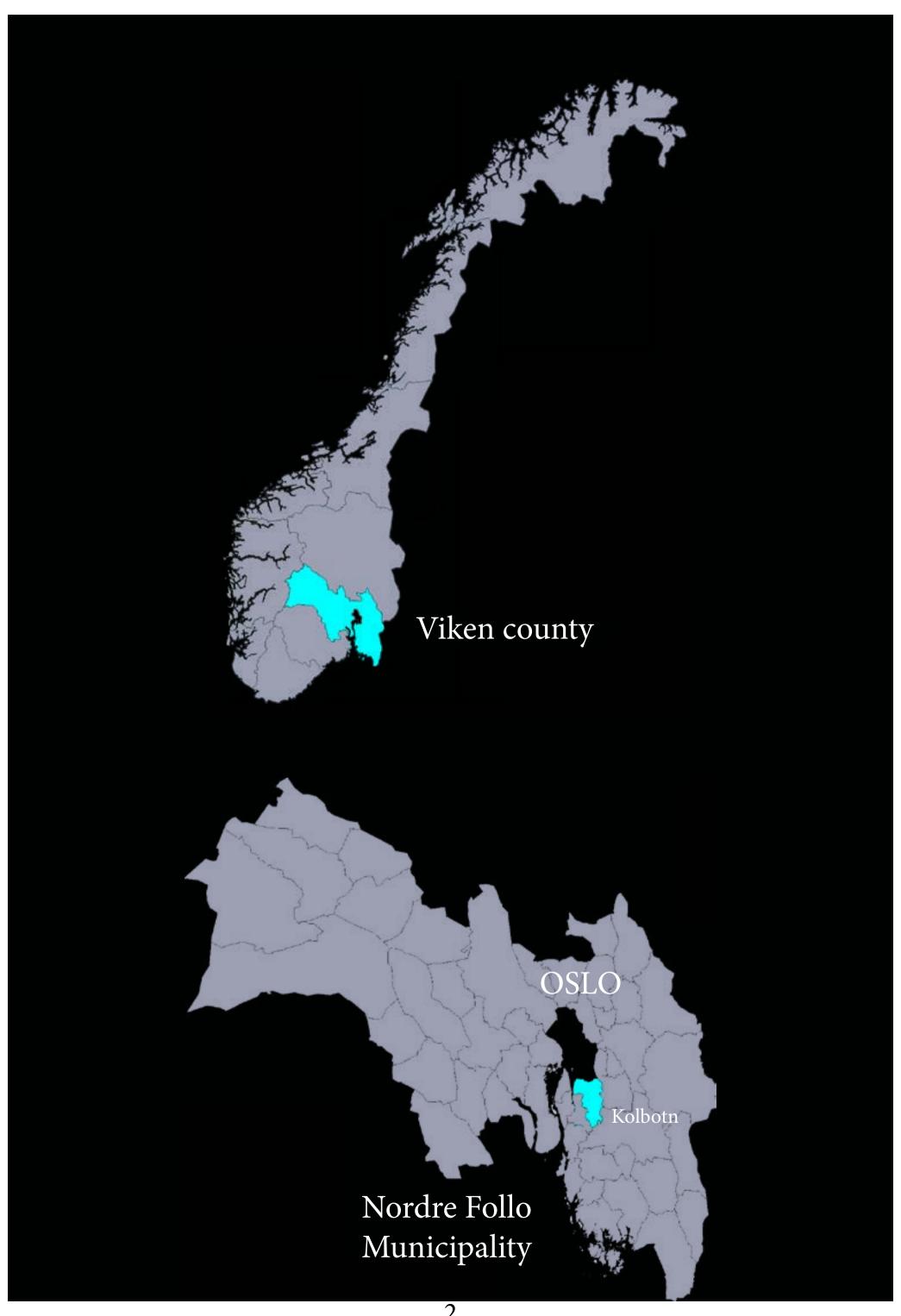
# You reap what you sow

-The remediation of Kolbotn lake

Diploma program: Adrian Højfeldt

Bergen Arkitekthøgskole June 2021



## Context

Kolbotn is a suburban site located 12 km south of Oslo. This place started as farmland until the sewer pipe system was completed in 1957. This changed Kolbotn from being a countryside location to a satellite city. Between 1957 and 1978 there was a great increasing number of residents that settled down around the lake in Kolbotn.



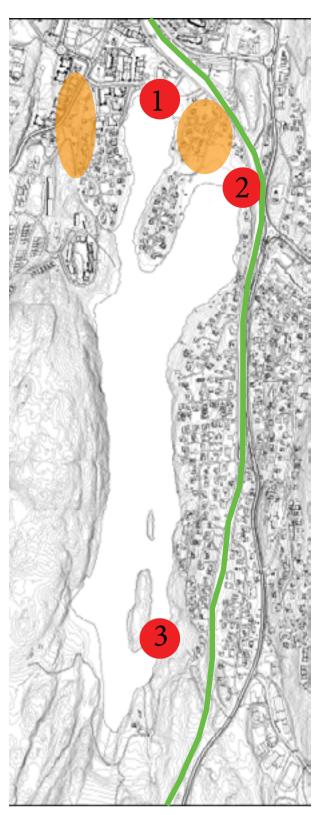


The lake is an important part of the identity of Kolbotn and has been extensively used for swimming, rowing boats, fishing, and more. Unfortunately during the years, the lake has gradually been more and more contaminated as a result of rivers with polluted water that ends in the lake.

After the beginning of the year 2000, the city center of Kolboth was torn down and replaced with Kolben culture house and a new square that had many new shops and apartments for the residents of Kolboth.

The lake however has gradually been more contaminated and has not been recommended for anyone to use for swimming since then. The sewer pipe system that was completed in 1957 had to accommodate increasing numbers of inhabitants, and maintenance/expansion became necessary. So far 40 % of the existing sewer pipe system has been replaced and enhanced.

The sewer pipe system combined with old surface water pipes is another reason for the increased polluted streams that find their way to the lake. As a result of this. The lake is suffering from the increasing growth of blue-green algae and coliform bacterias.



Kolbotn is surrounded mostly by private houses and properties. The three red dots represent the different access points for the public. However, to move from point 1 to point 2 or 3 makes the visitors walk on a road shared with the cars and next to the railway marked with green.

Marked with orange, is currently construction sites where old houses are being torn down and replaced with new facilities over several floors and a greatly increased number of apartments.

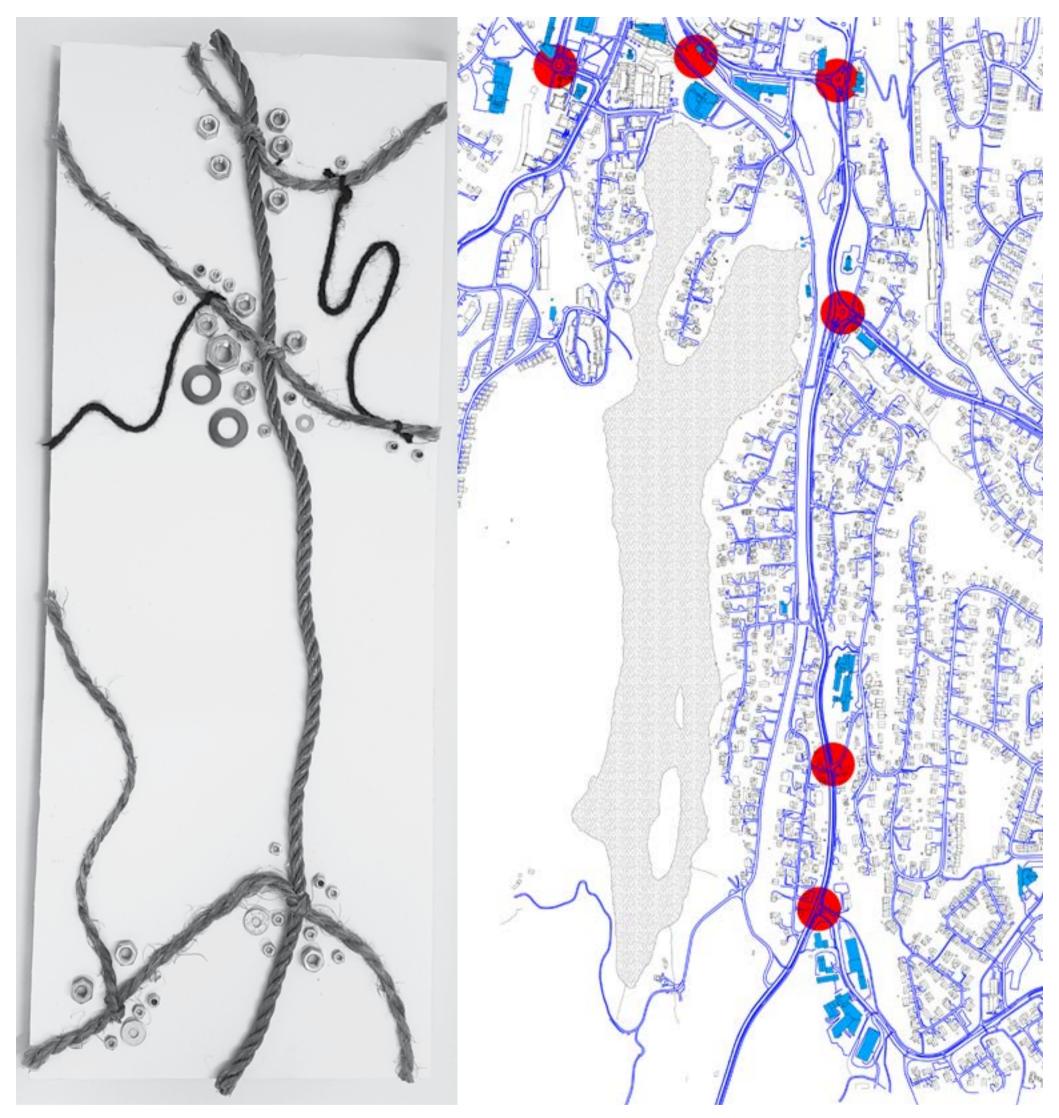
This process is gradually moving from the center of Kolbotn, and will most likely continue untile there's no more space for new buildings. This is a radical change happening around the lake. It's time to think differently around the lake as well.

Step one: Invite the residents to the lake from several more access points.

Step two: Place programs around the different streams that end in the lake to give the residents an understanding of the water conditions, and how to change the current situation for the better. Give the residents ownership of the lake.

Step three: Give the pedestrians a new pathway that variates between moving through the existing landscape and over the water surface connect to the existing infrastructure and the different locations for each stream.





Conceptual model illustrating the lake being neglected from the infrastructure designed for cars. Each connecting point has several public programs placed around the connecting points.

## YOU REAP WHAT YOU SOW:

## THE REMEDIATION OF KOLBOTN LAKE.

#### WHERE?

Since the 1700s, Kolbotn was a farming area with a few family houses with great distance between them. The Kolbotn lake was the main resource serving water for animals and humans then. In later years this lake was used extensively for fishing, swimming, and rowing boats. During the winter it was used for ice skating.

In 1957 the sewer system was completed connecting houses to the communal network. This was the first step towards the densification of Kolbotn. Between the 1960s and 1970s, the Kolbotn community and the city center building were completed and Kolbotn went from being a countryside location to a satellite city. The number of inhabitants increased drastically as they settled around Kolbotn lake.

The new sewer pipe system that was taken into use in 1957 had to accommodate increasing numbers of inhabitants, and maintenance/expansion became necessary. So far, only 40 % of the old sewer pipes have been replaced and enhanced.

There are five streams that end in Kolbotn lake: Augestad-, Skredderstu-, Midtodd-, Nordenga- and the Myrvoll-creek. The three first-mentioned ones bring a lot of polluted water to this lake through the years as a result of the old water stream network combined with the old sewer pipe system that leaks out to the Kolbotn lake.

Through the years this lake has gradually been more and more contaminated. There has been found a growing number of blue-green algae and coliform bacterias. Life under the surface has also suffered the consequences of being neglected for decades. This has resulted in a great number of dying fish because of the poor water conditions and lack of oxygen. At the beginning of the new millennium, there was no longer recommended to use this lake for swimming.

Nowadays Kolbotn continues to be densified around the lake with single-family areas being turned into areas with apartment blocks. The process of replacing old buildings with new ones has not lead to a better solution for the lake. The lake has been ignored for too long. The time and effort to clean this lake is a time-consuming process. What the inhabitants are being served now are new apartments that relate to the lake in different ways depending on where they are placed. There's a lovely view of the lake and is usable for fishing and rowing boats, but not much more, unfortunately. The lake is an important part of the identity of Kolbotn, and should be prioritized in the fu-

Because of the changing process happening in Kolbotn, it is time to think alternatively for the lake as well. Since the real estate developers are gradually replacing single houses and properties around this lake with larger buildings and an increased number of smaller apartments over several floors. Most likely this will continue until there are no more spots to take in use. Is it time to increase the access points to the lake, and make a public pathway available for everyone? By having the lake as the main client, and better its conditions.

#### WHAT?

The first step for better the conditions in the lake is by making the inhabitants aware of the current situation. The new pathway will invite the inhabitants for a walk around the lake, and pass by different programs.

The most polluted streams will go through a filtration process to be in control of the streams. By using nature for slowing down the streams and using plants and trees that take up water and phosphorus as nutrition in this filtering system, this will gradually make the lake cleaner, and the water from the stream will have better conditions compared to the one we have today. By better water conditions may turn the current situation for the better. This may take time, but the longer we wait, the longer it will take to clean this lake again. How long it will take before we can use this lake for swimming as before is hard to say, but it's time to think longer than ten or twenty years ahead.

#### HOW?

By activating the pathway around the lake and have different points that can be used several times during weekdays as weekends, but also during the entire year, this will lead to increased pedestrian traffic and a variety of ages.

The proposed pathway works as a foundation and can be used for placing new programs wherever it may be a need for it in the future. For instance, if the lake is clean enough for swimming, a diving tower could be placed along this pathway and become part of this public program.

The pathway also works as an alternative moving pattern to not force the pedestrians to walk along the railway and share the existing road with the cars.

The lake is 1.7 km long and has an existing hiking route in steep terrain on the west side of the lake. By connecting the existing pathways with the new proposal of surrounding the lake with a pedestrian path, each individual can decide to access this existing hiking route combined with the new pathway.

### WHY?

The outcome will hopefully result in a better solution not only for the lake and the life below the surface but also to maintain an important identity of what Kolbotn was. With a combination between inhabited sites, nature, parks, and a clean lake, Kolbotn will maintain one of the most important identities that describes what Kolbotn once was, but most importantly what Kolbotn will become in the future. It's important to give the inhabitants in Kolbotn ownership of this lake and to have a common responsibility for better the water conditions together as a team.

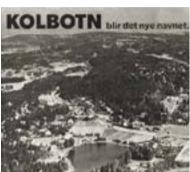
## Timeline of Kolbotn



1895 Kullebunden trainstation was operational



1912 "Det gamle tårnhuset" was the first building with an electric light bulb installed in 1917.



The name "Kullebunden" changes to "Kolbotn"



Kolbotn church

was completed



The residents in Kolbotn can flush the toilet for the first time. The

sewerpipe system

is completed.

1750

This storage house belongs to "Kullebunden hovedgård" and is the oldest remaining building in Kolbotn



Kullebunden hovedgård

Oppegård becomes an independent municipality

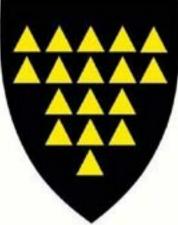
1922 Kolbotn grand

school

The water tower was finished during voluntary work.







Oppegård municipality





Photo: Oppegård historielag



1963 Kolbotn community is completed



1968 The city center building in Kolbotn was completed



1975 Sofiemyr sportshall and swimmingpool



Kolbotn culture house



Kolbotn becomes part of Nordre Follo municipality

Sofiemyr grand school

Oppegård highschool

Oppegård Townhall

Kolbotn square opens with a mall underground. Larger housing facilities with several private apartments placed above.







Photo: Hundven-Clements Photography

### About the lake

The lake is centrally placed in the suburb of Kolbotn in Nordre Follo municipality Viken, and has two small islands: "Storøya" and "Vesleøya". The lake is 0,29 km2 and placed (93 moh). The lake flows into Gjersjøen which is the residents drinking water (40 moh)

Because of the bad water quality, there have been several articles and featured discussions around this theme. The algae together with coliform bacterias have gradually turned this water so polluted that it's not recommended to swim in the lake.

In order to let decant the water into Kolbotn lake, this has to go through an application by the councilor. It's stated from the applications that decant water is a result of a cleaning process of the water-filters used for cleaning the drinking water in Nordre Follo cleanse facility. Their conclusion was that decant water restricts algae growth as well as dilutes the polluted water.

## What is decant water?

Decant water is not polluted, but this water has been taken out from our drinking water. It has been filtered with 0,01 - 0,03 mm light opening. Another reason for allowing decant the water into the lake is because that water has better conditions compared to the water from the supply streams. It reduces phosphorus for the algae by allowing decant water to this lake.

### Questioning:

From the articles online, it's stated that the conditions in the lake are poor, and decant water doesn't make the situation worse. However the lake has been polluted for decades, and from the beginning of 2000, it was recommended not to swim there anymore. Almost twenty years later, this hasn't changed.

In November 2020 it was suggested a sludge treatment construction in Nedre Ekornrud (south of this lake). This construction will be able to separate "decant water", "reject water" and "waterworks sludge". If this water should be pumped back to Stangasen water treatment facility, it would lead to difficulties for the cleaning process. The water quality would be worse than the existing water source which is Gjersjøen (A larger lake placed west for the lake). Every year an application is submitted for allowing 365 000m3 decant water to Kolbotn lake.

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Naturvernforbundet (The Nature Conservation Association ) has a different theory about the decant water in the lake. They state that Nordre Follo Renseanlegg IKS should further develop ways they deal with decent water, and sludge treatment. But also that it's totally unacceptable to use the lake as a waste landfill

There are around 60 - 70 landowners along this lake. However, the biggest landowner is the Sundt family and Nordre Follo municipality.

## The environmental organization:

Requires that the sewer pipes will be replaced. The current pipes are from the 1950s and are one of the main reasons for sewage leak into the lake. There's also a lack of oxygen for the life under the surface. It is a wish from the inhabitants, the municipality, and the municipal council to renew the sewer pipes in this area.

The response from the municipality is around 40 percent of the sewer pipe systems around the lake have been switched out. This happened in the period from 2003-2015. The process has made the situation worse as a result of the increasing numbers of inhabitants after the densification started around the new Kolbotn square. This leads to a greater load on the existing pipelines.

There was a dry and warm summer in 2018, and this made the water conditions in the lake a lot better together with no precipitation causing an increased amount of water to the water sewerage. There haven't been conditions like that in decades. In 2018 the amount of phosphorus was measured to 14.0/g/l, and more than 30.0/g/l during 2015, 2016, and 2017. This information is given by PURA (Water area for follow-up of the water regulations: PURA Bunnefjorden with Årungen and Gjersjøvassdraget.) Each year from May to October PURA takes tests of the Kolbotn lake.

The municipality will continue to rehabilitate water and the sewerage system, but also replace communal wells that cause merging between surface water and wastewater. The rehabilitation leads to minor leaks from the water pipes to the wastewater pipes.

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It's expected that during the process of renewing the sewer pipes, that this won't make the lake conditions better at first, but that the water conditions will gradually be better, but it can still take several decades for that to happen.

### Reference Group for the Kolbotn lake:

In November 2019, the reference group pointed out a strong need for a reduced supply of pollutants to this lake. It hasn't been decided if the water should be discharged by the creek in Myrvoll, or directly to the Kolbotn lake. If it should be led to the Myrvoll-creek, it should be studied how the increase of water will affect the creek.

Norconsult assumes the same amount of water will drain through the Kantorstream to Gjersjøen and there should be rectified how increased amount of water, as well as different water qualities, will affect these two streams. Calculations to wildlife as well as erosion have not been taken into consideration.

Conclusion and a summary were done by the Reference group: The masterplan, water supply, sewerage, and water environment did for 2015-2021 these main challenges appear in the old Oppegård municipality:

- A. Increasing numbers of inhabitants and densification.
- B. Climate changes.
- C. Regional cooperation.
- D. Requirements in the water regulations (Kolbotnvannet and Gjers-jøen).
- E. Discharges from the sewer system.

They think the discharge applied violates the intentions to improve the water quality in order to meet the requirements from the Water Regulations.

Plus in the application, there's a lack of analyzes of chemical nature and biological assessments.

Nordre Follo municipality is facing a radical change when it comes to densification around the Kolbotn lake. As a result, this may lead to poor water quality caused by the lack of resources to purify the lake. It will therefore have no utility to the residents.

It's not a question that Nordre Follo Renseanlegg (NFR) needs to be replaced with a more efficient one. However, this will take time to happen, as well that the sewer system from Stangasen Vannbehandlingsanlegg (SVBA) and Nordre Follo renseanlegg (NFR) doesn't have enough capacity to make this possible.

The Reference group states that there should be considered another solution until it's built sufficient capacity for the facilities that should assist the increased emissions from SVBA. Their suggestion for improving the water quality in the Kolbotn lake was sent to the administration and the politicians in Oppegård municipality in November 2019.

## Statements and suggestions

One article from OAvis (Oppegård Avis), Jarle Halvorsen from Sofiemyr (politically engaged citizen). Is critical to the changes happening in Kolbotn, and its surroundings. He asks questions about selling the green zones of our surroundings, as well it's necessary with densification in the center of Kolbotn. Facilitation walkways around the Kolbotn lake and removing the existing vegetation where Kantor is placed. The center of Kolbotn our natural habitat?

Kolbotn works as a habitat, and placing habitat cases around the Kolbotn lake is a poor idea. Most of the center in Kolbotn is densified enough, and the majority of residents are 60 years old or older.

The remaining green zones in the surroundings in Kolbotn is located in the generational park together with the green stretches nearby is all that remains from the beginning of Kolbotn's "green zones"

Tårnåsen / Ødegården is also going through densification, as well if they should cut down more of the green zones (parts of the forest). This forest is the only place where children from Hellerasten, Tårnåsen, and Ødegården can enter from a short distance. This location is perfect for them to build small cabins, play, and a place to hang out. Compare to the children growing up in Oslo who have to travel outside of Oslo for the same experience.

He refers to Hans Martin Enger (MDG) that it's important to reconsider this decision. If we decide to sell everything, there are no more green zones on this site, and it's not reversible. The ones who want to expand and densify these spots states that these sites have great potential with highly expected profit.

The demand for "green zones" for potential sites for new constructions is greater than ever, and this has a ripple effect from Kolbotn, Tårnåsen and Sofiemyr spreading towards Greverud and Oppegård.

## Suggested two new bridges for pedestrians:

In 2019 the counselor suggested an architectural competition crossing one side of the lake to the other. Designing greenery as well as public rooms in the city center of Kolbotn. The case post states that a bridge across the lake is an important landscape element and will have great importance for the inhabitants. The councilor says that the Kolbotn lake works as an identity mark. And that the bridge will become a landmark. This bridge will make it easier for the residents to use the bike or walk to the city center. This bridge will connect the residential areas.

In the site regulation, it's also suggested a 2nd bridge crossing the lake. Oppegård newspaper wrote an article in 2016 about the municipality's suggestion about creating a walkable path on piles that will be connected to Kantorbekken, and will function as a bridge from "Båtleppa" to "Tangen" across veslebukta. However, the price for building one pedestrian bridge will cost around 18,6 million Norwegian kroner.

The municipality is uncertain to the plan level at this stage. There's too much lack of information about the ground conditions, cables, wires, etc makes this process a lot more challenging. Costs that are not included with replacing the sewer pipe systems as well as land acquisition and property compensation.

The descriptive measure for the bridge:

- -150 meters long, 2,75 meters wide.
- -Handle should be transparently made and recessed light sources.
- -Free passage under the bridge with a minimum of 2 meters high, and a minimum of 2,5 meters wide.
- -The rise should be 1:20 maximum.
- Park-wise lighted.

This suggestion is handed out to 5 invited architects and the winner of this competition will be done by a jury during autumn 2019, and the councilor will return to the jury when it's decided.



### Conclusion:

As a result of the radical densification in the center of Kolbotn through decades, the lake in Kolbotn has been neglected and lost its integrity over time. The use of rowing boats is still active, and the library is renting out canoes and fishing equipment for everyone. In this way, this is a great opportunity to experience the lake from different angles without owning a house with a garden down to the lake. By renting a canoe, it's available for everyone.

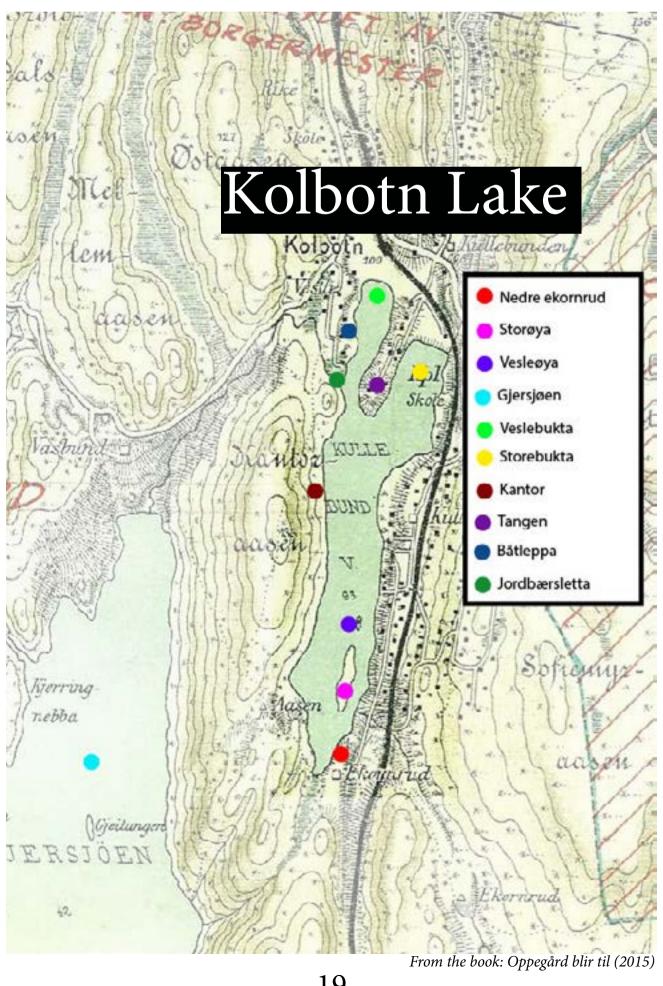
Because of the densification by replacing single houses with private gardens with blocks over several floors, the green zones are gradually disappearing more every year. By creating a public promenade for the pedestrians. This is more important than ever to remain some of the green zones that still exist in this area.

It's expected when the promenade is finished that this will be diligently used. Day and night, as well as summer and winter when this lake is used for ice skating. To have different public zones along this lake, there are places where people can sit down and enjoy the sun and the view from different locations, a place for chats, for barbequing, a place for a walk your dog, for parents that need their baby to fall asleep, and where universal design has been taken into consideration, which makes it easier for handicapped as well to use this promenade as they please. This is not limited by age or health condition, but a place everyone can take in use, and enjoy this walk across generations.

How different this will work and look during the summer compare to winter, but also how it changes from daytime to nighttime enlighted with lights.

As earlier mentioned when there was suggested to raise two bridges with an estimated price of 18,6 million Norwegian kroner. This proposal could be presented for the municipality to be partly done by the inhabitants (voluntary) and by a construction company. By doing this, there's a great way to lower the price, as well as the inhabitants connect ownership to this promenade. This means a mixture between genders, ages, and cultures working together with the same goal. And when it's finished, to be able to experience this promenade properly.

This inlay is meant to work as a natural friendly solution as possible. By taking up some parts of this site, and give it back in a different way. The promenade is working as a tree trunk and could invite others to be active to create some new programs in and around the lake.



What can the inhabitants of Kolbotn do for changing the pollution process? How do we approach the lake and make it possible to swim here again and purify the water over time? Since most of the single houses are being torn down and replaced by tall block buildings, would it be possible for families with children to use a rent-out cabin where families can stay and use in the summer as well as during the winter? This is the first step for changing the the current situation into something more universal designed and find

several ways to be active and relate to the lake in different ways.

Now that 40 percent of the old sewering pipe has been replaced, this may lead the water conditions worse at first, but if this stops the sewer from draining out into the lake, this would be one of the main causes to start with lead by the municipality for a brighter future for the lake. After the remaining 60 percent are replaced, this will lead to a change that would be able to measure yearly.

However, is there a need for a cleanse facility purifying the water over time? If this could speed up the gradual change of the water conditions for the better, how should this be presented? With energy caused by the sunlight, powered by wind, by human contribution, or a combination of all of these? This lake is centrally placed and has great potential. Maybe it's time to spend energy and time to change the current condition for the better. To make this lake livable as it once was.



Source: Oppegård historielag

	January:	Febuary:	March:
Week one:	Deliver portfolio	Tutorial Sverre	4th & 5th 2 presentation conceptual- ly, models, drawings etc.  Send reflection to tutors
		Workshop diploma program	afterwards. All tutors present on the 6th 3rd
		Research, mapping, topographical studies.	Students must hand in 1/2 - 1 page before each presentation. Project description.
			Study possibilities.
Week two:	Sosial Science Lectures	8th Deadline diploma program monday 12.00	Tutorial Sverre
			9th Sustainability with focus intentions - Marco
	Social Anthropology writing	Research, mapping, topographical studies, contact Viken municipality.	10th Sustainability with focus landscape - Nancy Coulling
			Study possibilities / tutoring
Week three:	Essay Delivery		1:1 day inspirational day - Andrea S
	Loody Denvery		16th Voluntary practical tasks on 1:1 From 09-14 - Alberto
			<sup>18th</sup> TTA- Kim Christensen; lecture followed by tu- torials
			Process work /Fur- ther studies
Week four:	Workshop typology landscape	submit project descriptions if you want tutorials Pavlina.	Tutorial Sverre
	Presentation social anthropology	Tutorial Sverre	Workshop with Pavlina
			Process work /Fur- ther studies

April:	May:	June:	August:
Tutorial Sverre  Process work / Further studies	3rd-5th  Workshop with Pavlina	Students that wants feedback must send in their project description.  Exhibition period starts	
23rd March - EASTER 3rd april HOLIDAY	Finalize the project. Details, make the project clear as possible.	Deadline to withdraw from exam  4th June Deadline to submit material to external reviewers.	
Finalize models, renders and drawings	Tutorial Sverre  Tutorials with Andre Fontes & Kim Christensen on TTA construction.	Tutorial Sverre  15th Hand in project description	
	Tutorials / Finalize the project. Details, make the project clear as possible.	Tutorials / Finalize the exhibition	
22nd - 23rd Diploma Presentation 3	Tutorial Sverre	<ul><li>Complete exhibition by 17.00</li></ul>	Diploma ceremony + party
Students must hand in 1/2 - 1 page before each presentation. Project description.  21st TTA Construction -	3 presentation conceptually, models, drawings etc.	Dugnad 09-17.00  Exhibition review  26th Lock out. Prepare from home	22nd Public exhibition
Andre Fontes Finalize models, renders and drawings	Student must send short reflection to their tutors afterwards	Finalize the exhibition final touch.	Suggested opening hours 14-20 man to fri
Tutorial Sverre	Individual presentations (dates to be confirmed)	Tutorial Sverre	28-29 august
Tutorials, finalize models, renders and drawings	Finalize the project. Details, make the project clear as possible.	Exhibition must be finished  Dugnad/Clean up exhibition  27th - 30th EXAM  30th Feedback - Concensus meeting	Exhibition must be taken down and cleaned. 12.00-18.00

## Curriculum vitae:



Adrian Højfeldt NAME:

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adrian\_hojfeldt@hotmail.com E-MAIL:

NATIONALITY: Norwegian

#### **EDUCATION:**

2019 - 2021:

Bergen school of architecture, Bergen Master in arcitecture

2012 - 2015:

Bergen school of architecture, Bergen Bachelor in arcitecture

2010 - 2012:

Einar Granum School of Art, Oslo 1 year. Basic art education. 2 year. 3-dimensional shapes.

2009: <u>Jan-Dec</u>

Rena Camp, Rena Degree in Ethics & Military Power.

2005 - 2008:

Oppegard High School, Sofiemyr Three-year study with subjects drawing, shape and color.

#### **WORK EXPERIENCE:**

2019

**Ski municipality,** Ski Worked in a 100% practical position from january to July when I returned to complete my master in Architecture.

2015 & 2018 **Kvernaas Architects,** Kolbotn

Worked for Kvernaas Architects in a

100% practical position.

2010:

JM, Tjuvholmen, Aker Brygge Worked in a 100 % position as a henchan for JM from January to July 2010

2009:

**Rena Camp,** Rena From January to December 2009 I was stationated in the army.

#### TOOLS:

Acrobat Painting

ArchiCAD Photo

AutoCAD Photoshop

Drawing Rhinoceros

Illustrator Sketchup

Indesign 3D Print

#### **TUTORS:**

APP: Sverre Sondresen

DAV: Marco Casagrande

Social anthropology: Tord Bø Bakke & Frode F. Jacobsen

TTA: Kim Christensen & Andrè Fontes

Haldbar: Marco Casagrande & Nancy Couling

Writing as a design tool: Paulina Lucas

1:1 Cecilie Andersson & Alberto Altes

#### **HELPERS:**

Anette Højfeldt & Kaisa Martine Højfeldt Kopperud

#### **PREVIOUS MASTER COURSES:**

2020: August - December **Masquerade**Frederik Petersen
Anne Friis

2020: January - June **Mini Master** Joakim Skaaja Tom Chamberlain

2019: August - December

Complex Context

Andrè Fontes
Tom Chamberlain

#### **REFERENCES:**

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#### Texts:

Anne-Katrine Brun Norbye - En smak av støl, en smak av frihet og natur.

Gullestad, Marianne - Home Decoration as popular Culture

Appendix - Kabyle House Bourdieu or the World Reversed.

#### **Books:**

Oppegård blir til

Oppegård kommunes historie.