the river has become clear to them and are open into options dealing with it.

Villagers

- The factory seems to be of high social importance for the neighborhood. Recent news articles mention the Salaca river to be a pearl for the city Staicele and had opened a lot of opportunities for Staicele, such as the paper factory, the Salaca tram, attracting watersporters (about 4.000 in 2017) and the Staicele vimba festival ("Salaca – Staiceles pērle", 2018). By removing the dam, inhabitants could see this as a break in their local culture. This would mean that the solution should keep this in mind and is necessary to avoid opposition of the inhabitants.

Nature Conservancy Agency

- Organization responsible for maintaining the biosphere reserve and the natura 2000 areas (restoration law). As the Salaca river is included in these, they could play an important role into creating this opened river.

Vidzeme Planning

- Planning organization for whole Vidzeme region. Have experience in aquiring funds for regional development and indurstrial heritage. Have currently been starting into being involved in biodiversity and environmental projects. Could become main coordinator of project and with that helping realizing regional development.

LEGMC

- Latvian Environment, Geology and Meteorology Centre. Lead partner of LIFE Goodwater IP project. They are managing and monitoring the rivers on large scale in Latvia. Could play important role for potential modelling and water quality perspective of dam removal.

National Cultural Heritage Office

- As the whole property is under monumental protection, the cultural heritage office is an important stakeholder. Until now, acquiring contact with the office has been challenging. They have shown interest in talking together about the subject.

Government

- The current government has a change of view and are open minded about dam removal, as mentioned before by the statements of the current Minister of Agriculture. Both Ministry of Agriculture and Ministry of Environmental Protection and Regional Development have shown interest and are well aware of the benefits of dam removal. Some push from the ministry could help in creating a success in the project. Ministry of Environmental Protection and Regional Development is responsible for maintaining the ecological status in the river and Ministry of Agriculture for maintaining fish population.

Limbazi municipality

- There have been some reorganizations of structures, and currently Staicele falls under the Limbazi municipality. This municipality has been in contact about the factory already because of building permits and taxes around such structures. The head of the municipality has mentioned that the municipality could play a role in helping with infrastructural elements in the project.

Anglers

- Downstream of the obstacle, the angling organization "Salakrasti" has its territory in the Salaca river. This angling organization has been shown to be a very active in contributing to river management, using their profits on selling angling permits. It has for example been actively removing vegetation from the riverbed with co-financed machinery. At the obstacle itself and upstream of it, it is the territory of the "Ūdensroze" anglings organization. Both organizations have shown large interest of being involved in further process.

Canoers

- Canoeing on Salaca river is described to be a regularly chosen activity for Latvians. As Staicele is in the middle of the river, it is an excellent location for the canoe tourism. On several canoeing websites, the remains of the Staicele dam are currently mentioned as a warning. On one of their websites is mentioned several boats have drowned due to the obstacle. (UpesOga, n.d.). The canoeing community could be used in attracting Staicele for canoe tourism and canoe rental companies could be situated on the property with potentially cabins for the tourists to sleep.

BIOR institute

- This institute has a large scientific background of fish populations and the current conditions for fish in the stream. Made top 70 for obstacles to be removed and are currenlt working on a feasibility study for all those 70 obstacles. With scientific background and high knowledge about the impacts of obstacles, could play important role in process.

WWF

- Has experience in dam removal in Latvia already and have a good network of showing the impacts and the benefits of dam removal. Could play important role into communicating around the process.

Nature Protection Club (VAK)

- Involved in previous attempts of removal of Staicele obstacle. With background knowledge, interested in helping with the process as far as their current abilities go.

CHALLENGES

SOCIAL PERSPECTIVE OF DAM

As mentioned in previous parts of the report, one main challenge is the development of a positive and beneficial perspective on the opening of the river. In previous projects, not all stakeholders were agreeing on the on the proposed solutions and dam removal. Before opening of the river, good cooperation with all stakeholders and creating awareness of all the benefits of the situation need to be implemented. The first main steps for this have been taken and there is a positive view on the project. However, it is very important to keep this good contact and positive collaborate vision.

NEED FOR ECONOMIC BENEFIT

As mentioned before, this project will need a larger scope with incorporating a view with economic benefit for the local community. The paper factory has been important for the development of the area. Since the factory has stopped working, the development of the area has been decreasing.

Therefore, it is important to keep the need of economic benefit in mind.

As stated before, the current state of the dam/bridge construction is poor. Even without taking the dam removal into consideration, some kind of restoration needs to be done for the construction. The options for this stabilization have been investigated by BGS already, and cost analysis have been made in 2008. These already indicate the need of at least 600.000 euros for restoration of the dam/bridge. This could nowadays be higher due to increase of material costs.

SOLUTIONS AND POSSIBLE FUNDING

Due to the high importance of the paper factory and the need for removal of the dam, a most feasible project would be combining these two aspects. In this way, it is possible to get most of both economic as ecologic potential out of the project.

Together with an expert view, a plan has been made to achieve this. The plan would be a self-rewarding project which would make it possible to remove the dam and give opportunity to restore the paper factory.

FIGURE 2 ARTIST IMPRESSION OF ONE OF THE POTENTIAL OPTIONS OF THE SITE, WITH TRANSPORTING SALMONS, CANOEING FACILITY, AND SOLAR PANELS

NEW PURPOSE PAPER FACTORY

As the paper factory used to cause the bloom of the region, the environment could profit from a new purpose.

The area of the whole property is large and renovating it all will cost large amounts of money. Also, due to stimulating the local development, the idea is to choose smaller buildings within the property for restoring first.

These buildings could be used for example for an activity center for canoers, providing a bed and breakfast facility for travelers and an education and working base for the fishing society. As one of the main project goals is to let the salmon transfer through the river, this could be visually represented in the rooms of the renovated building. Live streaming of underwater cameras would show the salmon and increase awareness of the purpose of the whole project. This has been done previously already by removal projects in other countries.

FIGURE 3 POTENTIAL BUILDINGS WITH NEW PURPOSE OPPORTUNITIES

FINANCIAL POTENTIAL

The financing of the project could be based on a self-rewarding system. For example, solar panels could be placed on the roofs, which could even be funded by means of a loan.

The following table shows the potential rewarding of solar panels. They are based on solar panel and energy prices from the Netherlands, this could be slightly different for Latvia.

Number of solar panels	Price for purchase	Profit per year (after 7 years)	Total profit*
10	€6.000	€1.000	€8.000
50	€30.000	€5.000	€40.000
70	€42.000	€7.000	€56.000

*The calculation of total profit is based on a life extent of 15 years and a self-repayment period of 7 years.

The costs of the removal of the bridge/dam construction are estimated at €300.000-€500.000 by several expert opinions. The difference is based on the different techniques which should be used and how careful the process will be. Depending on the funding strategies and whether the solar panels will be paid for from a loan, the rest of the earnings could be used for restoration of the building.

SIMILAR PROJECTS

In Europe, there have been many river restoration and dam removal projects already, some similar to this one. For original belonging buildings to the dam, other projects have created a new function for these structures. For example the Kangaskoski Dam in Finland has used the belonging building as a hydropower museum, as the dam with building was previously used for the first Kaplan turbine (*Kangaskoski - Hiitolanjoki*, n.d.).

CONCLUSION AND FIRST STEPS

The Staicele paper factory and it's belonging dam have been subject of discussion for a long time. Recently, an investigation of the current status has been made in cooperation with all relevant stakeholders. After a feasibility study around the history and future steps of the project, the following plan has been made. This plan is based on a sustainable solution for the whole property and its surroundings with benefits and involvement of all stakeholders (local and national). The goal of this approach is to have involvement of all the stakeholders in the final solution, as a line to success.

Main goal: creating a sustainable solution for the Staicele paper factory and the Salaca river with local and national environmental, social and economic benefit for all.

There are a few steps in the process that will need to be investigated:

PLANNING OF THE AREA

The first step that will be needed to take is a technical investigation. After a technical investigation, it will be known whether the river obstacle could be removed with or without damaging the bridge. Depending on the outcome, there are two options:

1. Obstacle beneath bridge will be removed and bridge will stay. In this case some stabilization of the bridge will be needed.
2. In case it will not be possible to remove the river obstacle without removing bridge, the bridge will be removed as well. However, this bridge is of importance to the functioning of the factory, as it is currently the only route for trucks to reach the factory. In the case the bridge will be removed, there are two solutions for maintaining this route:
    a. Rebuilding the bridge. After technical investigation, it will become clear whether the piler, or the complete structure need to be removed. Depending in the outcome, the steps will be planned so it will be usable by large heavy transport.
    b. Creating another route. The area of the factory is quite large and there are in total 21 buildings, all built in different times and stages. Removing one or more of the later added small buildings would create the possibility of appropriate reaching of the property by trucks.

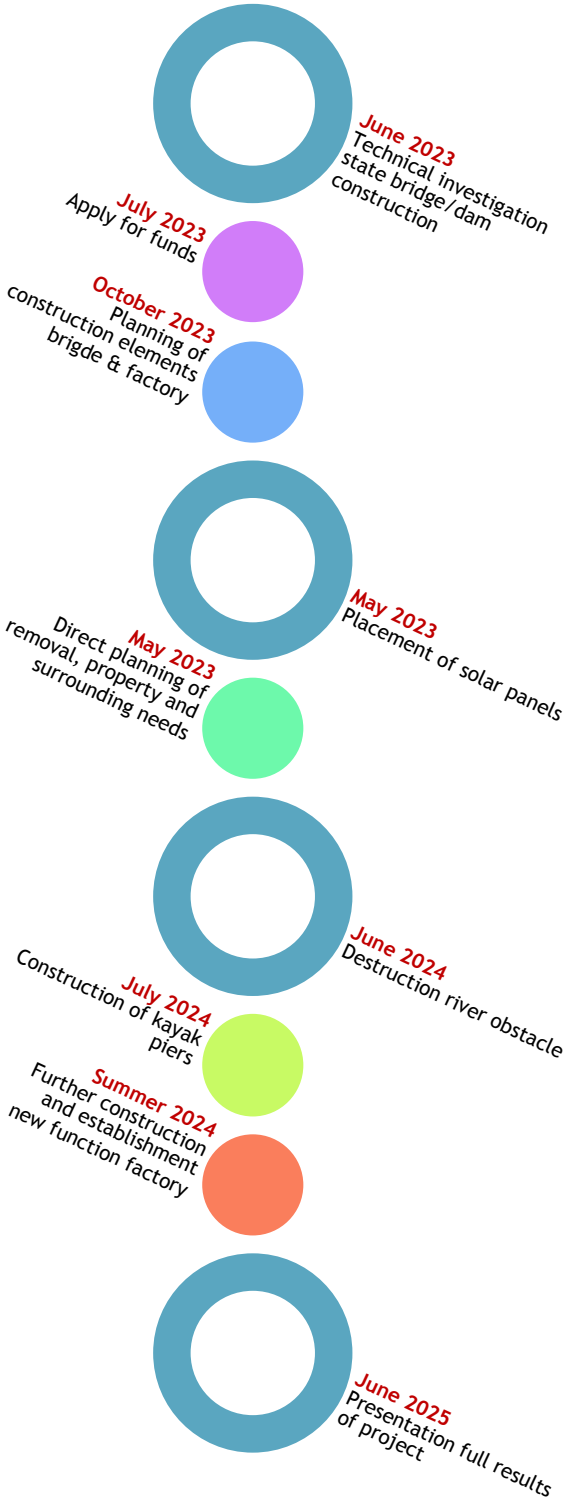
Part of the property is also the complex of a large inactive paper factory. This factory complex is due to its extraordinary history of local importance and is also under national cultural heritage. The opening of the river will not only have environmental benefits, however by combination of this project with the whole property, this could serve as a national showcase for good environmental management and could recreate the function of the factory complex for reblooming of local development.
New functions of the property area could become (in cooperation with the owners):

- Restart of production in factory
- Tourism facilities (canoe resting place, restaurant, accommodation)
- Anglers and fish research center (facilitation fish breeding spot/ visualization salmon transport)
- Sustainable electricity production (solar panels)

As the current state of the complex is not optimal, restoration of (parts) of the complex will need to be carried out. Involvement of the several parties is needed to carry the basis of the project. By involving the different stakeholders, all being responsible for a part of this project; the result will be prosperous for the long time.

It will be a long process with many small steps, with in the end an inspiring location for future generations. On the short term, the river will be restored, and first functions of the factory will become available. On the long term, the ecological status of the river will be significantly increased, and the factory will be the blooming center of Staicele village again.

PROPOSED TIMELINE FIRST GOALS



POTENTIAL PROJECT MANAGERS

For a successful implementation of the project, a local project manager will need to be acquired which shows dedication to the project and is willing to keep it evolving over at least 10 years to assure both goals of the project.

After the stakeholder meeting of 1st of June, it was concluded that the following organizations are able to be the potential project coordinators:

- Vidzeme Planning Region
- Nature Conservancy Agency
- BIOR

POSSIBLE FUNDING

There are several funds that could be useful for implementing the project and assuring the placement of solar panels or dam removal. The previous efforts and fund-raising activities could still be explored in making this project successful.

OPEN RIVERS PROGRAMME EUROPE

The fund opens twice a year, and the opening of the next round of this fund will be in July 2023. There would be an option in getting the full project of river obstacle removal and expenses paid by the project. After a talk with one of the responsible persons, it could become possible to finance a value of about 50.000 euros for solar panels, in case this amount stays within a certain percentage of the total obstacle removing money.

There are several categories in the funding, and there could possibly also be asked for the category that specifies for funding of a technical investigation to show the possibilities of maintaining the bridge and removing the river obstacle.

EUROPEAN UNION FUNDS

The following funds are from the European Union and require application via national authority or ministry. These however need a connection with municipality or NGO.

MARITIME, FISHERIES AND AQUACULTURE FUND

The budget per state is fixed for 5 years. Good cooperation with the government is needed in this case.

- Currently, there is a large budget of the European Maritime, Fisheries and Aquaculture fund available in Latvia. If well presented, it could even be possible to include for example building or fish education center or facilities for canoe tourism.

- Next to that: After a talk with Normunds Riekstins (head of Fisheries department, Ministry of Agriculture), he mentioned that the Fish fund itself could also exist for Staicele for administrative reports or technical investigation parts. The call for it has just finished, it could be available for next year. It is however not a very large fund, about 15.000 euros, with note that it is negotiable.

ENVIRONMENTAL PROTECTION FUND LATVIA

This fund had an opening ending 5th of May 2023, next one will be next year. Application for this fund is not very elaborate and could definitely be considered for implementation. Appliance as a legal person is possible, and they have very interesting funds which shows a good potential for comparable projects. For example, they could help with environmentally sustainable heating for the factory and tourism spots or help isolating the buildings.

LIFE APPLICATION

This fund is the European Programme for the Environment and Climate Action. The process of applying to this fund is quite tailed, however possible. These projects have national competition and require an excellent proposal. Deadlines for proposal submitting are closed at around November 2023. It could be considered to make this project one very large one, and at the same time trying to get national interest in it.

European Agricultural Fund for Rural Development (EAFRD)

The focus of this fund lays on local projects which help in rural development. The responsible organization in Latvia has unfortunately changed from the Ministry of Agriculture to the ministry of Finances. Using of this fund will directly go into restoration of the factory and creating new functions. There have been very large projects from them about restoring industrial heritage, and there is a very large EU budget for this specifically. Therefore, I think we would have a big chance, in case of a strong appliance.

Cohesion policy funds

(Information provided by Evita Bāliņa Senior Expert of Public Investment Development Division of EU Funds Strategy Department)

"The programme foresees support to promote and conserve biodiversity, but the support is focused for specially protected nature areas in Natura 2000 sites. The planned actions include habitat restoration and infrastructural development to reduce anthropogenic pressure, introduction of species protection plans, creation of green infrastructure elements outside of the Natura 2000 site.

Related to water bodies Programme foresees support regarding flooding and coastal erosion risk mitigation measures of national importance. Flood protection measures primarily is planned in flood risk areas of national significance according to national flood risk management documents. The planned actions include multifunctional green and blue infrastructure solutions for the prevention of and adaptation to flood risks, the creation, expansion, and reconstruction of urban stormwater run-off systems; measures to reduce the risk of coastal erosion, including the application of priority green solutions (e.g. artificial dunes, stacks of stones, the creation or restoration of vegetation).

For detailed information, we kindly ask you to contact the **Ministry of Environment Protection and Regional Development,** specifically department responsible for EU funds investments (https://www.varam.gov.lv/lv/strukturvieniba/investiciju-politikas-departaments).

Regarding the planned renovation of the historic paper factory the Programme foresees measures for the restoration of cultural monuments of regional significance, with the aim of increasing the number of visitors to the cultural sites. For detailed information, we kindly ask you to contact the **Ministry of Culture**, specifically department responsible for EU funds investments (https://www.km.gov.lv/lv/strukturvieniba/eiropas-savienibas-fondu-departaments)."

Other possible fundings could come from different private organizations with fish migration facilitation aims.

CONCLUSION AND RECOMMENDATION

In conclusion, there is a lot of potential in the realization of the opening of the remains of the Staiceles dam. Previous investigations and efforts have been carried out and show the importance of the dam removal.

The lessons learned from these investigations have been used for establishment of a new project plan. By good communication with all the stakeholders and active search for the financial benefit and fundings, this project could aim for success and establish a good example for future dam removal processes in Latvia.

STAKEHOLDER MEETING CONCLUSIONS

After the meeting of 1st of June there were a few short-term steps and a few long-term steps planned.

Some main questions that raised:

- What is the vision of the Cultural heritage office?
- Which order was the dam built? Bridge first, dam after? Or bridge on top of dam?
- What is the exact vision of the owners?

Overall, at the end of the meeting all stakeholders have agreed on the fact that the way to solve this Staicele problem is by looking into the larger picture. There were some discussions about other options, like making a raise in riverbed towards the obstacle. However, due to the possibility for getting this project towards a higher aim, and avoidance of future maintenance costs, conclusion was to neglect these.

COORDINATION:

Vidzeme planning region has agreed onto looking into the opportunities into becoming the coordinating party for it all. This does not mean they do all the work; the different stakeholders will separate the tasks into their specialty and agreed on being involved.

TECHNICAL REPORT:

BIOR has offered to deal with it. However, due to budgets they will need to apply for it next year, wherefore the technical assessment can take place after one year. Other option would be via Open Rivers Programme; however, this would also mean it will take time until next summer.

NEXT STEPS:

This group will be used, and a next meeting will be planned. Before that, there should be an estimation of the costs of a technical investigation.

Owners have mentioned to agree on technical assessment, however only when the exact questions are discussed with the owners beforehand.

FIRST NEXT STEPS AND PROPOSED TIMELINE

Action points:

1. Contact Cultural Heritage office

2. Ask for estimation costs technical assessment
3. Figure out who will pay for technical assessment
4. Schedule next meeting
5. Make sure another route can be used.

Overall, most important first steps have been achieved: the contact with the owners is well, different organizations are on one line about the vision and future steps of the project and there is a large will into succeeding. The cultural heritage office also seems to contribute to the conversation, and socially there is more and more support for the process. To make sure this project will succeed, there is need for a project manager taking over these first important steps.

By keeping the good contact between stakeholders and assuring the establishment of restoration of the river together with the factory, this project is shown to be feasible.

REFERENCES

Biedrība "Baltijas Vides forums". (2005). DABAS AIZSARDZĪBAS PLĀNS: Ziemeļvidzemes biosfēras rezervāta dabas parka "Salacas ieleja" posma "Mazsalaca - Staicele". In https://www.daba.gov.lv. Retrieved at March 8th 2023, from https://www.daba.gov.lv/lv/media/10655/download?attachment

EUNIS -Site factsheet for Salacas ieleja. (n.d.). https://eunis.eea.europa.eu/sites/LV0302200

Herbrands, M. (2009). Possibilities of creating a fishway in Salaca near the Staicele Dam: No. 00013363/2009/2. Fiskevårdsteknik AB.

Kangaskoski - Hiitolanjoki. (n.d.). https://hiitolanjoki.fi/en/kangaskoski/

L. (n.d.-a). *SALACAS IELEJA, 44103025812 - company data*. Retrieved at March 15 2023, from https://company.lursoft.lv/en/salacas-ieleja/44103025812

Leibenath, Markus & Badura, Marianne. (2005). Manual for the Evaluation of Natura 2000 Sites in Economic Terms.

Mantojums. (n.d.). Mantojums. https://mantojums.lv/cultural-objects/8777

Matisone, G. (2021, 10 juni). *Staiceles bijusī papīrfabrika - ēka bēdīgā stāvoklī, skurstenis rada bažas vietējiem*. LSM.LV. Retrieved at March 15th 2023, from https://www.lsm.lv/raksts/dzive--stils/pilsetvide/staiceles-bijusi-papirfabrika-eka-bediga-stavokli-skurstenis-rada-bazas-vietejiem.a408383/

Ozoliņa, G. (1997, 19 mei). Staiceliešu cerība - vecā papīrfabrika. Diena. Retrieved at March 15th 2023, from https://www.diena.lv/raksts/pasaule/krievija/staiceliesu-ceriba-veca-papirfabrika-10008835

PROJECT EXECUTIVE SUMMARY: Biodiversity Protection in North Vidzeme Biosphere Reserve. (2003). In I. Apene, thegef.org (PIMS 2190). GEF Operational Focal Point. https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/Multi-focal%20Area/Latvia%20-%20Protection%20of%20Bio%20and%20Intl%20Waters-VIDZEME%20Biosphere/Latvia%20NVBR-%20Executive%20Summary%20revised%20annexes.doc

Šmite, R. (2002, July 18). *«Salacas ieleja» gatavojas pirkt Staiceles papīrfabriku*. Dienas Bizness. Retrieved at March 15th 2023, from https://www.db.lv/zinas/salacas-ieleja-gatavojas-pirkt-staiceles-papirfabriku-172524

4. studija (2022, May 20). *Viens no «ļaunākajiem» zivju šķēršļiem. Jau 20 gadus nespēj palīdzēt lašiem un taimiņiem pārvarēt Salacu*. LSM.LV. https://www.lsm.lv/raksts/dzive--stils/vide-un-dzivnieki/viens-no-launakajiem-zivju-skersliem-jau-20-gadus-nespej-palidzet-lasiem-un-taiminiem-parvaret-salacu.a457688/

Salaca – Staiceles pērle. (2018, 26 januari). *Alojas Novada Dargumi*, 2.

Šmits: Mazās HES Latvijas upēs ir jājauc nost. (2023, 20 januari). nra.lv. https://nra.lv/latvija/403340-smits-mazas-hes-latvijas-upes-ir-jajauc-nost.htm

SIA "BGS. (2008). *Assessment of the Salacas dam near Staicele paper mill* (No. 00013363/2008/15). Bioloģiskās daudzveidības aizsardzība Ziemeļvidzemes biosfēras rezervāts.

Singh, N., Ustups, D., Jokinen, J., Häggström, H., Piotrowicz, J., Abersons, K., Kalinowski, M., Kesler, M., Nika, N. 2021. Success Or Failure Of River Restoration Projects: A multi-factorial analysis in the BSR. A publication of the RETROUT Project, 49 pp.

STAICELE. (n.d.). http://www.staicelesnovads.lv/2007_2012/turisms/viksnu_alas.php

UpesOga (n.d.) Salaca. upesoga.lv. https://upesoga.lv/lv/marsruti/river/42-salaca/route/427-mrnieki-l-vecsalaca-n

APPENDIX

APPENDIX I NATURA 2000 THREATS AND PRESSURES

Rank	Threats and pressures		inside/outside
H	A03.03	Abandonment / lack of mowing	i
M	A11	Agriculture activities not referred to above	i
M	B07	Forestry activities not referred to above	i
M	G01.01.01	Motorized nautical sports e.g. jet-skiing	i
M	G01.08	Other outdoor sports and leisure activities	i
M	H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities	both
M	I01	Invasive non-native species (plant & animal species)	i
M	I02	Problematic native species	i
M	J03.02	Anthropogenic reduction of habitat connectivity (fragmentation)	i
M	K01.01	Erosion	i
H	K02.01	Species composition change (succession)	i

APPENDIX II MONUMENTAL PROTECTION ZONE MAINTENANCE RULES

Unofficial translation from government site

1. In the protection zone of the cultural monument, the following shall be preserved:

1.1. The structure of the historical planning characteristic of the surroundings of the cultural monument.

1.2. The characteristic landscape of the surroundings of the cultural monument (except for indoor ones) (consisting of its elements – road network with historical type of covering, plantations, alleys, forests, fields, meadows, their contours, characteristic vegetation, historically characteristic buildings, historical character of amenities, historical engineering structures) .

1.3. The historical land relief in the immediate vicinity of the cultural monument.

1.4. Water bodies, their shore boundaries and natural (or historical artificial) shore formation.

1.5. Access to the cultural monument (free or partially restricted).

1.6. The possibility of unhindered perception of the cultural monument from traditional or important viewpoints.

1.7. In the view of the characteristic, historically important landscape from the cultural monument.

2. When using and staying in the protection zone of the cultural monument, the following should be taken into account:

2.1. The possibility of discovering new parts of the cultural monument.

2.2. Fire safety.

2.3. The need for a favorable hydrological regime for the cultural monument.

2.4. Air cleanliness necessary for the preservation and use of the cultural monument (not allowing increased pollution levels).

2.5. In order not to increase the noise level that disturbs the use of the cultural monument.

2.6. So that the perception and use of the cultural monument is not hindered by excessively bright and unfavorable artificial lighting.

3. The following is prohibited in the protection zone:

3.1. Take actions that destroy or significantly transform the values to be preserved in the protection zone of the cultural monument.

3.2. Establish waste storage landfills.

3.3. Carry out activities that cause soil movement or landslides in the immediate vicinity of the cultural monument.

3.4. Store or place explosives or flammable substances, except in specially designated areas.

3.5. Store or dispose of chemically active or corrosive substances.

3.6. Create vibrations that threaten the monument.

3.7. Place storage facilities for fodder, mineral fertilizers, fuel, lubricating materials, chemicals, construction materials and other types of materials that transform the landscape characteristic of the cultural monument, except in places specially designed and arranged for this purpose.

3.8. Increase the traffic load, which negatively affects the preservation of the cultural monument.

3.9. Search for antiquities without the permission of NKMP

APPENDIX III CULTURAL HERITAGE INTERVIEW

Talk with Aivars Igals April 26, 2023

Background: doesn't speak English very well. Kaspars Abersons and Isabelle Alten visit him. Kaspars Abersons translates the questions and answers.

1. In what way are you aware of the monumental status of Staicele?

   I was directly involved in it at the time it became a monumental state. I was the one that set up the exact borders and planned the Staicele project.

2. Could you tell me in detail what this entails?

   It all started in 2010. The municipality asked about inclusion of mainly the streets. The idea of the municipality was first only to include the Main Street, and in case possible the factory as well. Initially, the bridge was not included. It did not exist in papers of cadastral objects. To see all the history, you will need to go through all protocols. It ended as a part of the factory and a part of the landscape

3. What is the reason why the bridge is part of the cultural heritage?

   Initially, its function was a railway road for transporting of goods. All construction of the bridge is serious and impressive. We have nothing against lowering of the head of the dam. However, we are totally against demolishing of the bridge. It will need to be removed from the heritage site first. To do that, a specific commission needs to decide on it. It will be a complicated bureaucratic procedure.

4. (Is it correct that this bridge is from a different time than the factory?)

   It is still the original from the 18th/19th century. In 1910 reconstruction has been done, with some adjustments. Upper part might be new. To know the details of which part is from which time, you will need to go through a lot of papers. You can do it easier as well and look at it from on site. Then you could see which parts are newer and which part not.

5. The current state is so to say very bad; do you have any regulations for it? And in case it is a dangerous object for people?

   In attitude towards the heritage, the technical status is not a criterion. It is the duty of the owner to maintain it.

6. Is there any financing for repairing monuments in such a bad state?

   Until this year it was an object of local importance, in local importance the financing is only from the municipality. From January 1st, the site has moved to the status of regional importance. In this case it is possible to apply for state funding. We have our own program for saving heritage sites, with funding of different cultural heritages (also movies/theatres) and other state programs.

7. What will you do in case the structure collapses from itself?

   It does happen sometimes. At first, we try to contact owners and have on site investigation. If owners do not take action afterwards, we can make an administrative fine starting from 250 euros, which could increase. We even have cases of 10 thousand euros. (After question Kaspars if they actually pay it, he answered that there was a case that due to bankruptcy, it was gone, however did not really want it to get translated.) We try to work more together with the owners.

8. What are your plans of dealing with the property?

   We mainly focus on projects where the heritage has threats. The applications for it should come from the owner's site. On our homepage you can find more information about it.

9. Have you ever considered rebuilding of the property with same state?

   If it comes to this specific site, it could be considered. However, for this we have more priority towards buildings which have been built in a bad way from the beginning, like the Sovjet buildings. So, buildings with initial lacking of buildings technology. If walls are in a bad quality, we could look into it. To make this decision, technical certified papers are needed first. We will not offer this; you will need to find an engineer yourself.

10. What would be other options from your side with helping to protect this monumental property, with the current strategy it will one day just collapse.

    The question is, if owner does not have money to maintain the property, does he need to keep the property? One should not buy a castle if you do not have the money to maintain it. I am not much interested in finding solutions. He could do a lot: try making it a concert hall or art place or restaurant etc. He could also use advantage of the Salaca river, it is almost in the middle of the river. Last time we visited the site, we saw some attempts of the owner to maintain the site, so that is good for us.

11. There seems to be a conflict between keeping cultural heritage at the one side and the current EU goals of restoring free flow rivers. What is your vision on that?

12. Would it be an option for the Staicele case, to keep the sides of the bridge with a monumental description?

13. Would you be interested to help with cooperating on a good solution for Staicele? For example, helping with acquiring necessary funds?

APPENDIX IV PARTICIPANT LIST STAKEHOLDER MEETING

Participant list Stakeholders meeting June 1st 2023: **Salaca river restoration and local Staicele development**

Nr	Name	Organization	Phone number	Signature
1	Didzis Ustups	ZI BIOR	26366098	
2	Laura Ķukāne-Kerus	VARAM	29396135	
3	Alīse Ajalis	NK u SALACKRAST	28366057	
4	Edijs Leoke	Life is Salaca	26557196	
5	Verners Apiņš	Fabrikas īpašnieks	28747369	
6	Evija Apiņa	Fabrikas īpašniece	28376023	
7	KASPARS ABERSONS	ZI BIOR	26547795	
8	KRISTA PETERSONE	Vidzemes PR	29416535	
9	Normunds Riekstiņš	MoA	29156051	
10	Edīte Kublina	MoA	26140894	
11	Ričards Kaupužs	BIOR	20231922	
12		BIOR	26316185	
13	Aldis Auziņš	VAU	25989947	
14	Linda Fibiga	LVĢMC	29221828	
15	Jānis Sīve	LVĢMC	29161173	
16	Ruta Meeder	BIOR	0	
17	Isabelle Alten	Dam Removal Eu + BIOR	+31611206190	

Online: participant list Stakeholders meeting June 1st 2023: **Salaca river restoration and local Staicele development**

Nr	Name	Organization	Phone number/ email	Signature
18	Toms Arnavs	Udensroze	29283994 toms.arnavs@vvd.gov.lv	
19	Daiga Vilkaste	VARAM	Daiga.Vilkaste@varam.gov.lv	
20	Anna Siliņa	Limbazi Municipality	22037299 anna.silina@limbazunovads.lv	
21	Kristaps Pilskalns	MoA	Kristaps.Pilskalns@zm.gov.lv	
22	Herman Wanningen	World Fish Migration Foundation	herman@fishmigration.org	
23	Gita Strode	Nature Conservancy Agency	29455010 gita.strode@daba.gov.lv	
24	Elita Dreimane	Behalf of owners for engineering background		
25	Rihards Būda	Staiceles pagasts	28652353 rihards.buda@limbazunovads.lv	

Appendix V Checklist by Laura Wildman

Dam Removal Feasibility Checklist for Project Proponents

Save the Sound
Action for our region's environment.

Developed by Laura Wildman

	Question	Yes/No	Comments (from Project Proponents)
Ownership	Is the dam owner in opposition to removing the dam, regardless of cost and the outcome of a Feasibility Analysis?	No	
Access	Are there any insurmountable issues with getting permissions to access the dam site or the impoundment?	No	
Current use (& economic value of dam)			
Flood control	Is the dam an official flood control dam (was it constructed for the purpose of reducing flooding downstream)?	No	
Water supply	Does the dam and its impoundment serve to supply water to the public or an industry?	No	
Fire suppression	Is the dam's impoundment used for fire suppression?	No	
Navigation	Does the dam serve a navigational purpose?	No	
Hydroelectric	Is the dam an active hydro-electric facility, or is it looking to become a hydro-electric facility in the near future?	No	Ideas of becoming HPP were there but legally not possible and not in picture anymore
Recreational	Does the dam serve an active recreational use (i.e. the impoundment has a public boat ramp, there are multiple lake front homes surrounding the impoundment, this is where the town's fishing derby is held every year, the pond is a renown warm water fishery that is heavily utilized, etc.)?	Yes	Local fishing festivals are held
Ice Jam Control	Was the dam constructed for the purpose of controlling ice jams?	No	
Water rights, and other legal rights	Do you know of any legal rights that others may have to water diversions supplied by this dam, or of any lake abutters may have legal rights in regards to the dam or its flow releases?	No	However legally the monumental status might include regulations of water status
Sediment			
Quality[1]	Is the impounded sediment contaminated?	Unknown	Estimated no, due to no harmful chemical substances found in soil by other reports regaring water quality.
Ecological Impacts	When compared to the NOAA ecological (freshwater or marine, depending on the location) screening criteria were any of the results in excess of the criteria?	Unknown	Sediment quality not measured yet.
Human Exposure	When compared to your State's Human Exposure Criteria were any of the results in excess of the criteria?	Unknown	
Quantity[2]	Is the quantity of impounded sediment behind the dam so high that, if sediment excavation and relocation off-site were required, it would be outside of the funding potential for this project?	No	
Infrastructure/utility impacts			
Bridges[3]	Is there a bridge at the dam site or upstream, within the backwater of the impoundment at high flow, that would be undermined if the dam were to be removed (i.e. the foundations of the abutments or any in-channel piers are shallow and potentially resting on impounded sediment)?	No	
Culverts[4]	Is there a culvert upstream, within the backwater of the impoundment at high flow, that would be undermined if the dam were to be removed?	No	
Buildings/Foundations	Is there a foundation of a building near the dam or within the backwater of the impoundment at high flow, that would be undermined if the dam were to be removed?	No	
Roadways/Railroad	Is there a paralleling roadway or railroad embankment near the dam or within the backwater of the impoundment at high flow, that would be undermined if the dam were to be removed?	No	
Retaining walls	Is there a retaining wall near the dam or within the backwater of the impoundment at high flow, that would be undermined if the dam were to be removed?	No	
Subsurface utility pipes/lines[5]	Are there any subsurface utility pipes or lines near the dam or within the backwater of the impoundment at high flow, that could become exposed or undermined if the dam were to be removed?	No	
Overhead utilities	Are their any overhead wires that are low enough to create a problem for construction equipment during a dam removal or that might make accessing the site impossible?	No	
Wells	Are there water supply or residential wells near the impoundment that could be impacted as a result of removing the dam?	No	
USGS Gage	Is there a USGS Gage on the dam or withing the backwater of the dam's impoundment?	No	
Flooding & hydrologic impacts[6]	Even if the dam is not an official flood control dam, does it have the potential to attenuate flood flows? (see Description & Methods below for explanation of how to determine this)	No	
Geomorphic equilibrium[7]	Is there any signs of geomorphic instabilities in the channel below the dam (i.e. is their a headcut that has extended to the base of the dam after the dam was constructed)?	Yes	
Historic/archeological[8]	Are their any know historic or archeological concerns that may preclude the removal of the dam?	Yes	
Public health & safety[9]	Is the dam in exceptional condition and in full compliance with all State Dam Safety Requirements/Codes?	No	
Environmental concerns & benefits	Are their highly valued man-made wetlands that will be eliminated if the dam is removed (i.e. high value wetlands that were created due to the dam's construction)?	No	
Sensitive or invasive species[10]	Is their a Rare, Threatened or Endangered Species within the impoundment or a wetland associated with the impoundment, that can not be suitably protected if the dam were to be removed? (Note: if there is a RTE species downstream typically suitable sediment and flow management can be incorporated into the dam removal design to protect those RTE species)	No	
Cost & funding availability[11]	Is there no funding available to remove the dam? (see resources described below)	No	
Aesthetic & sentimental value	Does the site have any outstanding aesthetic features or known sentimental values that may eliminate the possibility for removing this dam?	Yes	
Community concerns	Do you know of any community concerns that may eliminate the possibility for removing this dam?	Yes	Picknick boat tourists & lowering of water level in derivation channel could lower anglers interest in property.

If the answers to the first and/or second questions are YES, then dam removal is not feasible.

If the answer to all of these question is NO than it is highly likely that removing the dam is feasible and would result in an overall improved ecological condition for the river system.

If one or more of the answers to these questions was YES or UNKNOWN, then additional work is needed to ensure that the removal of this dam is feasible, and can be completed with no increased human risks and minimum impacts to the environment and infrastructure/utilities.

DESCRIPTION & METHODS

1 Sediment Quality

Impounded sediment should be tested for **total solids, metals, total cyanide, grain size, pesticides, total PCBs, semivolatile organic compounds (PAHs)**, and compared to the s**tate residential land use standards** and the **NOAA Sediment Probable and Threshold Effect Concentration (PEC & TEC) SQuiRTs Criteria for Freshwater or Marine environments** (https://repository.library.noaa.gov/view/noaa/9327/noaa_9327_DS1.pdf?). These consensus-based sediment quality guidelines have been developed to synthesize previously published toxicity studies and have been shown to be both accurate predictors of sediment toxicity and negative predictors for toxicity to benthic invertebrates by direct contact. These NOAA guidelines have been established in two-tiers: Threshold Effect Concentration or Level (TEC or TEL) and Probable Effect Concentration or Level (PEC or PEL). **TEC/TEL is the concentration below which harmful effects are unlikely to be observed**; **PEC/TEL is the concentration above which harmful effects are likely to be observed.** These guidelines do not consider the potential for bioaccumulation and are not intended to serve as site-specific clean-up levels. Instead, they are applied to facilitate the decision-making process regarding sediment management; an absence of exceedances generally serves as a defensible basis for no further investigation. State residential exposure criteria are typically based on daily contact for multiple years, and thus serves as a conservative threshold for human health risk if the impounded sediment is exposed post dam removal. Where possible, it is important to try to sample sediment from the full vertical extent of the impounded sediment deposit and focus on collecting samples from the finer grained material, where contaminants are more likely to bind.

When collecting samples by hand this can be accomplished with a clear plastic Shelby tube (advanced into the sediment by hand or with a hand held vibracore attachment) or sediment sampling auger equipment such as the examples found at https://www.ams-samplers.com/hand-tooling/soil-samplers/soil-sampling-kits.html (Note: proper decontamination methods will need to be conducted between samples).

Some states have specific guidelines for how many samples need to be collected, but most states do not, and therefore it is suggested that sediment sampling plans be developed and reviewed by the appropriate state regulators. However screening level testing does not need an approved sediment testing plan.

2	**Sediment Quantity**	Total sediment quantity is typically estimated based of the sediment probing results, that determine the depth of the impounded sediment deposit. When water depths or sediment depths are too deep to determine with hand held sediment probing equipment (such as graduated rebar, extendable tile probe https://www.ams-samplers.com/5-8-x-3-extendable-tile-probe-complete.html, sediment sampler, or range pole), mechanical borings from a barge mounted (or tripod mounted if the impoundment is shallow enough) drilling rig may be needed to determine the depth to refusal. It is important to log the probes/borings to describe the character of the sediment encountered and the character of the underlying material (i.e. original riverbed of floodplain material; refusal). Sediment samples are typically collected during the sediment probing or boring work.
3	**Bridges**	If there are bridges over the dam or upstream of the dam, within the extent of the impoundment under high flows, it is very helpful to gather bridge engineering design plans from the municipality, state DOT or Federal Highway Administration if they exist. These plans should show the extend of the abutment and pier foundations and describe if the footings are founded on bedrock, piers, or are spread footings potentially on impounded sediment. As built plans are always preferred since the footings of the bridge may have been modified during constructions to adapt to conditions found in the field.
4	**Culverts**	If there are culverts upstream of the dam, within the extent of the impoundment under high flows, they could become subject to scour and therefore be either undermined or transition into a drop culvert outlet, which would not restore riverine connectivity post dam removal. Investigation of the culvert in relation to the anticipated water depth drops and sediment transport will be important.
5	**Subsurface Utilities**	The municipality and or state should be contacted to help determine if there are subsurface utilities near the dam or within the upstream area of impact. It is especially critical to identify subsurface utilities that cross the channel bed or impoundment for these can be undermined or exposed post dam removal. However utilities paralleling the river or impoundment may also become an issue and should be identified. Most states have a services that can help identify these subsurface utilities (i.e. Ohio811; CT: Call Before You Dig; PA One Call)
6	**Flooding & hydrologic impacts**	Even if a dam was not constructed to reduce flooding downstream, the dam may still provide some level of flood attenuation. One quick check, without conducting a hydrologic or hydraulic analysis, is: If the dam/spillway extends channel bank to channel bank and is constantly spilling, then the dam likely provides no reduction of peak flood flows. However if the dam has a spillway section and also a higher section of the dam crest, that does not overflow, then the dam/impoundment may attenuate flood flows and may need to be assessed further in order to determine if the dam can be removed without impacting downstream properties. Most small dams have little to no ability to attenuate flows and can be safely removed without impacting downstream properties.
7	**Geomorphic equilibrium**	If the downstream channel is highly entrenched that could be a sign that a headcut has extended to the base of the dam. Removing the dam could therefore propagate that headcut farther upstream and cut into what was the underlying streambed material prior to the construction of the dam. This can lead to an "unraveling" and entrenchment of the upstream system and the dam removal design would need to determine the best method to limit or mitigate this potential impact prior to proceeding with dam removal.
8	**Historic/archeological**	Any structure over 50 years in age has the potential to be historic, and archeological sites could have been submerged by the dam's impoundment, thereby protecting them from looting. It is therefore critical to contact the State Historic Preservation Office (SHPO) to ask if the dam has any historic value or if their are any archeological concerns if the dam were to be removed. Most states have a simple form that should be filled out when a dam removal option is being considered for a site.
9	**Public health & safety**	It is important to determine if a dam is considered a state regulated dam or not, because this effects permitting and requirements for the dam. This can be done by contacting the State Dam Safety Office. If the dam is a state regulated dam you should ask what hazard classification the dam has, and if there are past dam inspections that are currently available. Some dams may even have active Dam Safety Orders requiring the dams to be repaired or lowered/removed. State Offices of Dam Safety often have a significant amount of data in regards to state regulated dams that can be very helpful when removing a dam and trying to keep project costs to a minimum.
10	**Sensitive or invasive species**	Check the state databases to determine if there are any rare, threatened or endangered species upstream or downstream of the dam. For the upstream reach, extend your search just above the extent of potential impact. For the downstream reach, extend your search to the confluence with the next major river.
11	**Cost & funding availability**	There are numerous funding sources that can help reduce the cost of dam removal for the dam owner or project proponents. Some of these resources can be found at: https://www.americanrivers.org/river-restoration-funding-sources/