



SMART CITIES

L7 10.4.2017

Spring Semester 2017, ETH Zürich

Gerhard Schmitt

Smart Cities

1 GS ET:
Introduction

Definitions
Context

3 GS: Urban
Big Data

4 GS ET:
Urban
Measurement

5 GS: Urban
Science

6 GS:
Complexity
Science

7 GS: Smart
Governance

8 GS: Smart
Livability

10 GS: From
smart cities
to responsive
cities

Objectives,
Definition,
MOOC

Smart
Objects,
Smart
Buildings,
Smart Cities

Stocks and
Flows in
Urban
Systems

Measurement
and
Simulation

Citizen
Design
Science

Complexity
Science

Participatory
Design and
Management

City
Livability
Rankings

From smart
cities to
responsive
cities

Exercise 1:
QUA-KIT

Exercise 2:
Urban
Measurement

Exercise 3:
QUA-KIT

Final
presentation
on MOOC
discussion
topics

The story so far:

- 10.4.2017 Good Urban Governance enabling long-term resilience
- 3.4.2017 Complexity Science as explanation for Smart City growth
- 27.3.2017 Citizen Design Science as a future urban development method
- 13.3.2017 Can you improve what you do not measure?
- 6.3.2017 Big Data as new urban raw material, made useful with Information Architecture and with the Stocks and Flows concept
- 27.2.2017 From smart houses to smart cities – emerging criteria for smart cities as urban systems
- 20.2.2017 Cities are complex systems. Ideally, they are sustainable, resilient, livable, smart, and finally responsive – from production machines to human habitat

Across all your courses:

102,253

Total Enrollment

83,796

Current Enrollment

379

Change in Last Week

1,296

Verified Enrollment

Course List

Find a course



Number of results: 9








 Download CSV

Availability

- ☐ Archived
- ☐ Current
- ☐ Upcoming
- ☐ Unknown

Pacing Type

- ☐ Instructor-Paced
- ☐ Self-Paced

Course Name 	Start Date 	End Date 	Total Enrollment 	Current Enrollment 	Change Last Week 	Verified Enrollment 
Future Cities course-v1:ETHx+FC-01x+2016_T2	04/01/2016	06/30/2017	21,743	19,241	159	340
Future Cities course-v1:ETHx+FC-01x+2T2015	04/01/2015	06/30/2015	20,975	16,293	-10	203
Future Cities ETHx/FC-01x/3T2014	09/24/2014	12/12/2014	17,242	11,917	-5	0

Urban Governance

„The exercise of political, economic and administrative authority in the management of a country's affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations.

Good governance is among other things participatory, transparent and accountable. It is also effective and equitable and it promotes the rule of law. Good governance assures that political, social and economic priorities are based on broad consensus in society and that the voices of the poorest and the most vulnerable are heard in decision-making over the allocation of development resources.” <http://www.un.org/millenniumgoals/pdf/Think%20Pieces/>

Urban Governance

“Governance includes the state, but transcends it by taking in the private sector and civil society. The state creates a conducive political and legal environment. The private sector generates jobs and income. The civil society facilitates political and social interaction mobilizing groups to participate in economic, social and political activities. Because each has its weaknesses and strengths, a major objective of our support for good governance is to promote constructive interaction among all three.”

http://www.un.org/millenniumgoals/pdf/Think%20Pieces/7_governance.pdf

Urban Governance

“Good governance occurs when societal norms and practices empower and encourage people to take increasingly greater control over their own development in a manner that does not impinge upon the accepted rights of others”

UNDP Internet Conference Forum on

"Public Private Interface in Urban Environmental Management"

Urban Governance

- exercise of political, economic and administrative authority in the management of a city's affairs on all levels
- participatory, transparent and accountable
- Effective, equitable and promotes the rule of law
- political, social and economic priorities are based on broad consensus in society
- the voices of the poorest and the most vulnerable are heard in decision-making over the allocation of development resources



http://static.nzz.ch/files/4/5/6/BamS_20161030_1.18775456.pdf

SMART CITIES Amsterdam

Democratic Governance in Action

- The Story of the Sihlsee





Sihlsee

From Wikipedia, the free encyclopedia

The **Sihlsee** (in English sometimes called *Lake Sihl*) is an [artificial lake](#) in the [Swiss canton of Schwyz](#), near the [town of Einsiedeln](#). The lake was created by damming the river [Sihl](#) and flooding a section of the upper [Sihl Valley](#).^[1]

The lake feeds the [Etzelwerk power station](#), which is located 5 kilometres (3 mi) to the north-east in [Altendorf](#) on the upper section of [Lake Zürich](#) (the *Obersee*) and which supplies electricity to the [Swiss Federal Railways](#) (SBB). Its concrete [dam](#) is 33 metres (108 ft) high and 124 metres (407 ft) m long. The lake is the largest artificial lake of Switzerland in terms of surface with a maximum length of 8.5 kilometres (5 mi) and maximum width of 2.5 kilometres (2 mi). The maximum depth is 17 metres (56 ft), and the lake has an approximate volume of 96,000,000 m³ (3.4 × 10⁹ cu ft).^[*citation needed*]

The power plant project started in 1932. A concrete dam and two viaducts over the lake were built before 1937 when the valley was flooded. As a result 107 farms disappeared completely and 1762 persons had to leave their homes.^[2]

A failure of the dam could lead, according to studies, to an 8-metre (26 ft) high flood wave through the lower [Sihl Valley](#) reaching the [Altstadt](#) of the city of [Zürich](#), the biggest city in Switzerland, within 2 hours. This threat has led the City of Zürich to develop, publish and test evacuation plans for the affected areas of the city, and especially the area around [Zürich Hauptbahnhof railway station](#).^[3]

Typ	Pumpspeicherwerk
Gesamtleistung	135 Megawatt
Jahresproduktion	260 Gigawattstunden
Fallhöhe brutto	480 Meter
Wassermenge	34 Kubikmeter pro Sekunde
Turbinen	6 Pelton turbinen horizontal, zweidüsig 1 Pelton turbine vertikal, sechsdüsig
Generatoren	7 Synchrongeneratoren
Scheineistung	6 mal 18 Megavoltampere und 1 mal 50 Megavoltampere
Pumpen	3 fünfstufige Pumpen (14, 18 und 22 Megawatt)



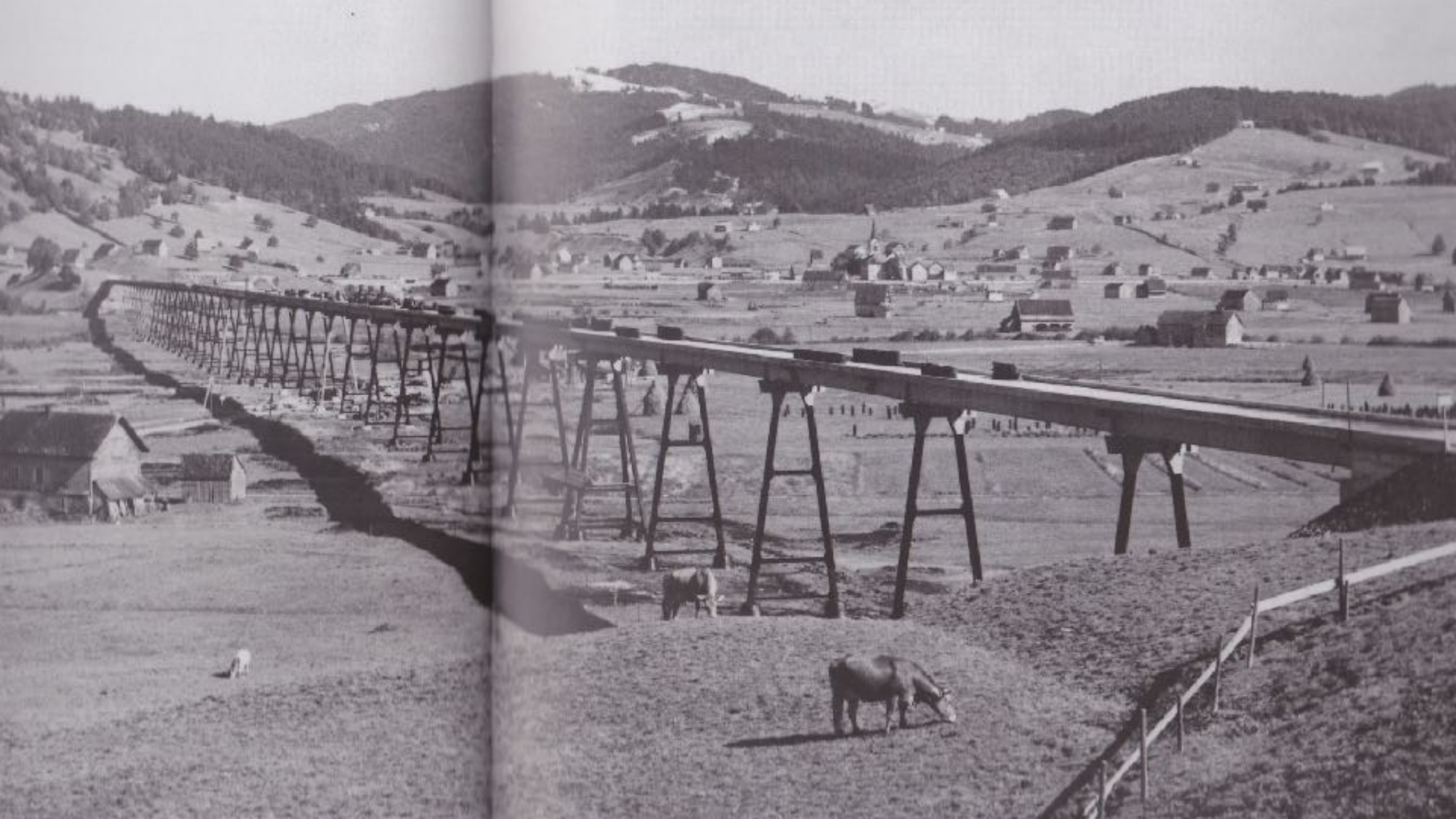












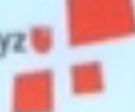




Ausgangslage

- Konzession der Etzelwerk AG (SBB) läuft am 11. Mai 2017 ab
- Erteilung einer Übergangskonzession bis 31.12.2022
- Konzessionsgeber (Wassernutzung):
 - Bezirke Einsiedeln und Höfe (Volksabstimmung)
 - Kantone ZH und ZG (Regierungsratsbeschluss)
 - Genehmigung Kanton SZ (Kantonsratsbeschluss)
- Pumpkonzessionsgeber:
 - Kanton SZ (Kantonsratsbeschluss)
- Konzedenten und SBB haben sich geeinigt, die neue Konzession zu verhandeln





Verfahren und Konzessionsverhandlungen

- Verhandlungen Neukonzessionierung:
 - Laufen seit 2013
 - Pro Jahr 2 bis 3 formelle Verhandlungen zwischen Konzedenten und SBB
 - Dieses Jahr 3 Verhandlungen geplant
- Aufteilung in 8 Fachgruppen aufgrund Komplexität und Vielfalt der Themenpakete
- Zurzeit finden Verhandlungen zum Themenpaket 1, «See und Infrastruktur» und Themenpaket 4&5, «Nutzungsrecht und Abgeltungen» statt





Organisation Verhandlungen

Vorbereitung Konzessionsgeber

Kantone SZ, ZH, ZG; mit Bezirken
Einsiedeln und Höfe

RR R. Bünler, Kanton SZ (Leitung)
RR M. Kägi, Kanton ZH
RR U. Hürlimann, Kanton ZG
C. Bommer, AWB Kanton SZ
F. Pirker, BA Einsiedeln
M. Kalin, BA Höfe
F.X. Muheim, Jurist

Verhandlungsdelegation

Konzessionsgeber und SBB
(Leitung RR René Bünler)

strategische Ebene

Vorbereitung Kanton SZ

Kanton SZ mit Bezirken
Einsiedeln und Höfe
(Leitung RR René Bünler)

SBB

Verhandlungsdelegation

Thomas Schweiger (Verhandlungsführer)
Andreas Eggmann (Gesamtprojektleiter)
Ellen Guggisberg (Juristin)

Projektgruppe

Konzessionsgeber

(Leitung C. Bommer)

Vorbereitungsgruppe

Konzessionsgeber und SBB

(Leitung C. Bommer)

operative Ebene

SBB Fachgruppe Konzession

(Leitung A. Eggmann)

Fachgruppen

Themenpaket 1

- See und Infrastruktur

Themenpaket 2

- Rest- und Dotierwasser

Themenpaket 3

- Ausgleichs- und Ersatzmassnahmen

Themenpaket 4

- Nutzungsrecht und direkte Abgeltung

Themenpaket 5

- weitere wirtschaftliche Abgeltungen

Themenpaket 6

- Fristen und Termine

Themenpaket 7

- Massnahmen am Konzessionsende

Themenpaket 8

- Betrieb, Einsichtsrecht und Hochwasser

Verfahrensfragen

- Kommunikation und Klärung
rechtlicher Fragen



- Beteiligte:
 - Bezirke Einsiedeln und Höfe
 - Kantone Zürich, Zug und Schwyz
 - SBB
- Koordinations- und Zeitaufwand:
 - Gross durch interne Meinungsbildung, Verhandlungsmandate abholen, viele Beteiligte
- Umfangreiche Abklärungen:
 - Hochwasserschutz
 - Umwelt Ausgleichs- und Ersatzmassnahmen
 - Bewertung der Infrastrukturanlagen
 - Rechtliche Aspekte



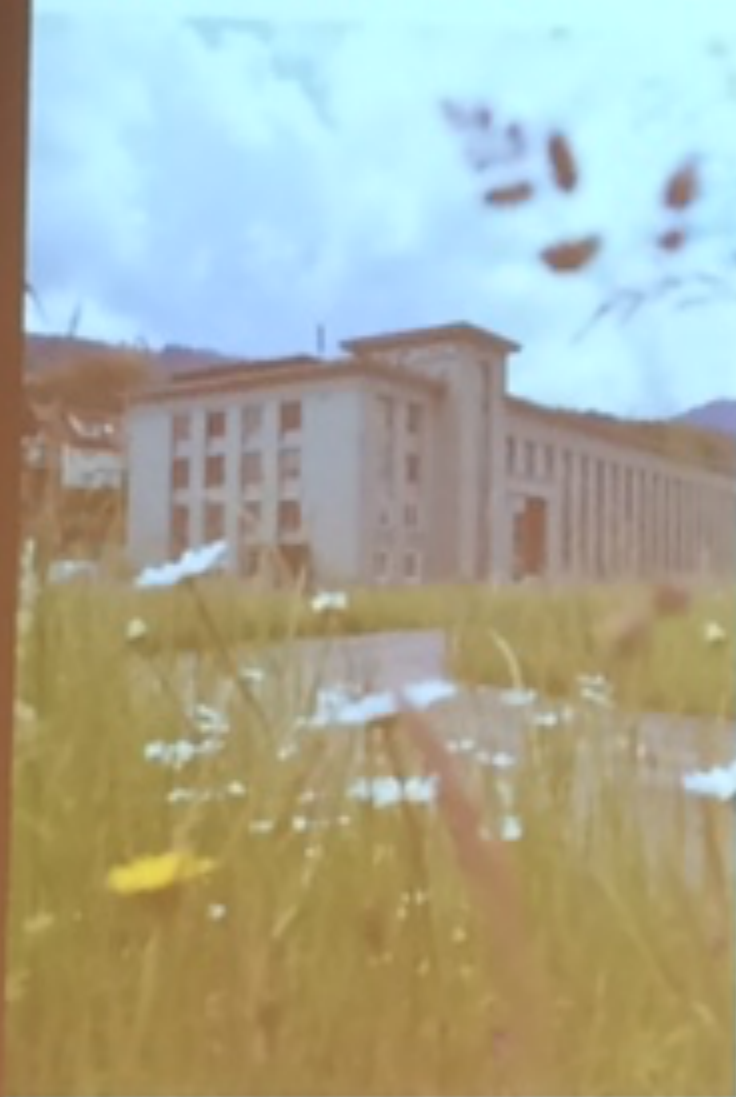
- Politik:
 - Abwägungen
 - Abstimmungen
- Wirtschaftlichkeit:
 - Entwicklungen über 80 Jahre
 - Bevölkerung
 - Strompreis
 - Klima





Nur diese Verbindung

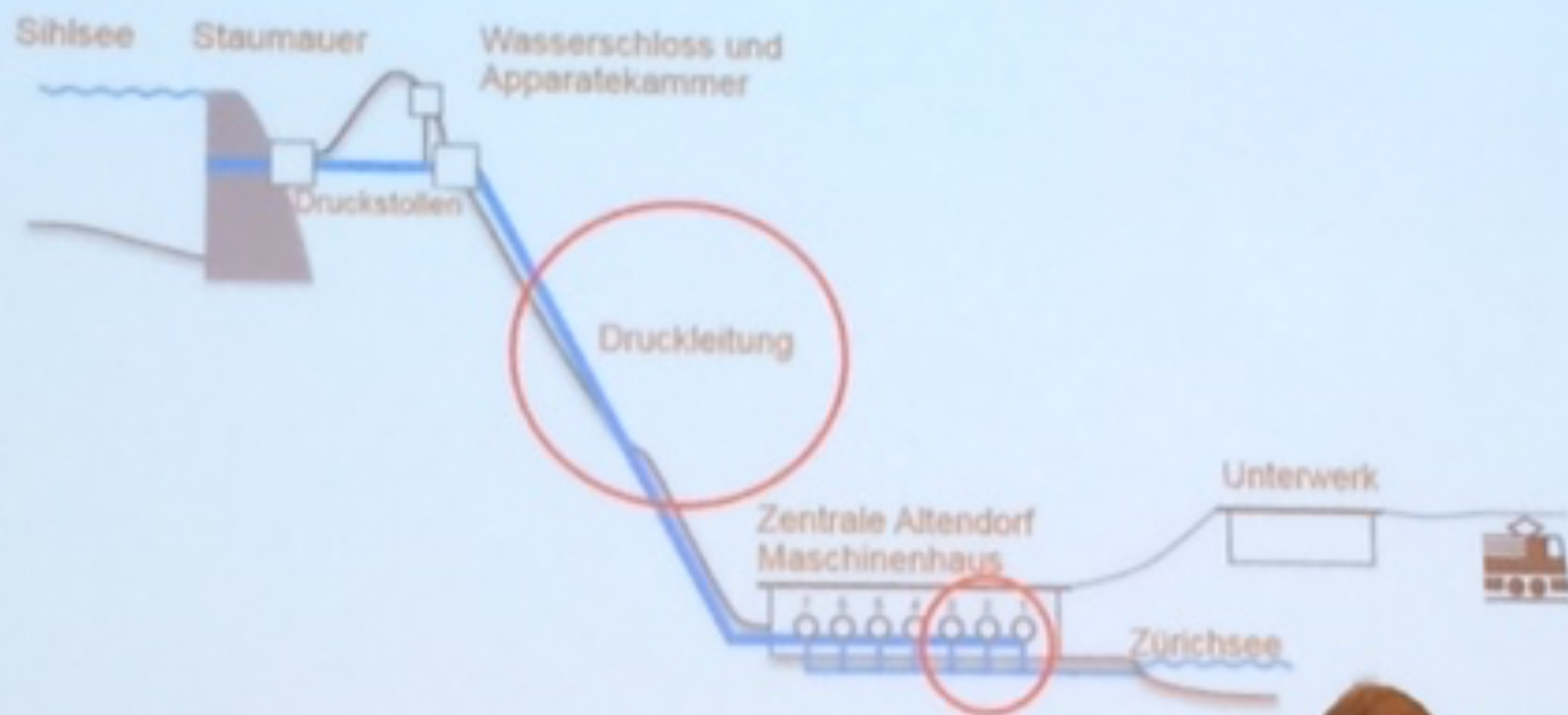
Neukonzessionierung und Modernisierung.



- Das Etzelwerk ist ein nachhaltiger Träger der Bahnstromversorgung: Es produziert rund 10 Prozent des gesamten Jahresverbrauchs an Bahnstrom in der Schweiz.
- Neukonzessionierung und Modernisierung des Etzelwerkes sind wichtige Faktoren für die Umsetzung der SBB Energiestrategie.
- **Ziel: nachhaltiger Bahnstrom zu wirtschaftlichen Preisen.**



Schrittweise Erneuerung des Etzelwerks ab 2024.



Marktpreiszerfall des Stroms seit 2010.



- SBB hat einen wichtigen Entscheid zur Kraftwerksvariante getroffen
- Verhandlungen der Neukonzession bauen darauf auf



Welche Varianten hat man auch noch geprüft?

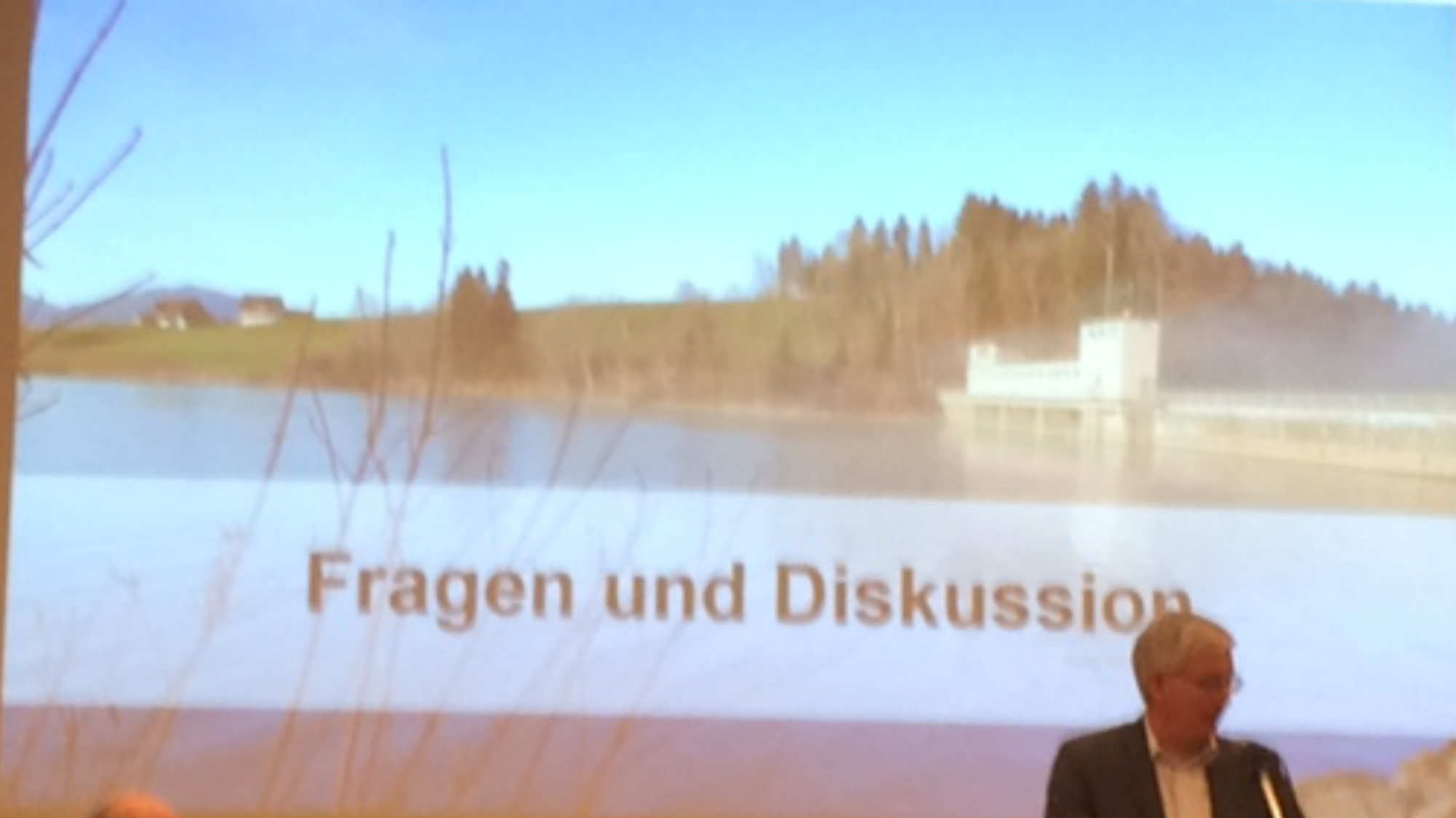
Mehr Leistung – mehr Strom.

Ausbau – 150 Megawatt

- teilweise neues Kraftwerk.
- moderater Ausbau von 134 auf 150 Megawatt.
- Kosten:
ca. CHF 220-320 Mio.

Neubau – 250 Megawatt

- neues Kraftwerk.
- Ausbau von 134 auf 250 Megawatt.
- Kosten:
ca. CHF 475-500 Mio.



Fragen und Diskussion



QGIS

result DGFGeoJSON Polygon

<input checked="" type="checkbox"/>	280 - 339
<input checked="" type="checkbox"/>	339 - 419
<input checked="" type="checkbox"/>	419 - 450
<input checked="" type="checkbox"/>	450 - 523
<input checked="" type="checkbox"/>	523 - 698
<input checked="" type="checkbox"/>	698 - 812
<input checked="" type="checkbox"/>	812 - 926
<input checked="" type="checkbox"/>	926 - 1141
<input checked="" type="checkbox"/>	1141 - 1545
<input checked="" type="checkbox"/>	1545 - 1867
<input checked="" type="checkbox"/>	1867 - 2087
<input checked="" type="checkbox"/>	2087 - 2521
<input checked="" type="checkbox"/>	2521 - 3040
<input checked="" type="checkbox"/>	3040 - 3804
<input checked="" type="checkbox"/>	3804 - 4950
<input checked="" type="checkbox"/>	4950 - 6573
<input checked="" type="checkbox"/>	6573 - 7933
<input checked="" type="checkbox"/>	7933 - 10345
<input checked="" type="checkbox"/>	10345 - 18045
<input checked="" type="checkbox"/>	18045 - 92554

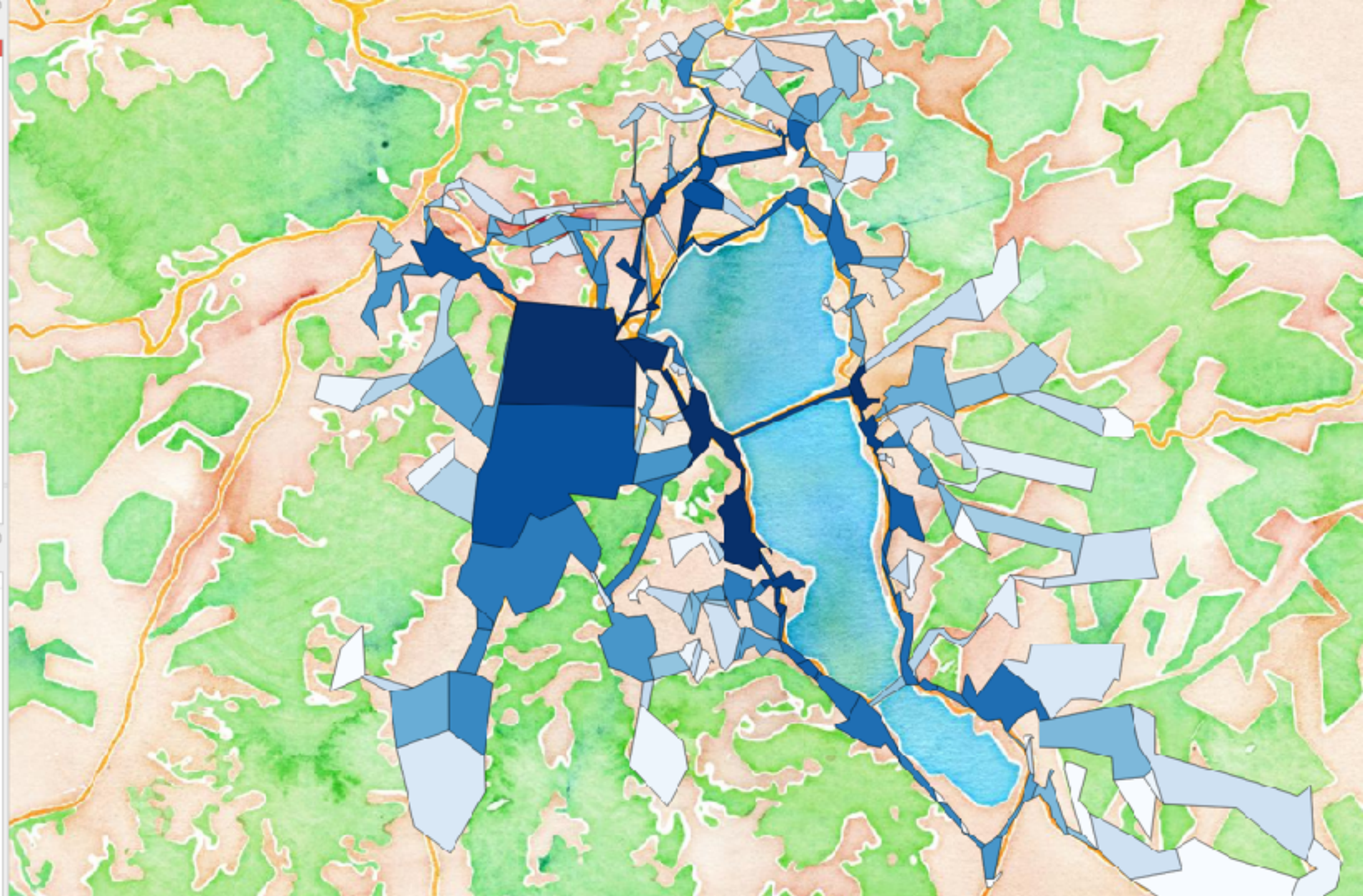
result DGFGeoJSON Polygon

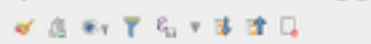
QOSM layer - Stamen (Watercolor)

Identify Results

Feature

Value





result: OGRGeoJSON Polygons

- ☒ 280 - 339
- ☒ 339 - 419
- ☒ 419 - 458
- ☒ 458 - 523
- ☒ 523 - 698
- ☒ 698 - 812
- ☒ 812 - 924
- ☒ 924 - 1141
- ☒ 1141 - 1343
- ☒ 1343 - 1867
- ☒ 1867 - 2087
- ☒ 2087 - 2521
- ☒ 2521 - 3048
- ☒ 3048 - 3864
- ☒ 3864 - 4950
- ☒ 4950 - 6373
- ☒ 6373 - 7533
- ☒ 7533 - 10345
- ☒ 10345 - 18045
- ☒ 18045 - 52514

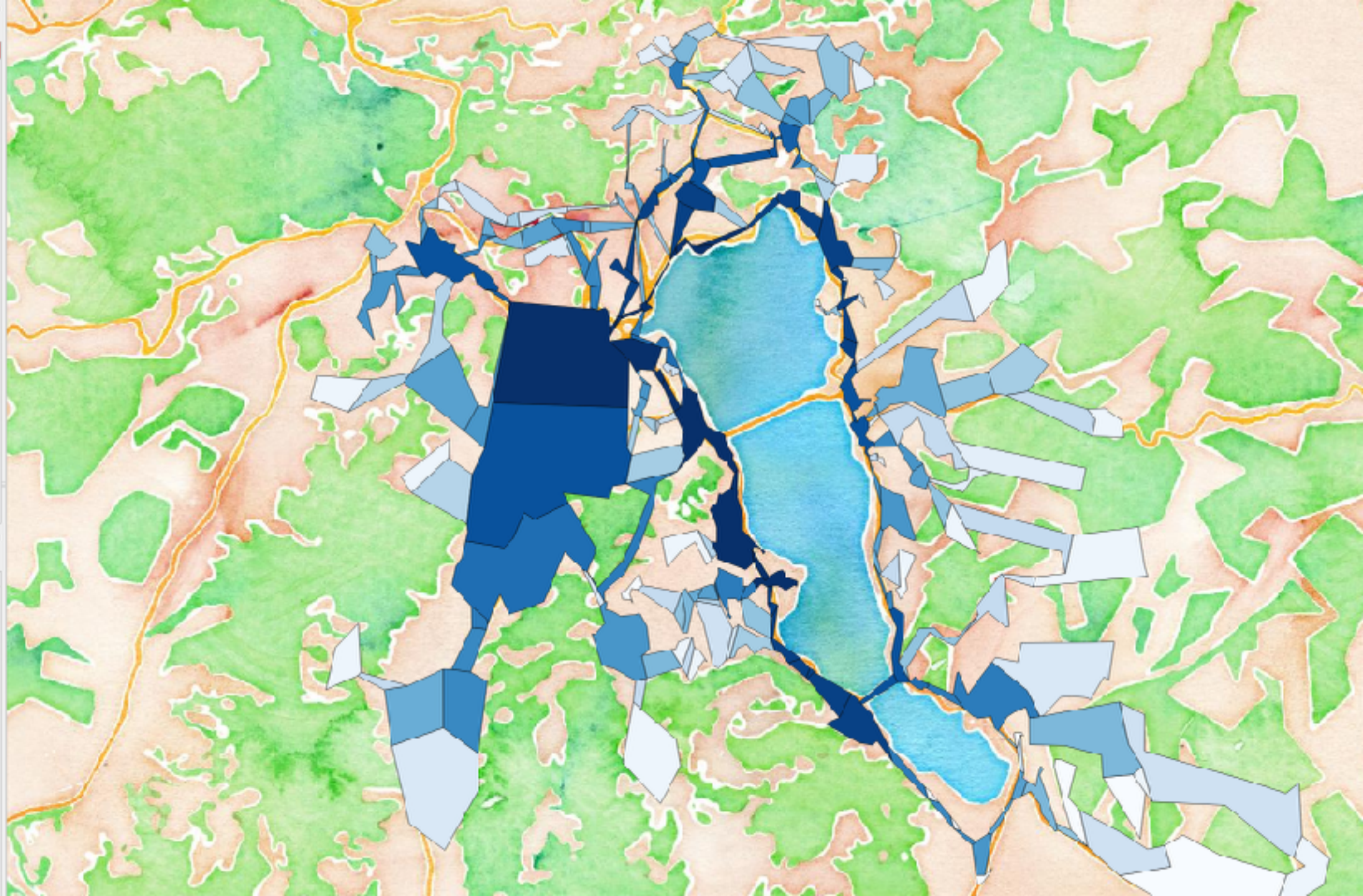
result: OGRGeoJSON Polygons

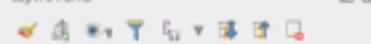
☒ OOSM layer - Stamen (Watercolor)

Identify Results



Feature Value





☐ bridge

- ☒ 200 - 139
- ☒ 329 - 419
- ☒ 419 - 450
- ☒ 450 - 123
- ☒ 323 - 498
- ☒ 608 - 812
- ☒ 812 - 928
- ☒ 928 - 1141
- ☒ 1141 - 1545
- ☒ 1545 - 1867
- ☒ 1867 - 2087
- ☒ 2087 - 2521
- ☒ 2521 - 3048
- ☒ 3048 - 3864
- ☒ 3864 - 4910
- ☒ 4910 - 6573
- ☒ 6573 - 7933
- ☒ 7933 - 10346
- ☒ 10346 - 18045
- ☒ 18045 - 92554

☒ **Joiner layer**

- ☒ -12377 - -300
- ☒ -280 - -700
- ☒ -700 - 200
- ☒ 200 - 100
- ☒ 700 - 12377

☒ nobridge

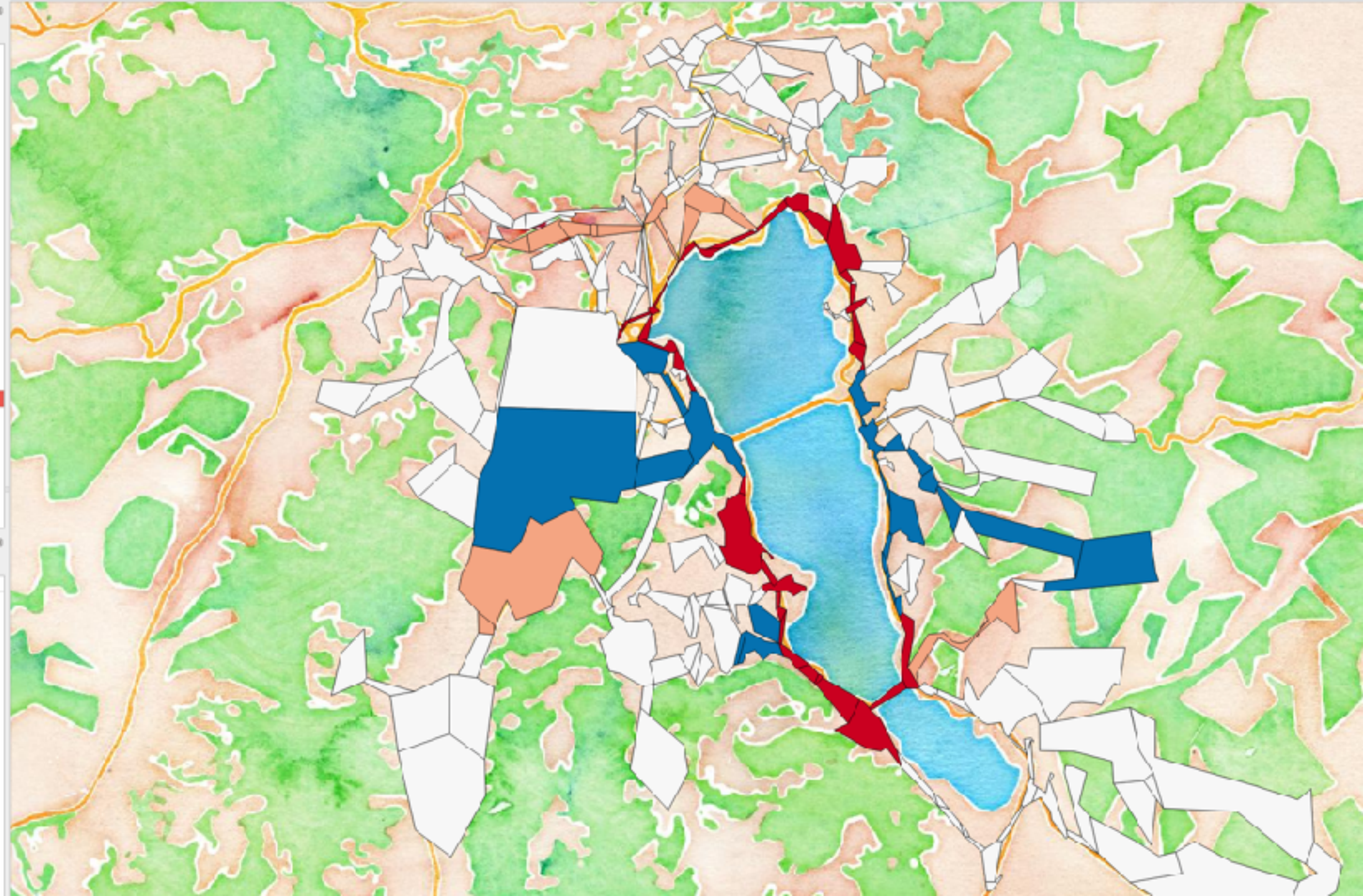
☒ QCSM layer - Stamer (Watercolor)

Identify Results



Feature

Value



How to Design for Responsive Governance: in-class exercise

1. Form of governance in your home town?
2. Biggest concern you have in your home town?
3. Who would you approach to address the concern?
4. In which way would you communicate your suggestion?
5. In which way would you be able to use smart city technology?
6. What would you do if the outcome is not as expected?

Global City Governance: Outcome

Questions

1. Form of governance in your home town?
2. Biggest concern you have in your home town?
3. Who would you approach to address the concern?
4. In which way would you communicate your suggestion?
5. In which way would you be able to use smart city technology?
6. What would you do if the outcome is not as expected?

iA Class FS 2017 Answers

1. Democratic (), guided democracy (), central government controlled ()
2. Pollution ()
3. Elected representative (), friend (), NGO
4. App (), telephone call (), demonstration (),
5. Open Data (), app (),
6. Protest (), complaint (), better proposal ()

Conclusions - Smart Governance

- Urban (Smart) Governance is **specific** to each city and determines its development
- The **quality** of urban governance is **decisive** for the progress of the urban system
- If **neglected**, consequences are **severe**, ranging from protests to blocking the development to threatening Society and its foundations
- **Inclusiveness** in urban decision-making is of utmost importance for urban progress → participatory design and **citizen design science** are therefore crucial for the future



Thank you!