

# INTER-RELATIONAL TERRITORIES

a new interplay between pre- and inner-alpine areas for  
future water use under the framework of institutional thickness



## **Index**

I. The 'water tower' of Europe

II. What are the inter-relations?

III. And how to change them?

IV. Conclusion & Reflection



# THE 'WATER TOWER' OF EUROPE

I. Context

II. From problem field to problem focus

III. Research design



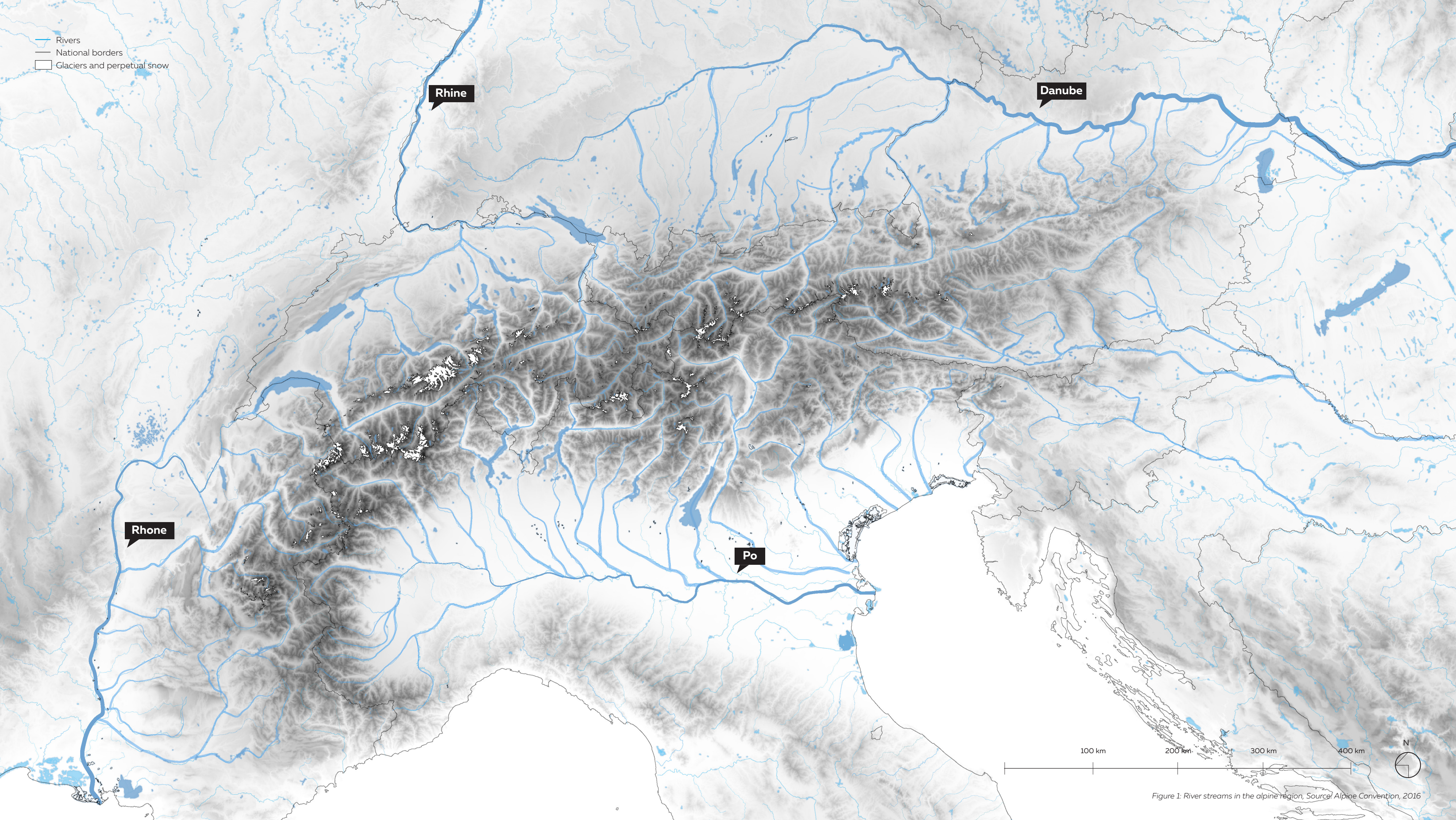


Figure 1: River streams in the alpine region, Source: Alpine Convention, 2016





Figure 2: River Loisach, Source: Author



## Natural water storage



Figure 3: Natural reservoir near Ehrwald, Source: Author



## Natural water storage



Figure 4: Pasterze glacier at the Großglockner, Source: [www.bergwelten.com](http://www.bergwelten.com)

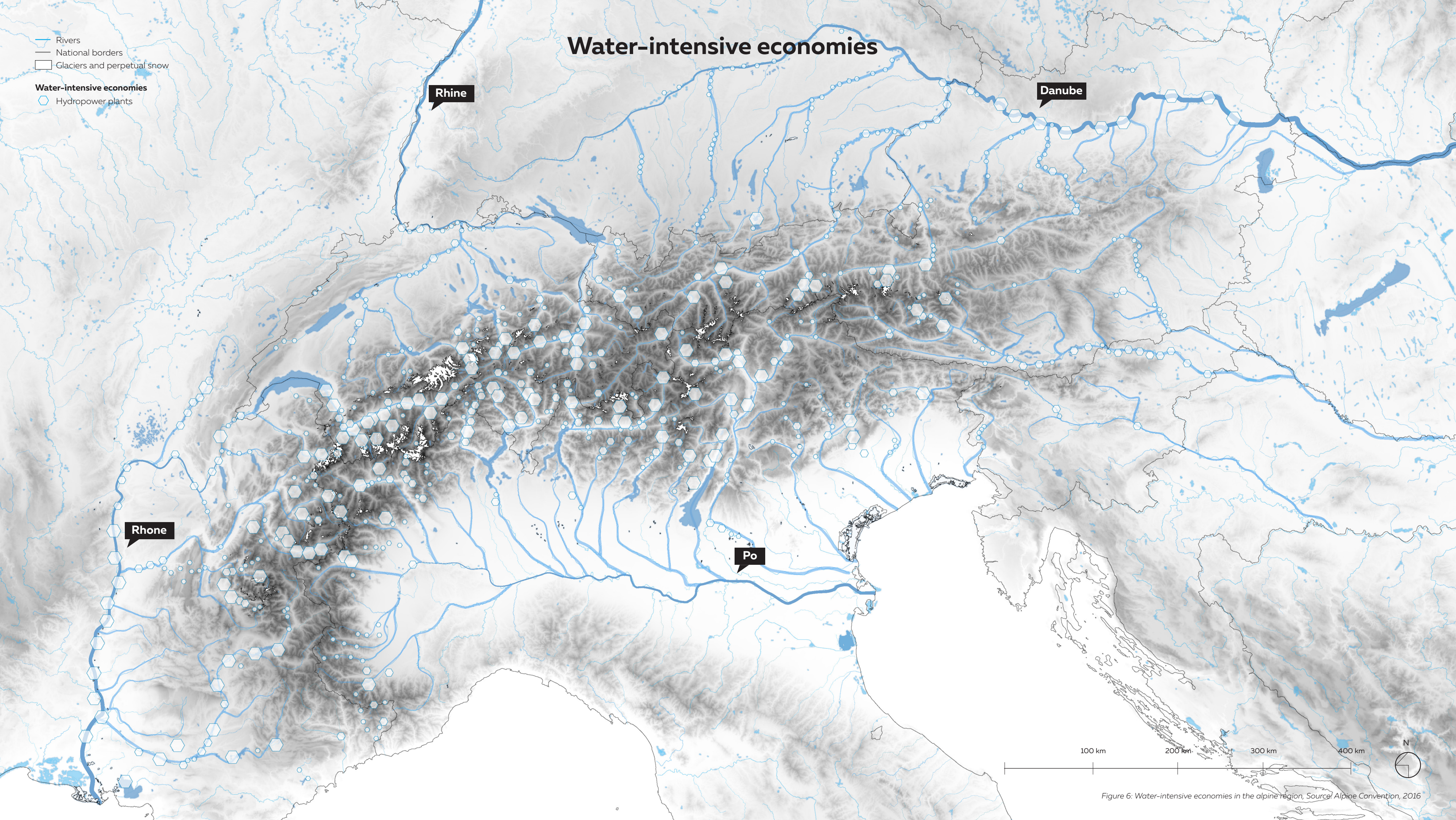


## Natural water storage



Figure 5: Kitzbüheler Alps, Source: [www.kitzbueheler-alpen.com](http://www.kitzbueheler-alpen.com)





# Water-intensive economies

Rhine

Danube

Rhône

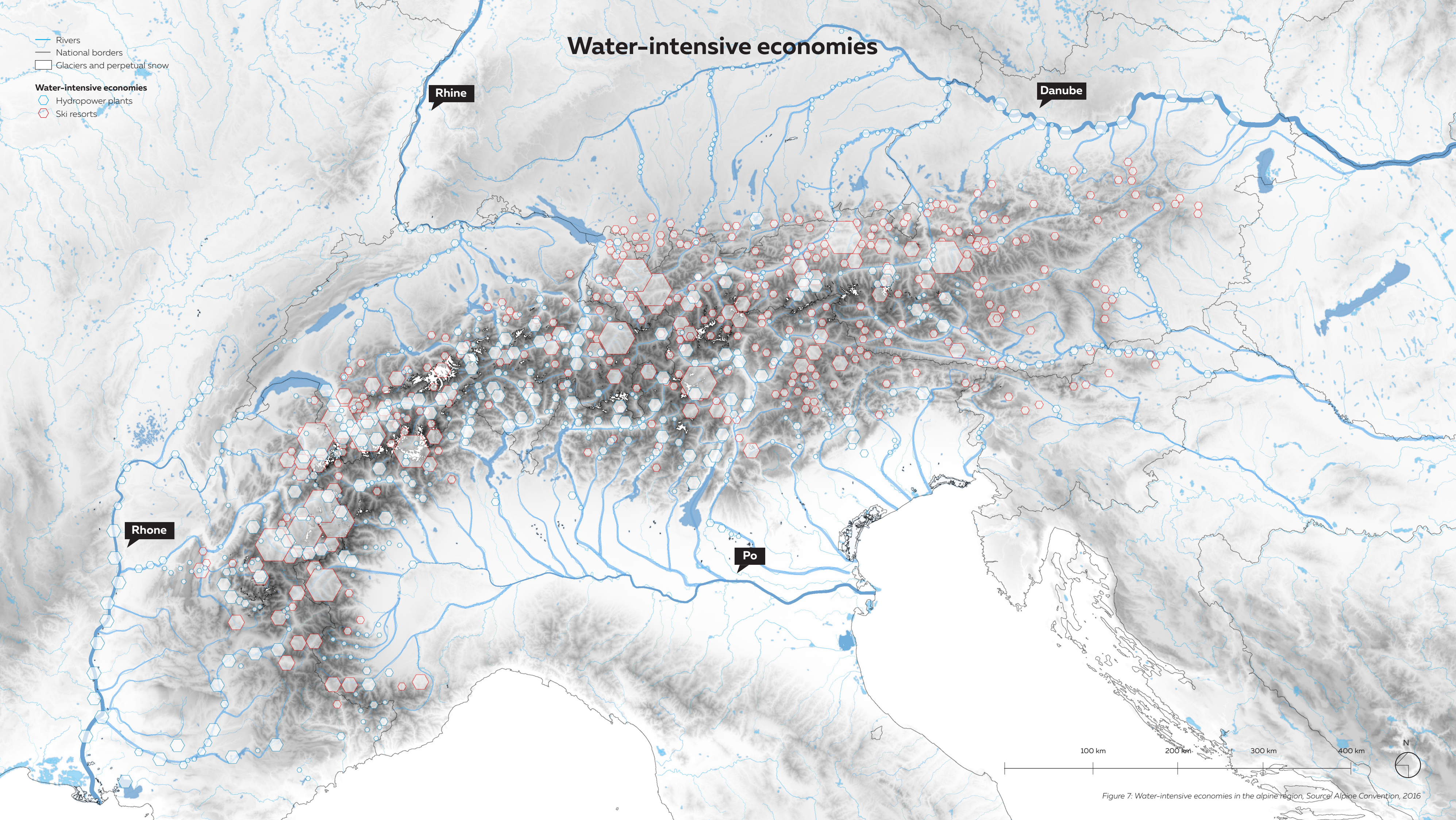
Po

100 km 200 km 300 km 400 km



Figure 6: Water-intensive economies in the alpine region, Source: Alpine Convention, 2016





# Water-intensive economies

Rhine

Danube

Rhone

Po

100 km 200 km 300 km 400 km

Figure 7: Water-intensive economies in the alpine region, Source: Alpine Convention, 2016



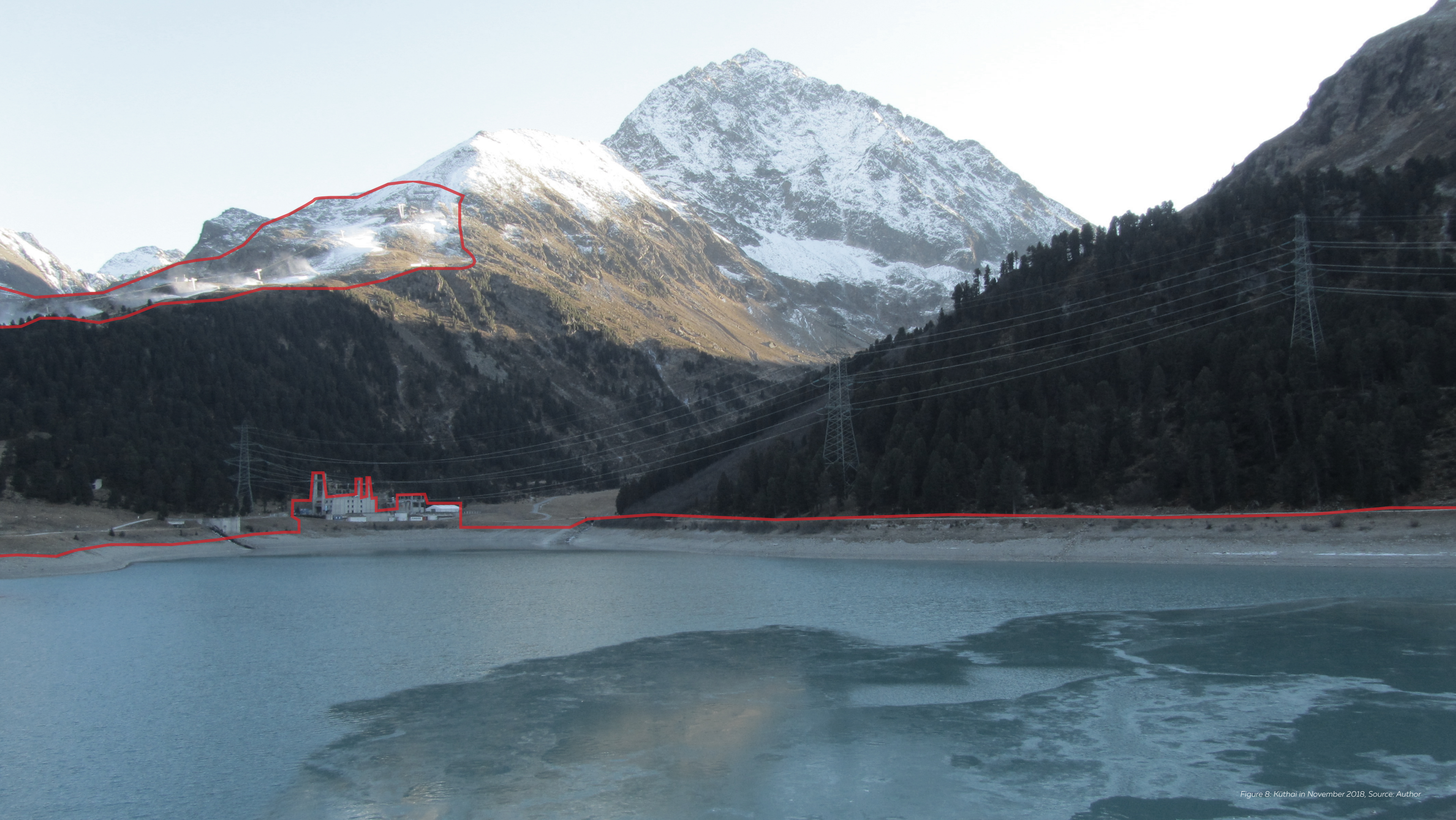


Figure 8: K  thai in November 2018, Source: Author





Figure 9: Kütahya in November 2018, Source: Author



# Climate Change effects

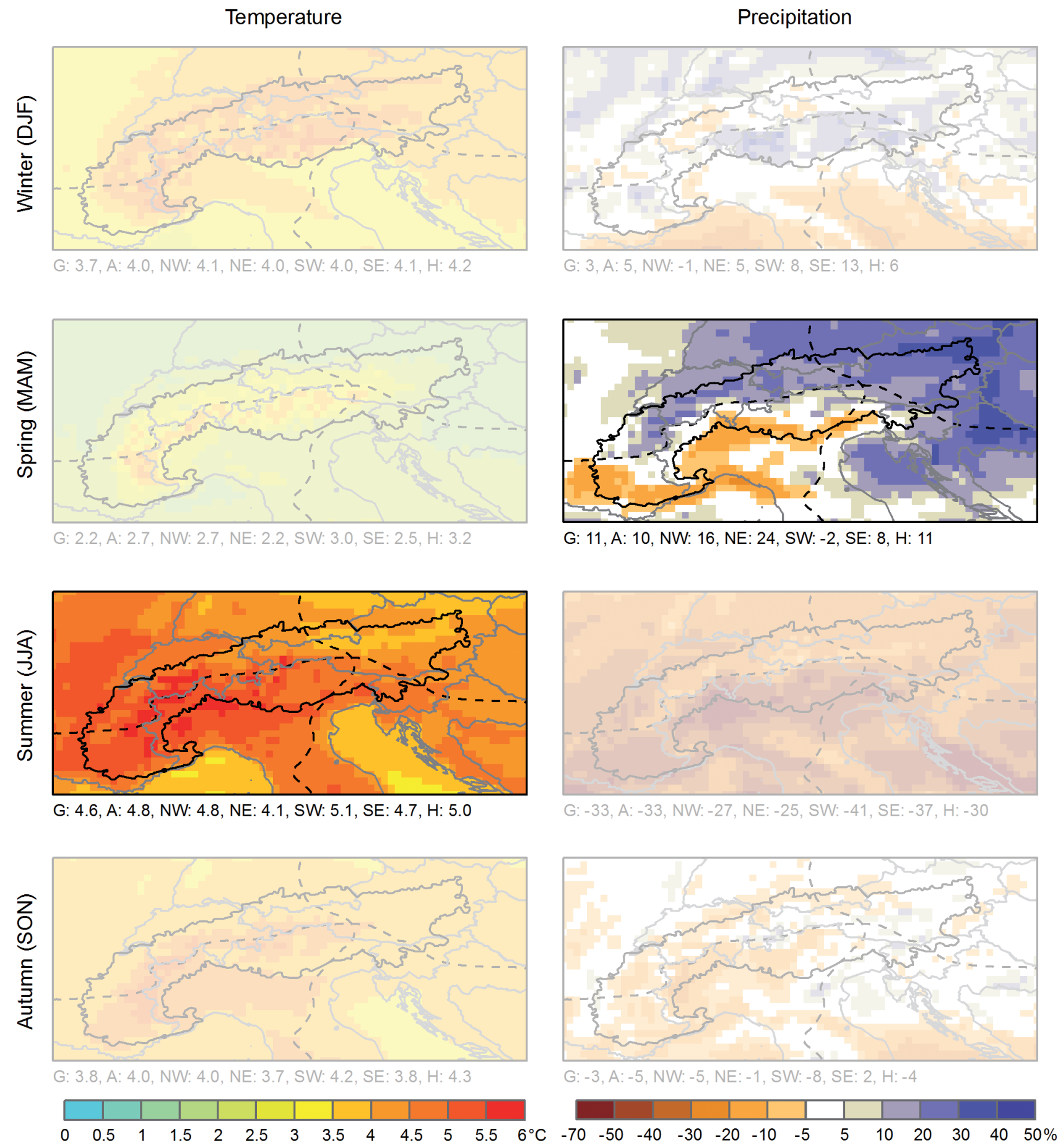


Figure 10: Expected externalities of climate change in the Alps until the 22nd century, Source: EURAC research, 2016



# Climate Change effects

extreme climatic events



Figure 11: Heavy snowfalls in January 2019, Source: Die Zeit, 2019



Figure 12: Heavy rainfalls and flooding in March 2019 in Passau, Source: BR, 2019



# Climate Change effects

extreme climatic events



Figure 13: River bed of Töss during the dry summer 2018, Source: NZZ, 2018



Figure 14: Fields in Wila during the dry summer 2018, Source: NZZ, 2018



# Climate Change effects

changing run-off pattern

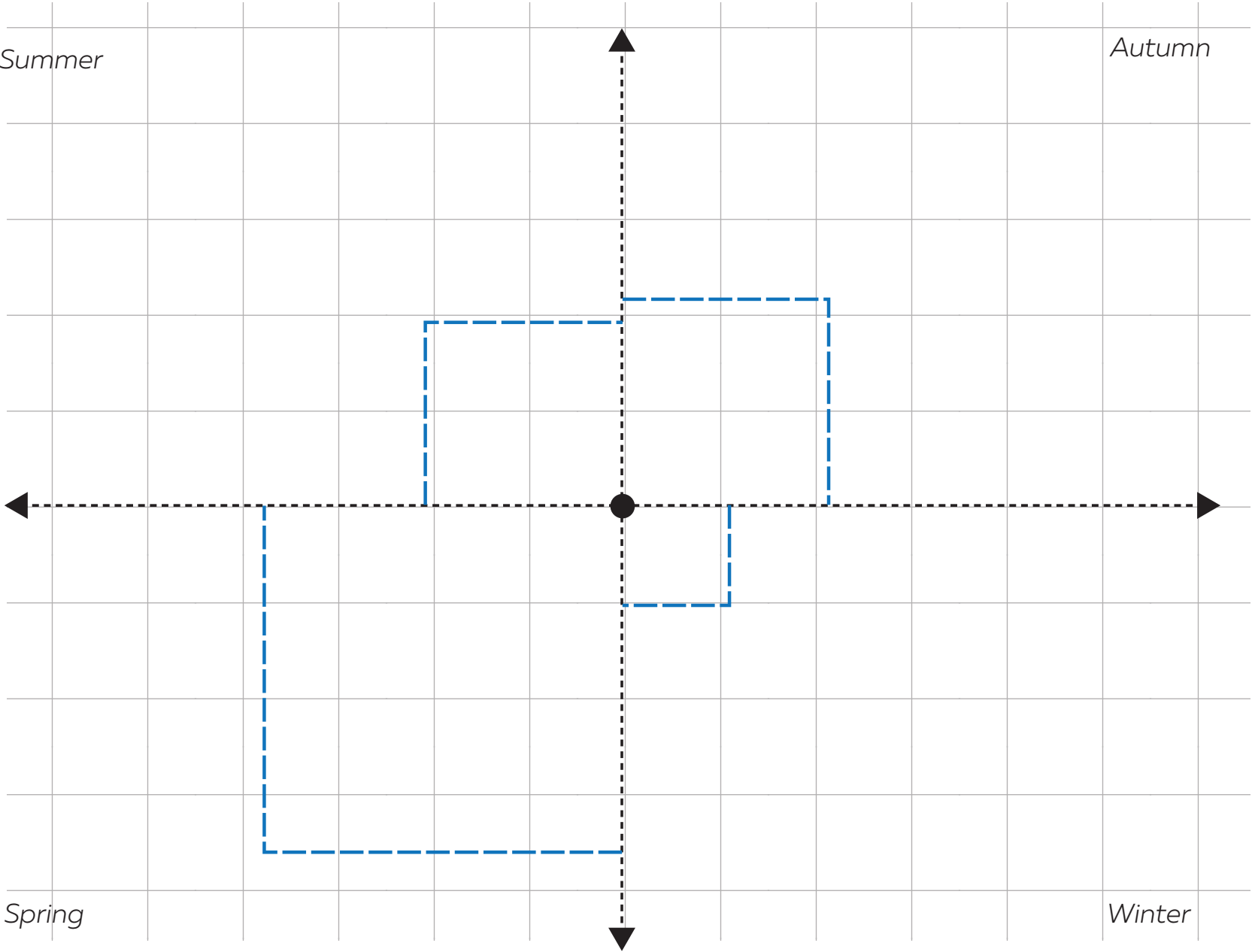


Figure 15: Current runoff pattern  
Source: EURAC Research, 2018



# Climate Change effects

changing run-off pattern

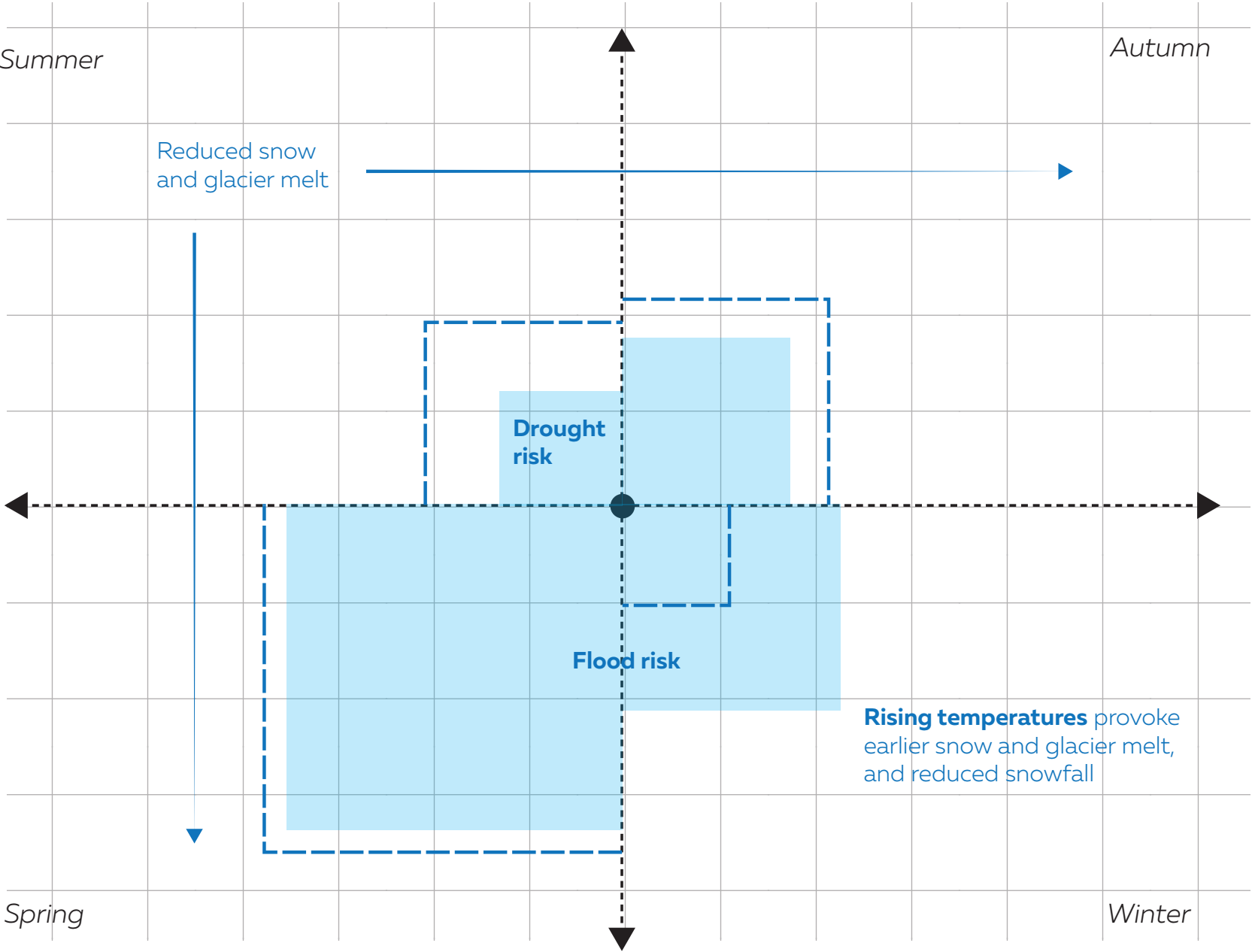


Figure 16: Changing runoff pattern  
Source: EURAC Research, 2018



Institutional thickness

EUROPÄISCHE  
MAKROREGIONEN



Figure 18: European Macro-regions, Source: Franziska Sielker, 2018

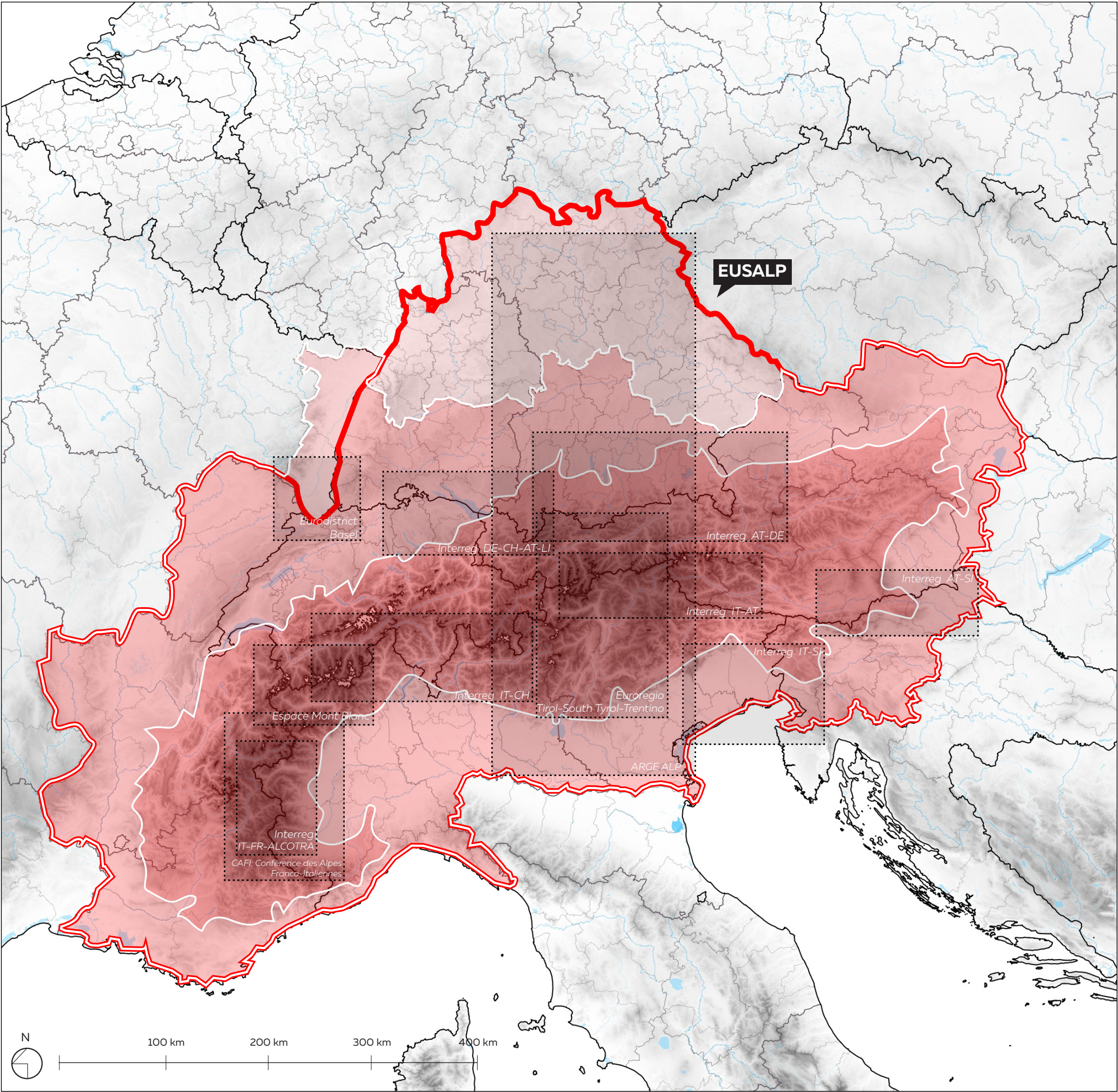
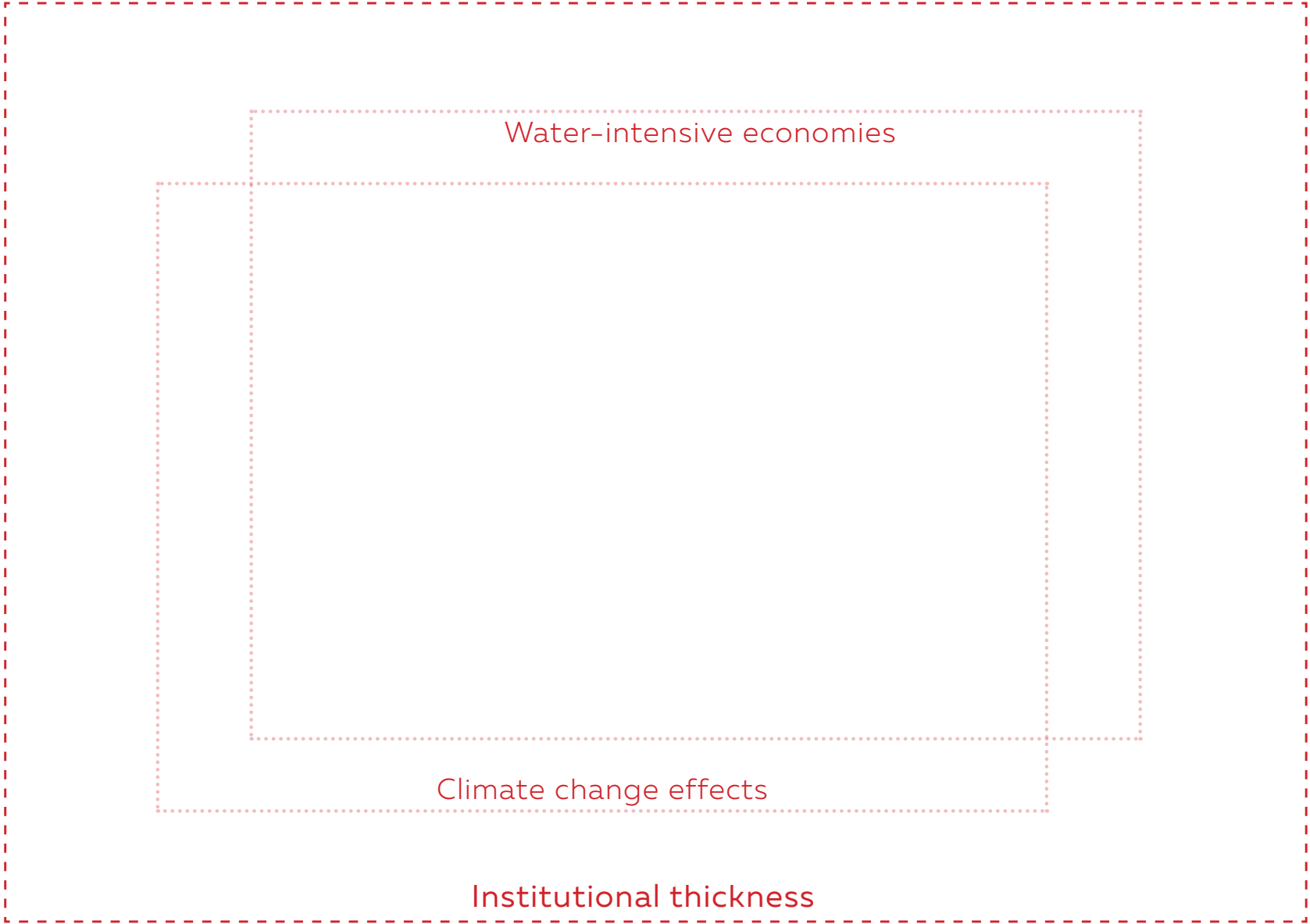


Figure 17: Transnational and cross-border cooperation programmes  
Source: Alpine Convention

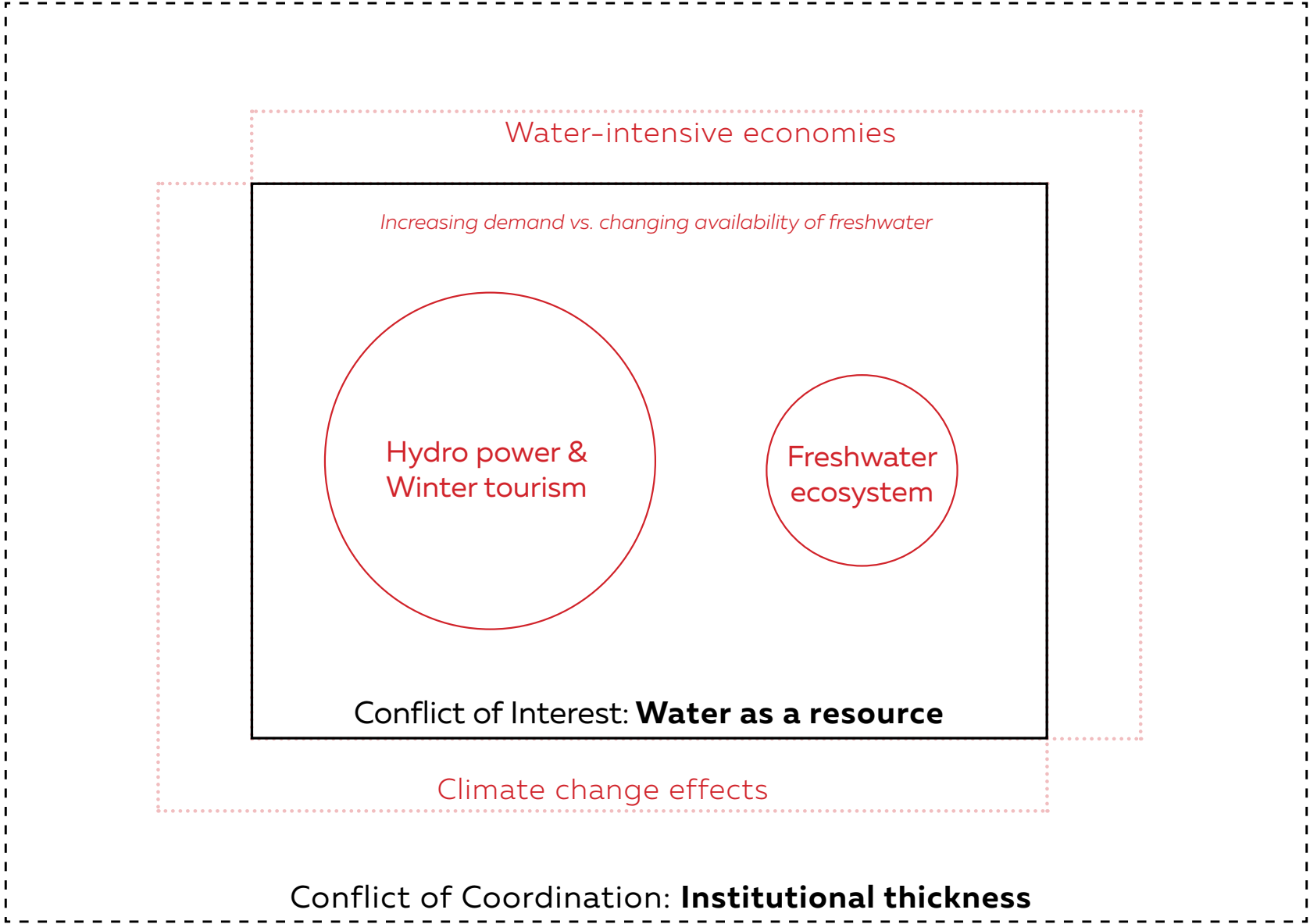


# Problem statement





# Problem statement





# Research question

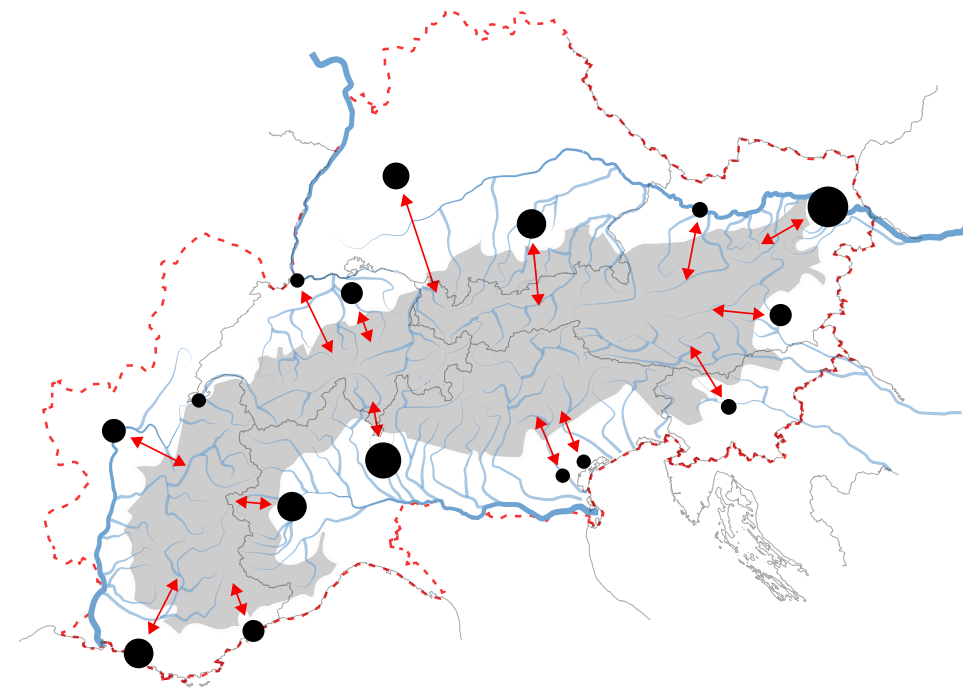
Framework

What are the potentials of a macro-regional strategy to develop a more socio-ecological resilient relationship between inner- and pre-alpine areas for future water use?

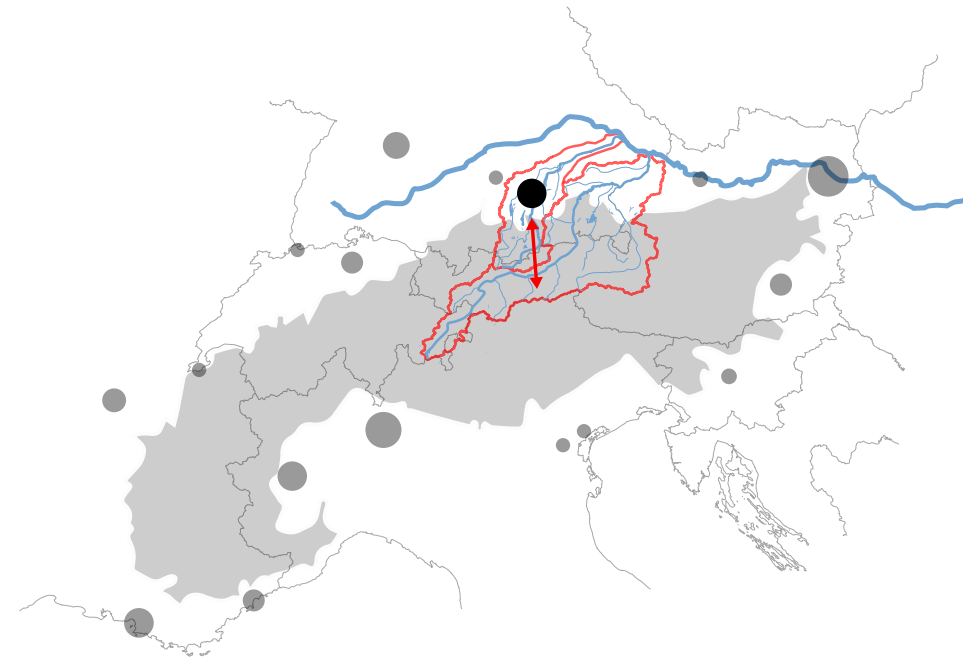
Research aim



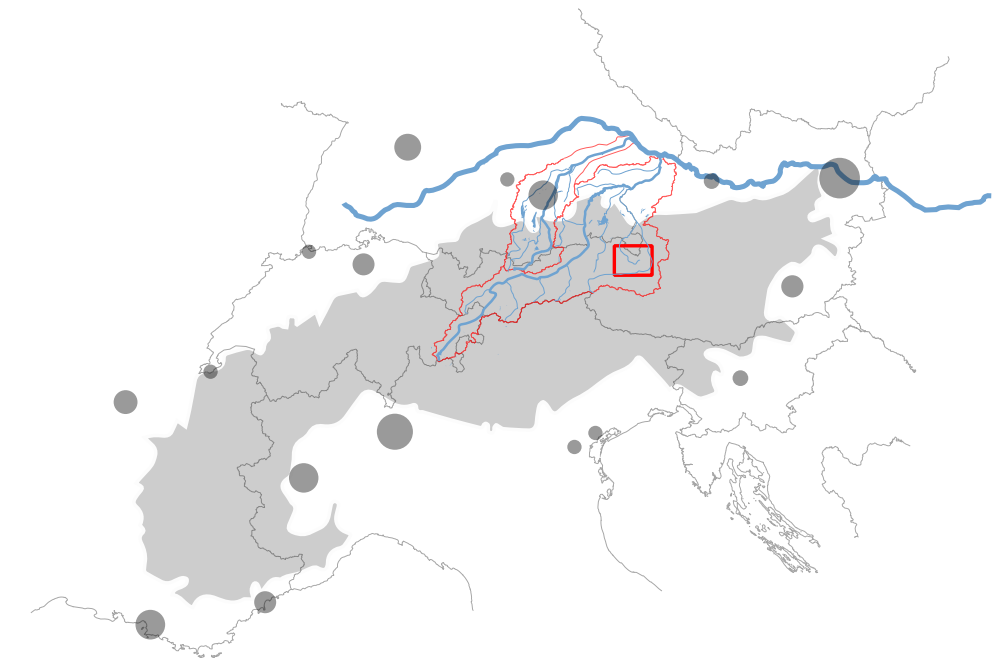
# Methodology



Vision



Vision & Strategy



Key area & Strategic interventions



WHAT ARE THE  
INTER-RELATIONS?



# Hydro power

- **40%** of European hydroelectric power is produced in Alpine region (~176 TWh)
- Until 2030: supply European energy demand by 32% renewable sources

>> Two overlapping networks produce interrelations between pre- and inner alpine areas

## 1. River ecosystems

## 2. Import and export of electricity

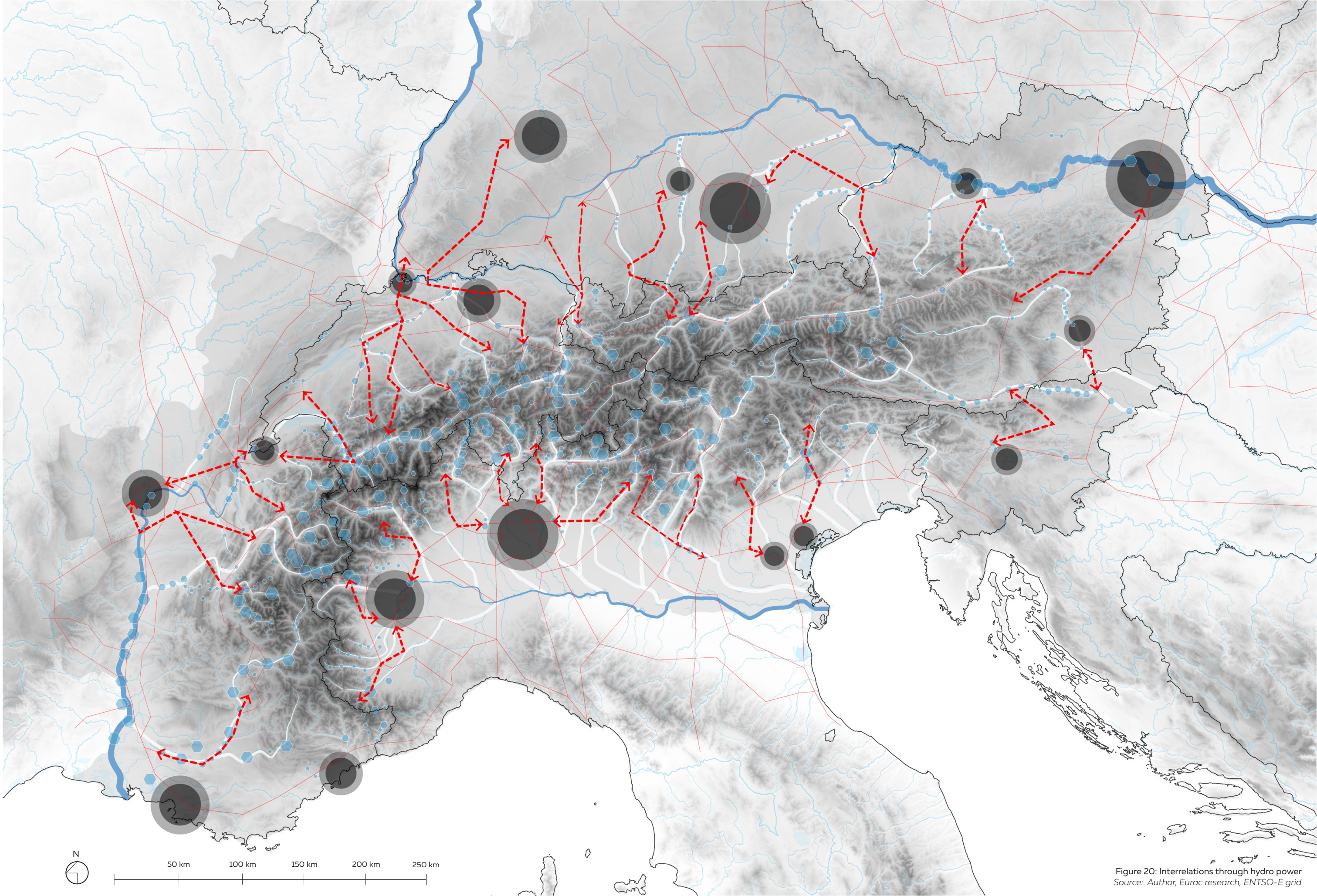
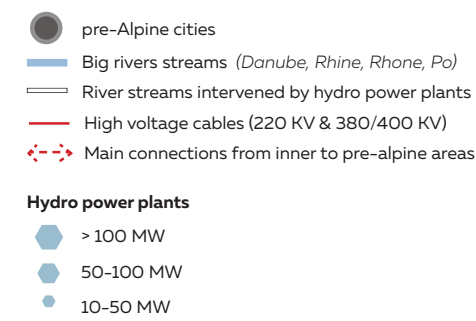


Figure 20: Interrelations through hydro power  
Source: Author, Eurac research, ENTSO-E grid





Figure 22: Transmission lines in Lermoos, Source: Author

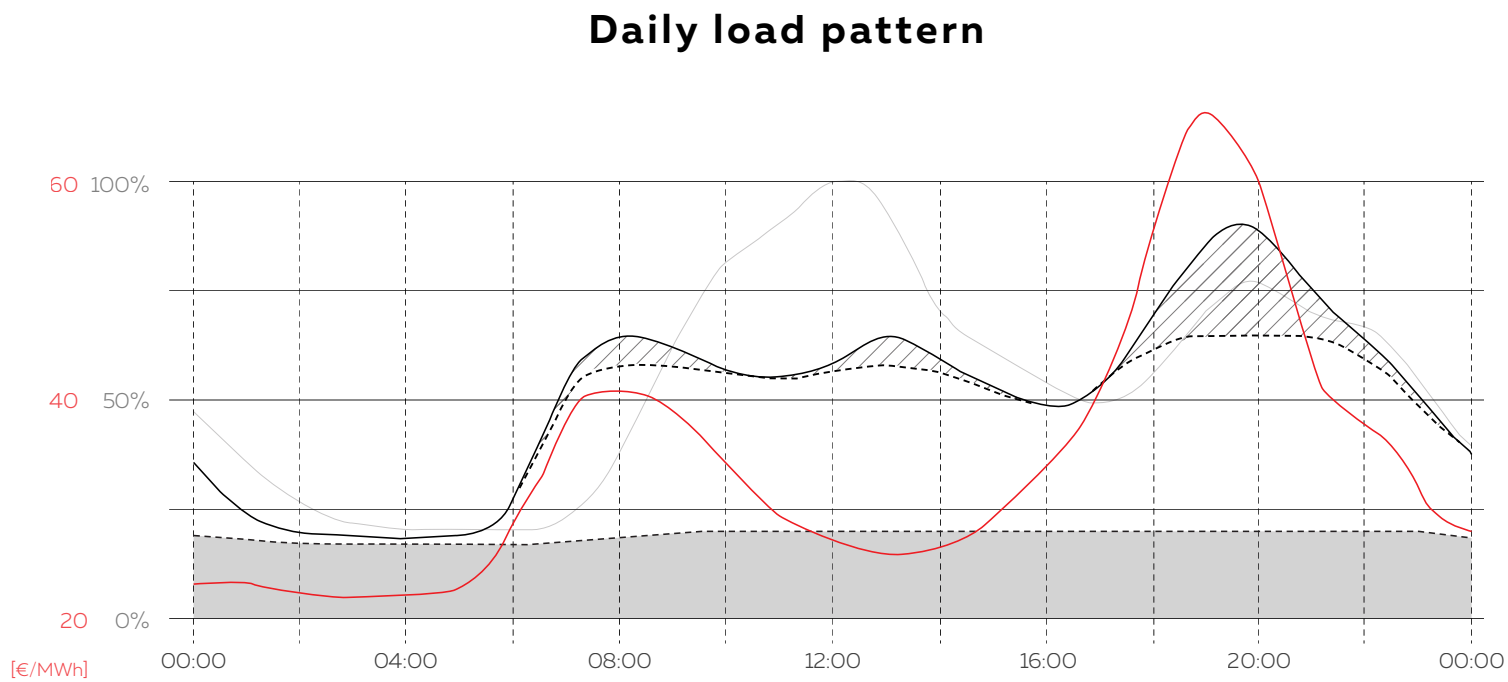
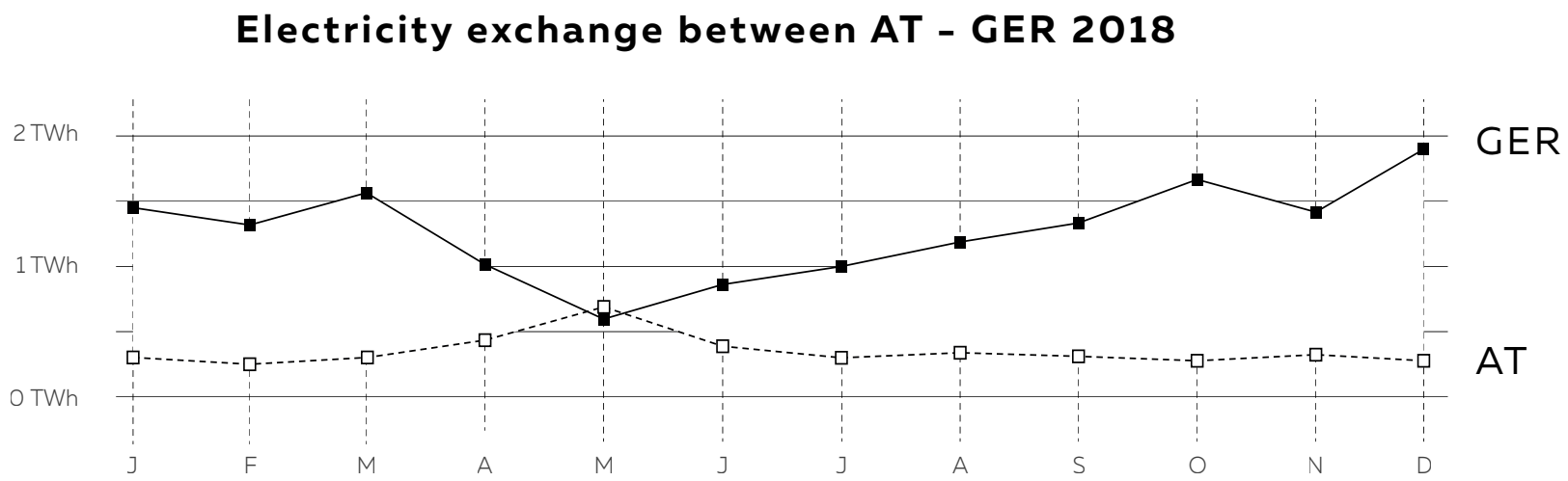


Figure 21: Schematic daily load pattern in spring and electricity prices  
Source: Association of Swiss Electricity companies, 2018



# Winter tourism

~40% of skier visits worldwide take place in the Alps (FR + AT)

>> Three overlapping networks produce interrelations between pre- and inner alpine areas

1. River ecosystems

2. Electricity network

3. Traffic flows

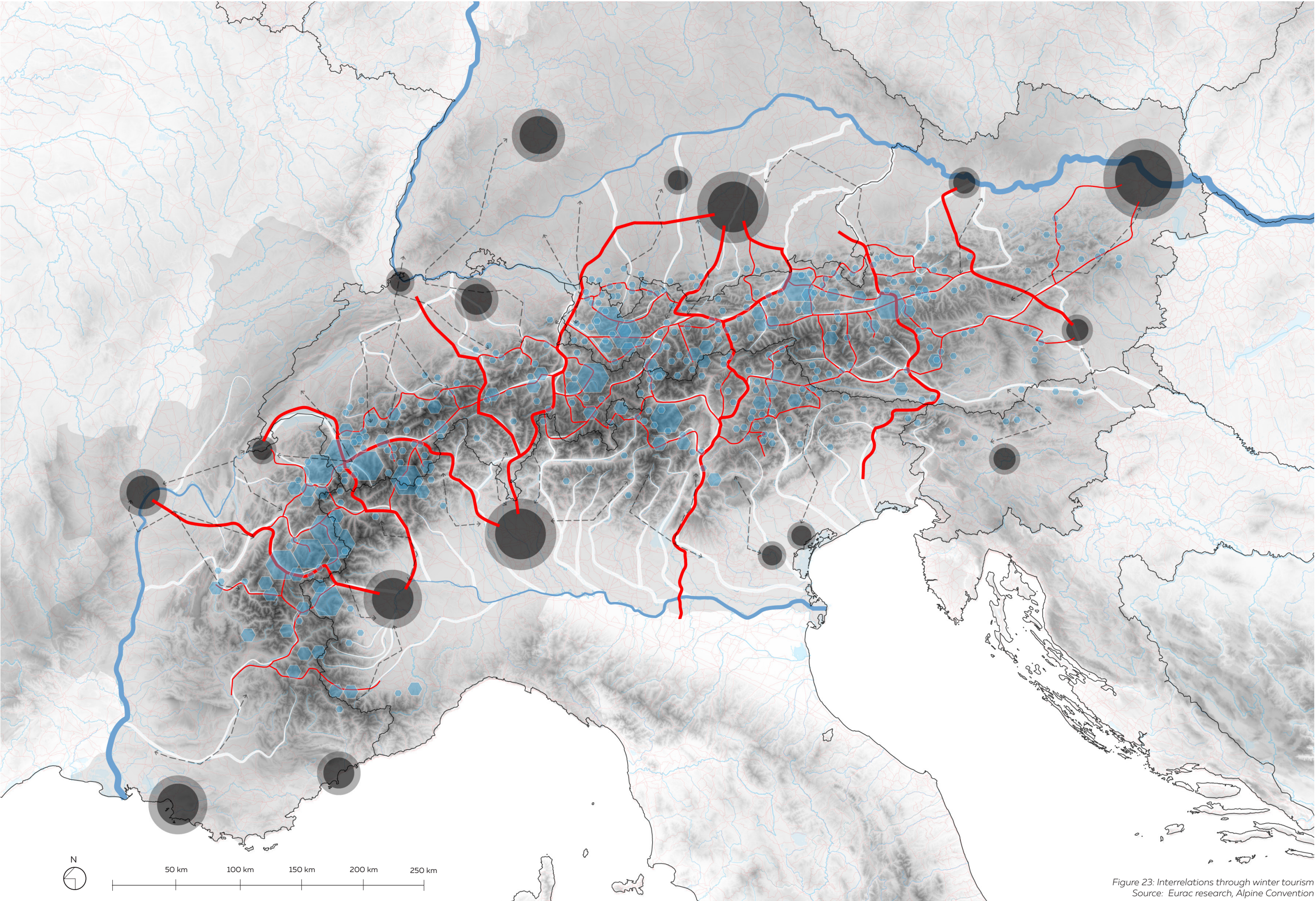
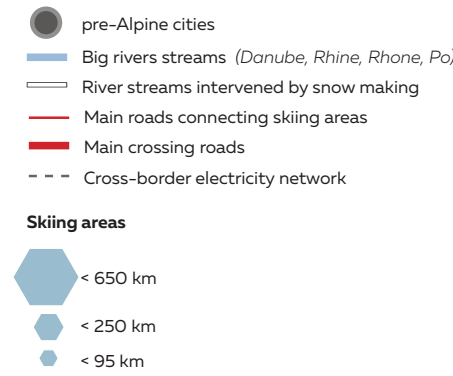


Figure 23: Interrelations through winter tourism  
Source: Eurac research, Alpine Convention





Figure 25: Snow cannon in Lermoos, April 2019; Source: Author

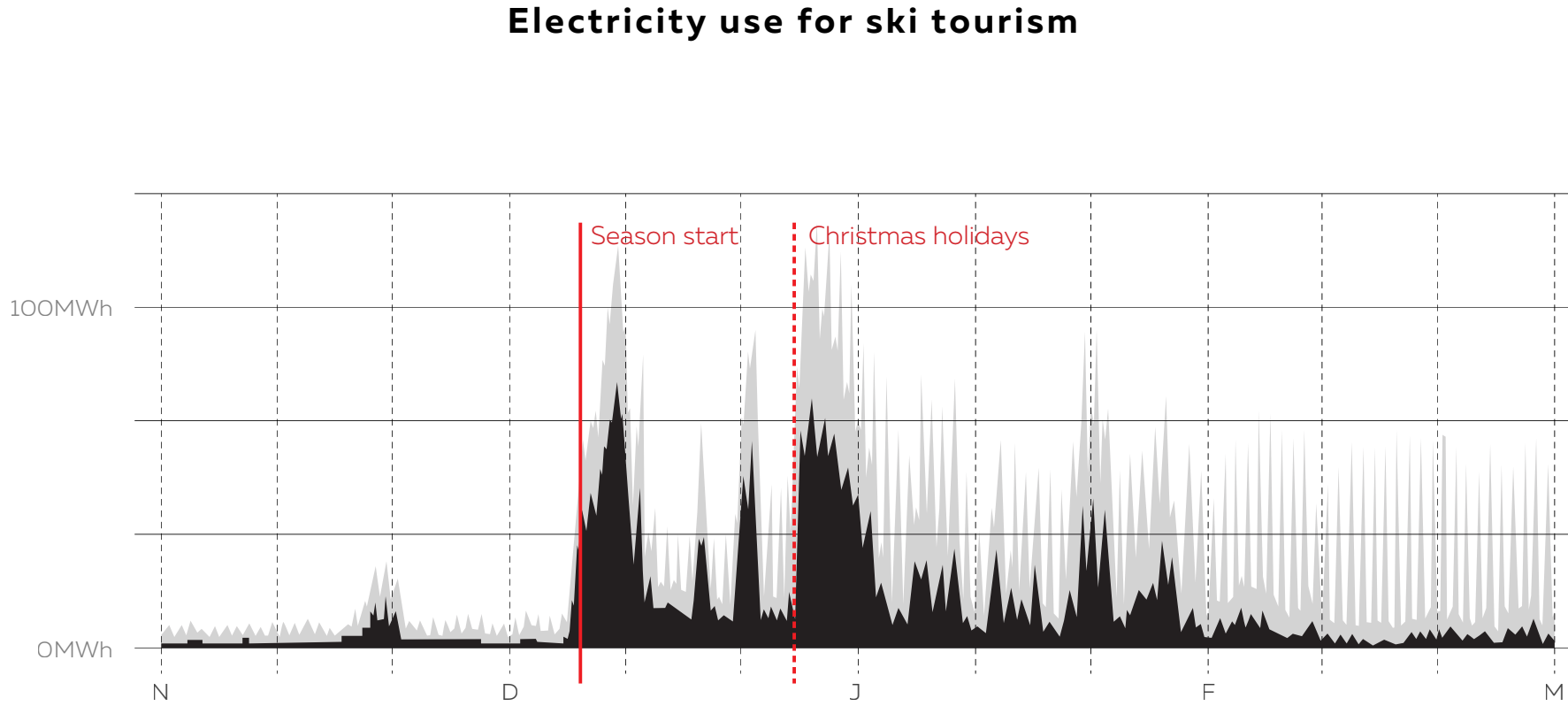


Figure 24: Electricity consumption pattern of artificial snow making and ski lifts in Salzburg 2015  
Source: ÖIR GmbH, Austrian Power Grid AG



# Connection of skiing areas

Kühtai - Hochoetz (AT)

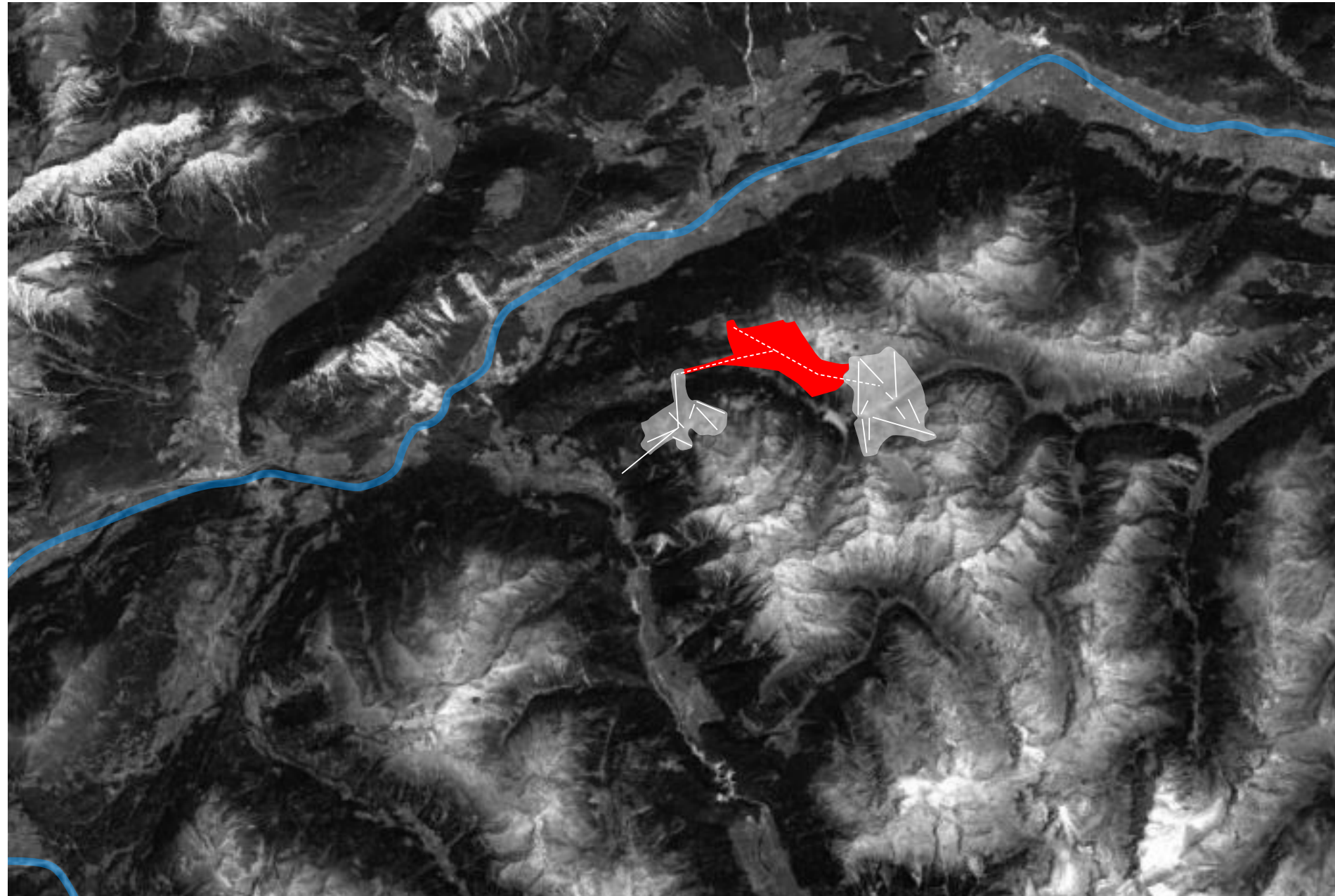


Figure 26: Conflict map  
Source: Google earth, TIWAG, WWF



# Connection of skiing areas

## Kühtai - Hochoetz (AT)



Figure 27: Feldringer Böden in Summer and Winter, Source: Gerd Estermann



# Extension of hydropower plant

Kauner valley (AT)

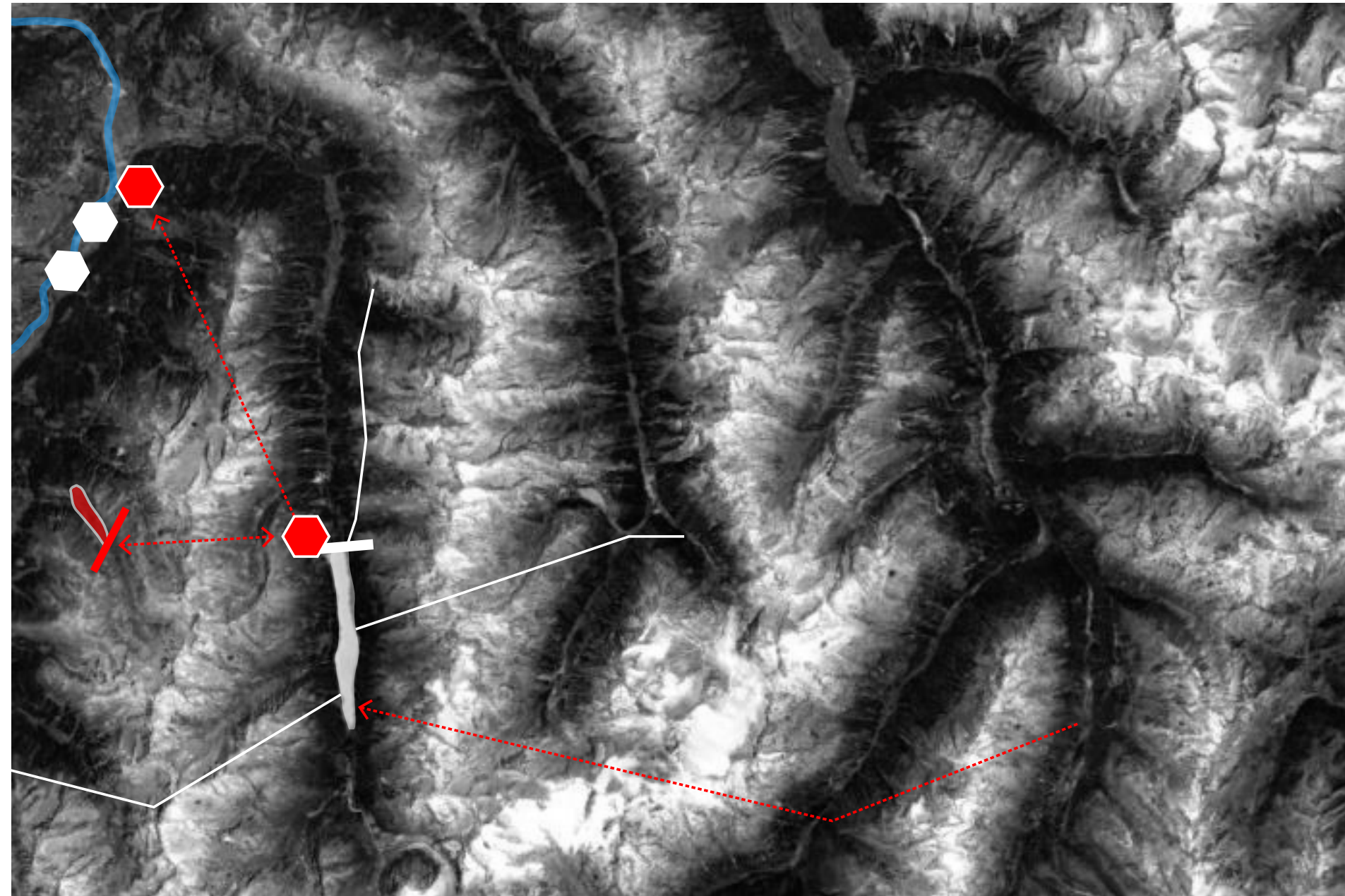


Figure 28: Conflict map  
Source: Google earth, TIWAG, WWF



# Extension of hydropower plant

## Kauner valley (AT)



Figure 29: Gepatch water reservoir of power plant, Source: TIWAG



Figure 30: Torrent Platzerbach in Patzertal, Source: WWF



*Giving up natural sites like the Feldringer Böden' and the 'Schafjoch' is not worth it. In turn, it will provoke increased tourism in our commune, and so more traffic and urbanisation. Finally, the revenue won't stay in our municipality, but within the ski operators.*

**Citizen of Oetz**

*This expansion is an opportunity to create a future for our economic development and to stay competitive.*

**Mayor of Oetz**

*The connection of two skiing areas is our only opportunity to compete with other resorts in the future.*

**Representative of 'Ötztal Tourismus'**

*Our landscape will be destroyed in a long-term perspective through over touristic development. Additionally, also protected amphibians will loose their natural haitat.*

**Gerd Estermann, initiator of petition**

## SPATIAL JUSTICE?

*A new power plant will satisfy the government because it supports the energy transition, and TIWAG itself for increasing their profit by exporting electricity to other counties, but the local population doesn't experience any revenue. Finally, we don't know any more where the energy produced by TIWAG goes to.*

**Citizen of Tirol**

*We need to achieve our goals set for the energy transition and therefore hydro power is an important component. However, the conservation of our alpine landscape and rivers is essential.*

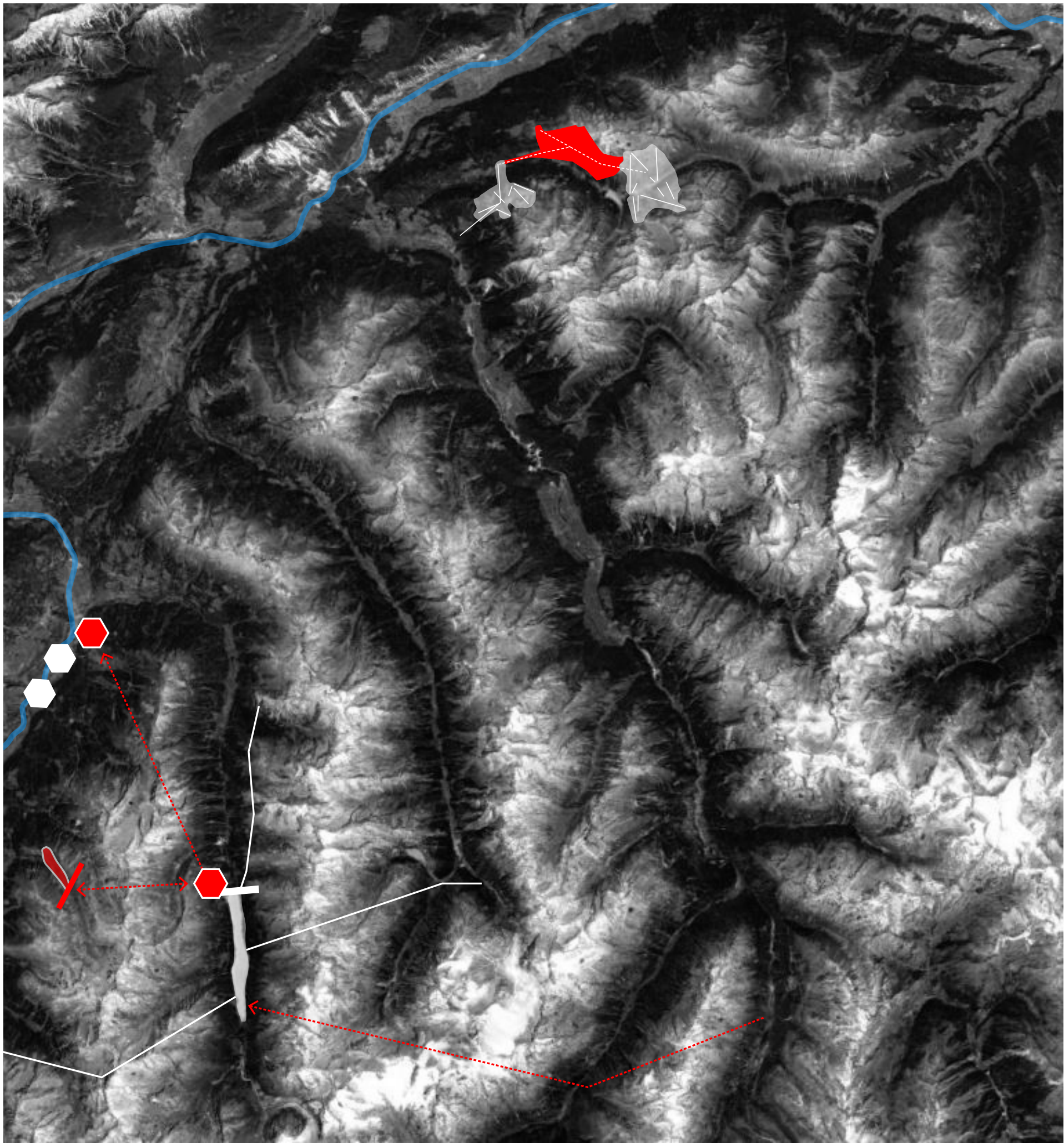
**Provincial government Tirol**

*The government must not allow hundreds of hectares of valuable alpine habitats to be overstuffed for the greed of an energy supplier and even the last intact rivers in the far eastern Ötz Valley to be sacrificed.*

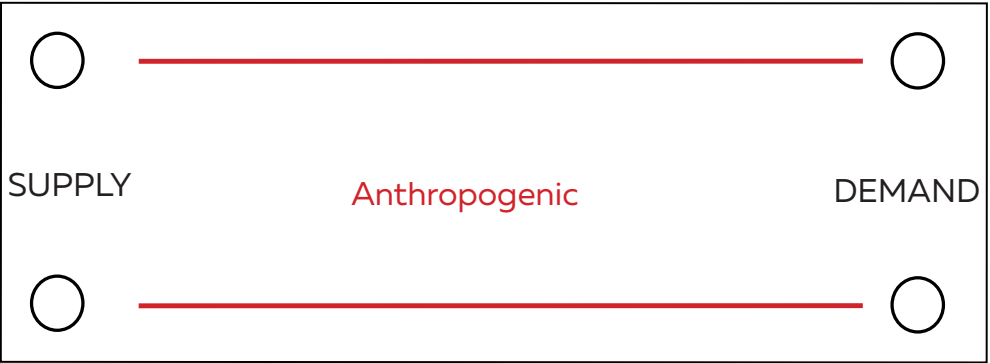
**Initiators of petition (WWF)**

*With the expansion we make a significant contribution to the energy transition in Tyrol, Austria and Europe. Moreover, infrastructure and compensation measures contribute to an improvement of flood protection in the Ötz Valley without additional procedures, protective structures or public money.*

**Representative of 'TIWAG'**



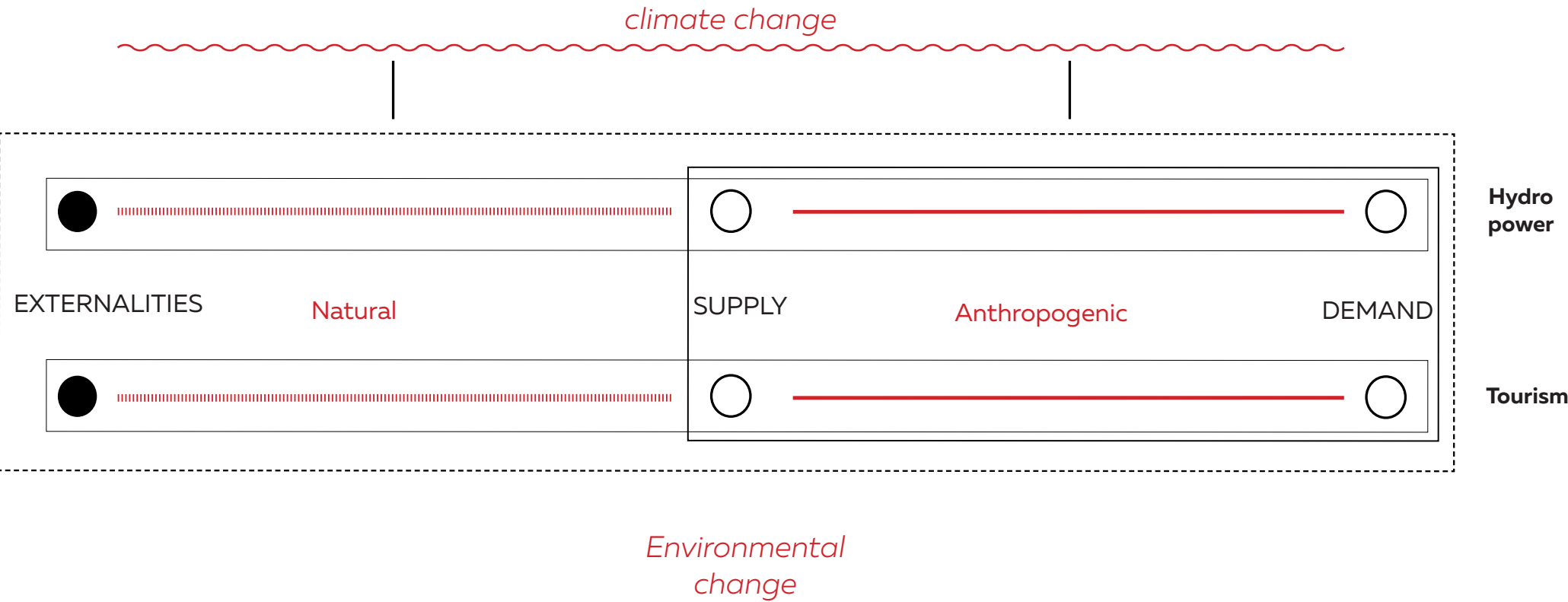




Hydro  
power

Tourism







HOW CAN THE INTER-RELATIONS  
BE TRANSFORMED?



1 Make anthropogenic networks more sustainable

- pre-Alpine cities
- Big rivers streams (Danube, Rhine, Rhone, Po)
- River streams
- Areas strongly affected by climate change
- High intensive winter tourism areas
- Areas with high hydro power potential

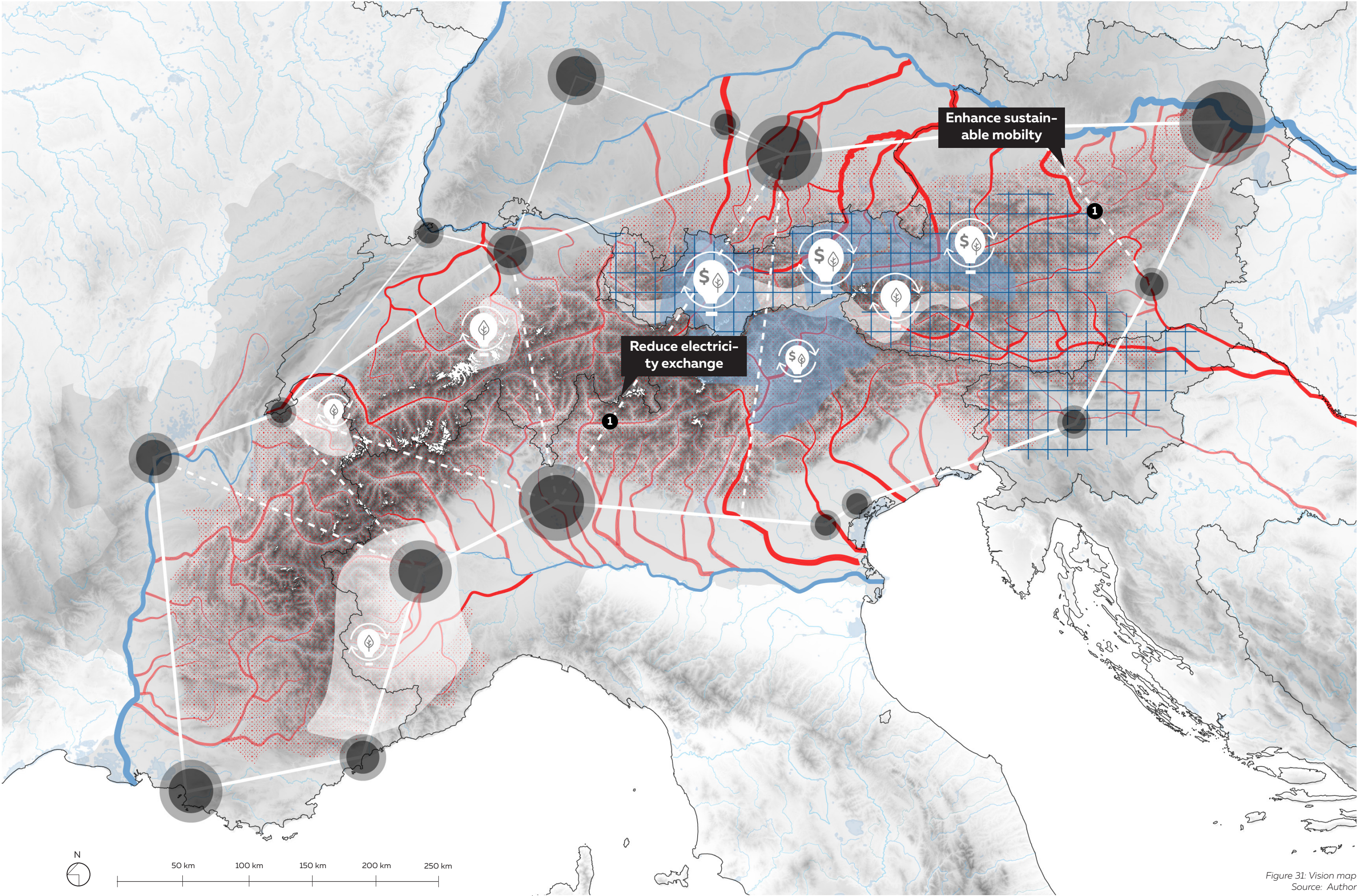


Figure 31: Vision map  
Source: Author



- 1 Make anthropogenic networks more sustainable
- 2 Prioritize interrelations through freshwater eco-systems

- pre-Alpine cities
- Big rivers streams (Danube, Rhine, Rhone, Po)
- River streams
- Areas strongly affected by climate change
- High intensive winter tourism areas
- Areas with high hydro power potential

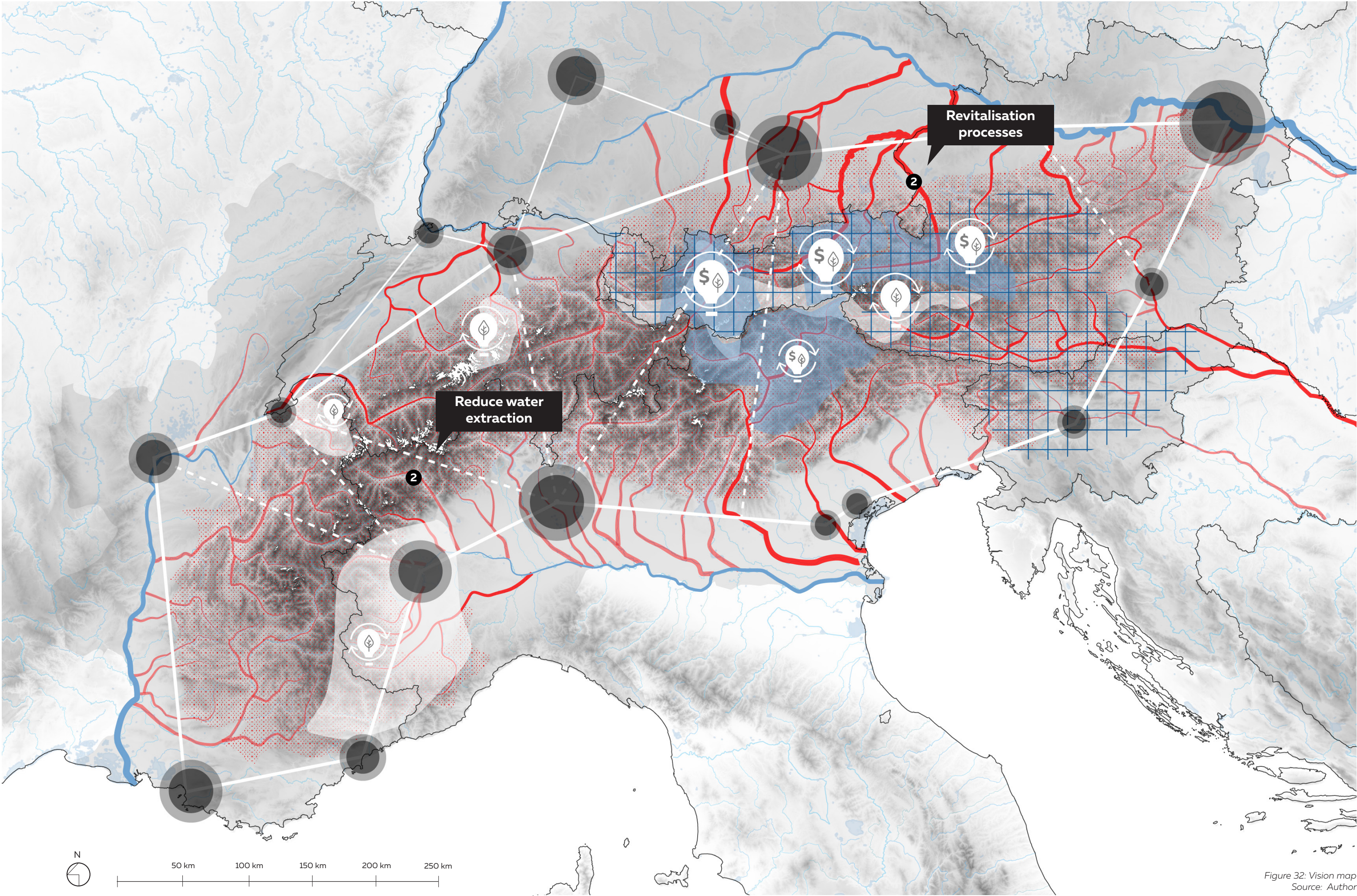


Figure 32: Vision map  
Source: Author



- 1 Make anthropogenic networks more sustainable
- 2 Prioritize interrelations through freshwater ecosystems
- 3 Create economic and environmental adaptation

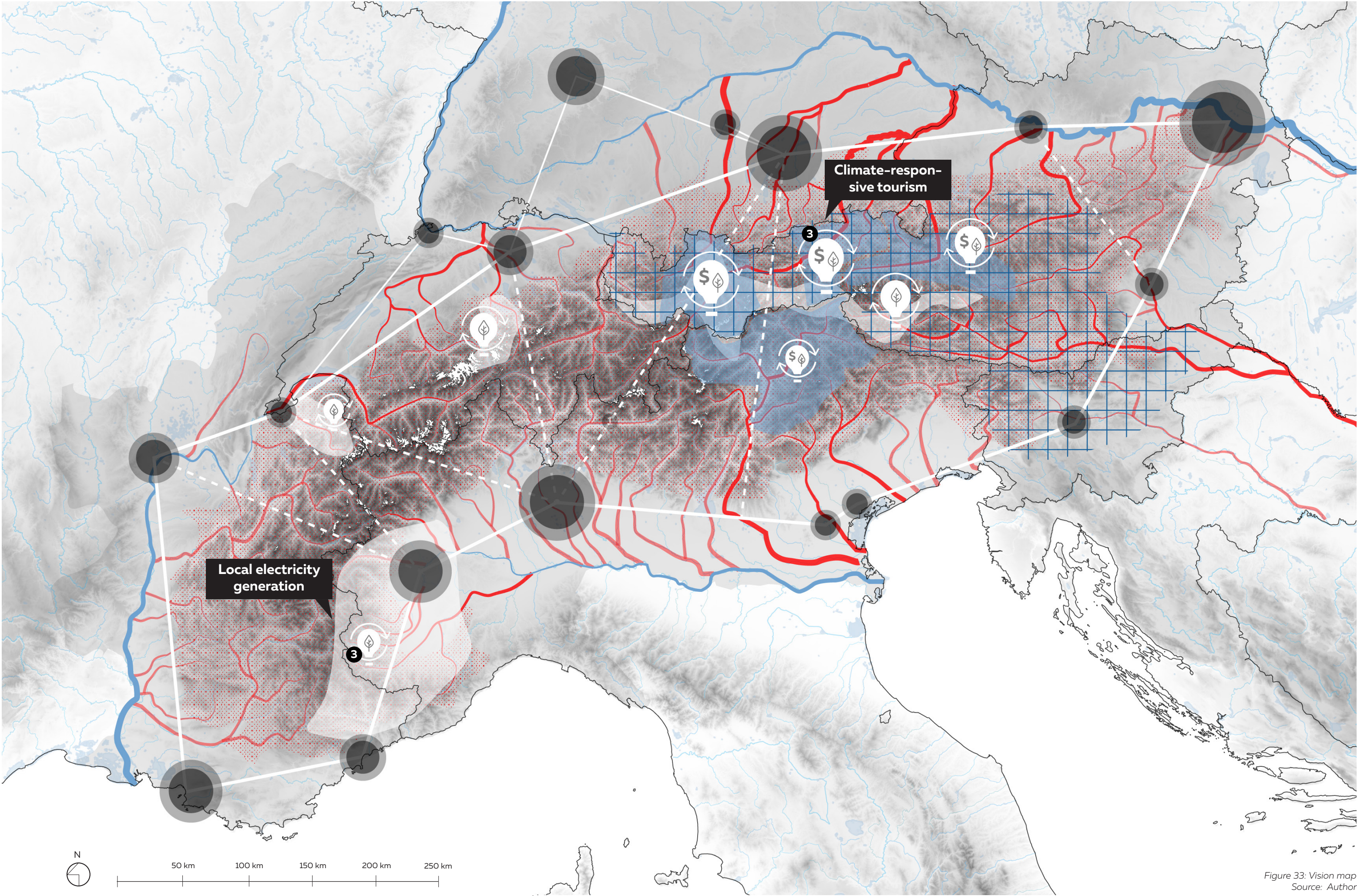
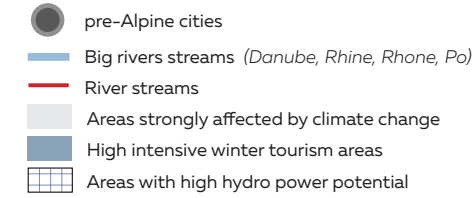
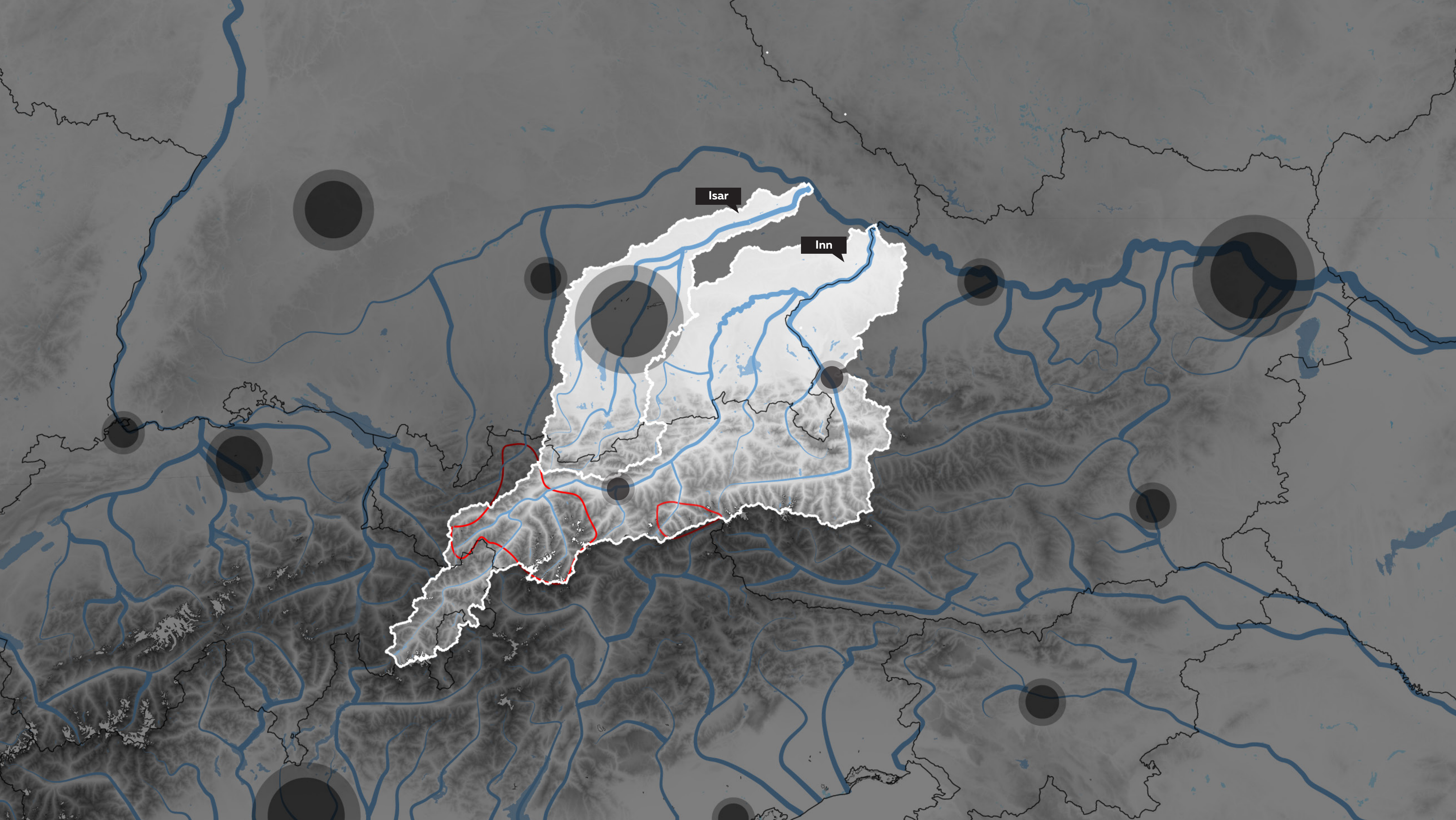


Figure 33: Vision map  
Source: Author





Isar

Inn



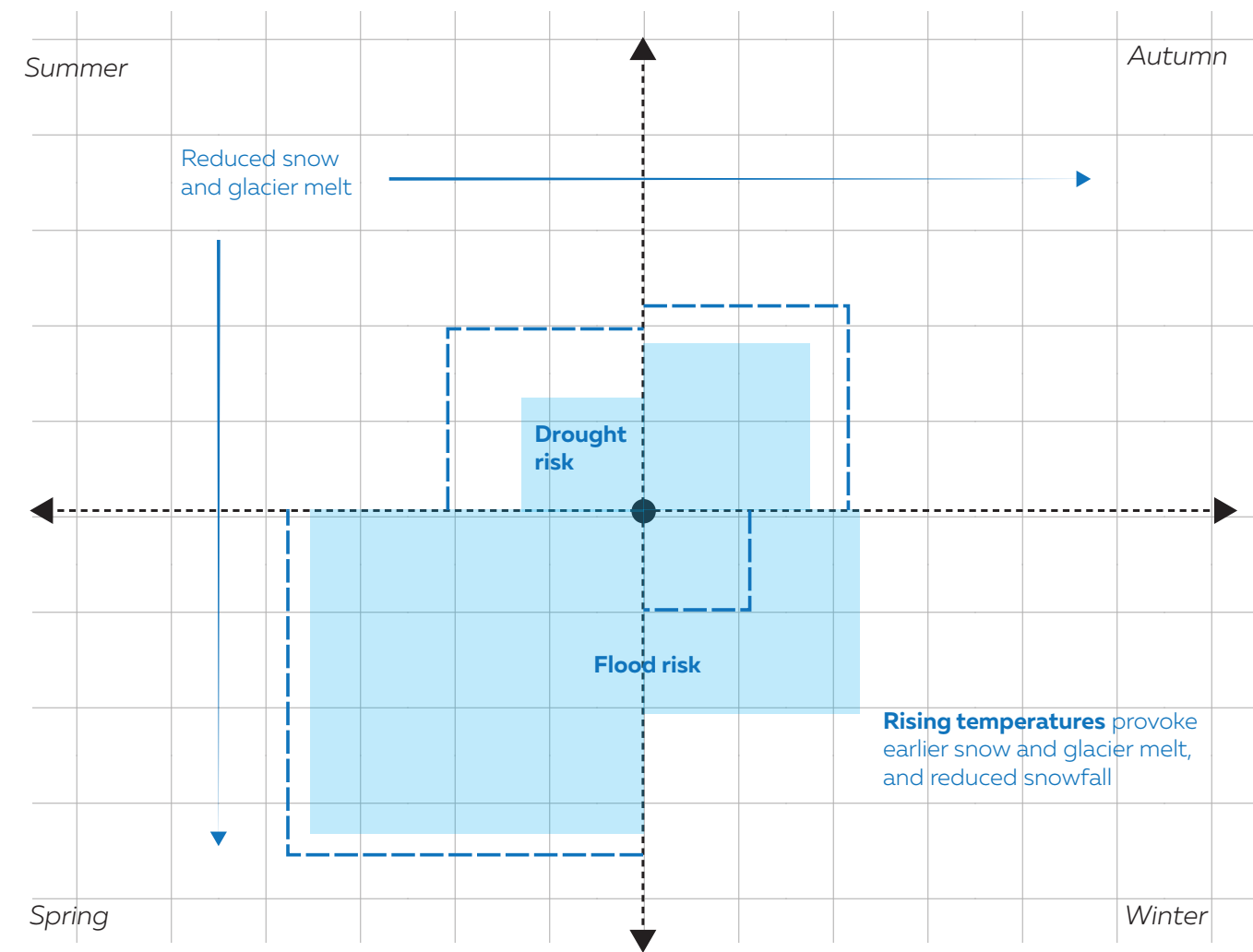
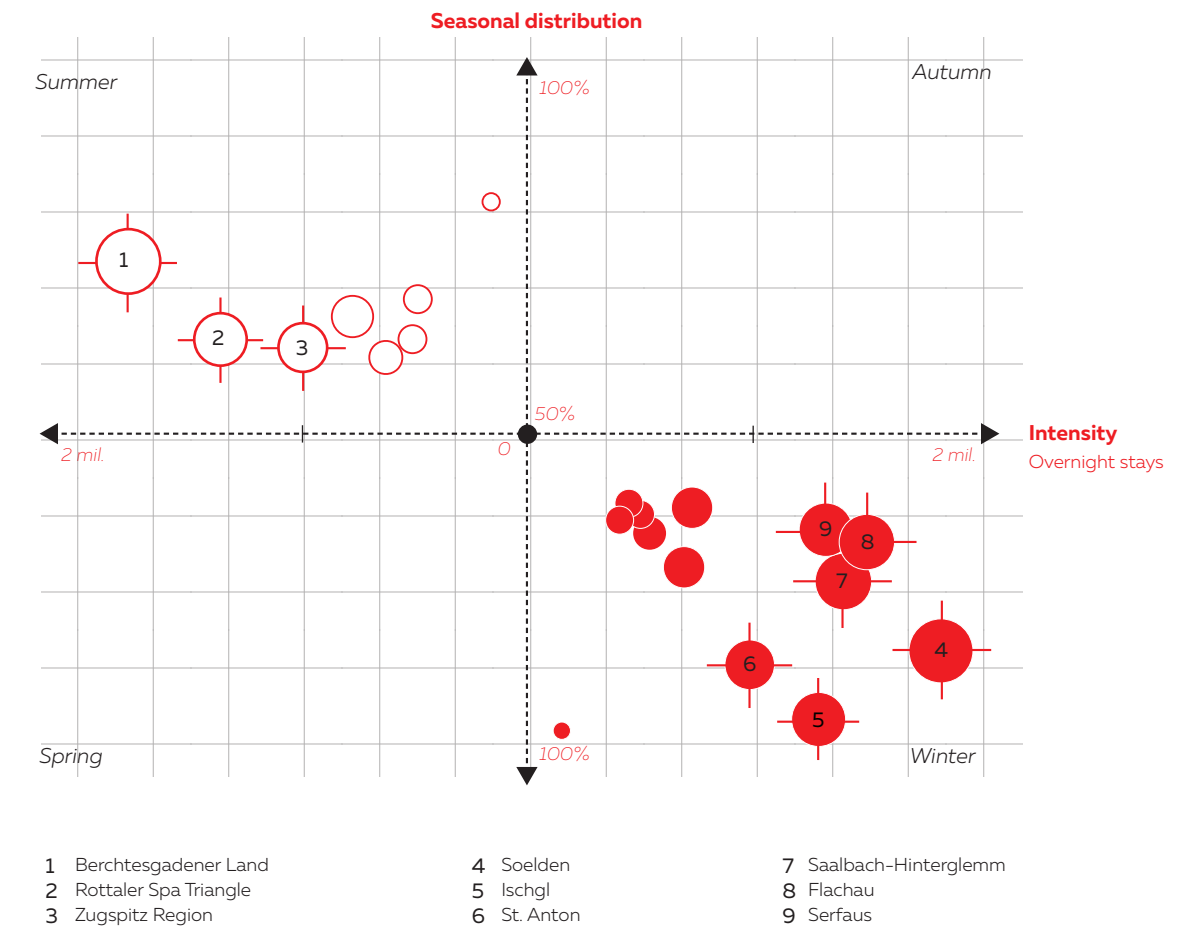
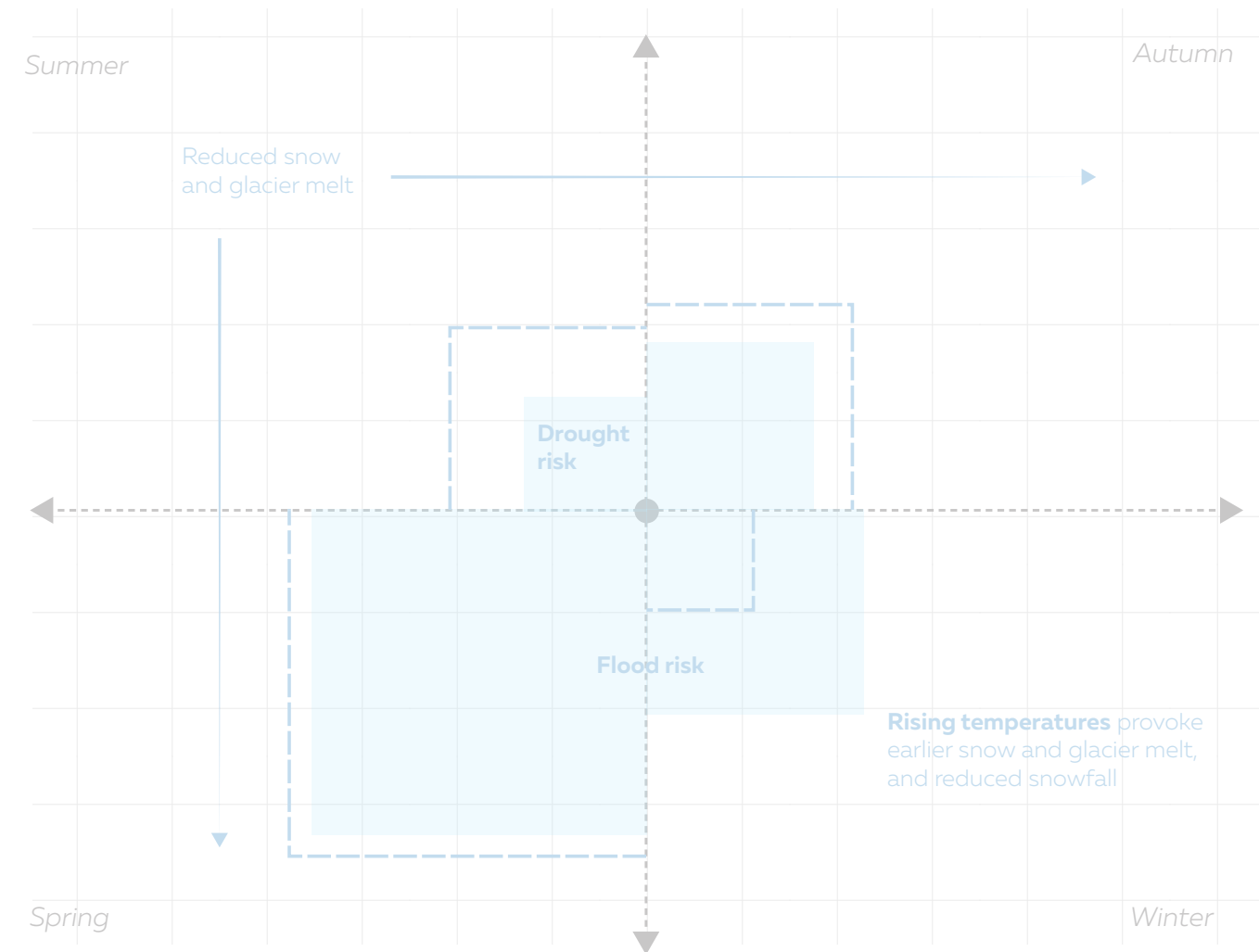
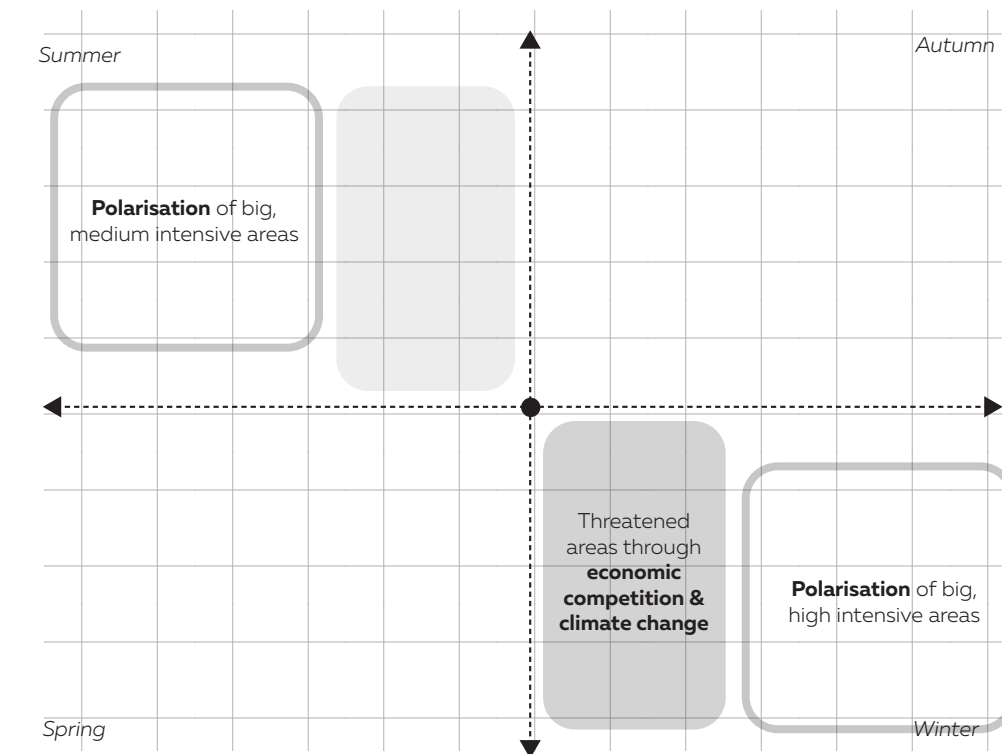
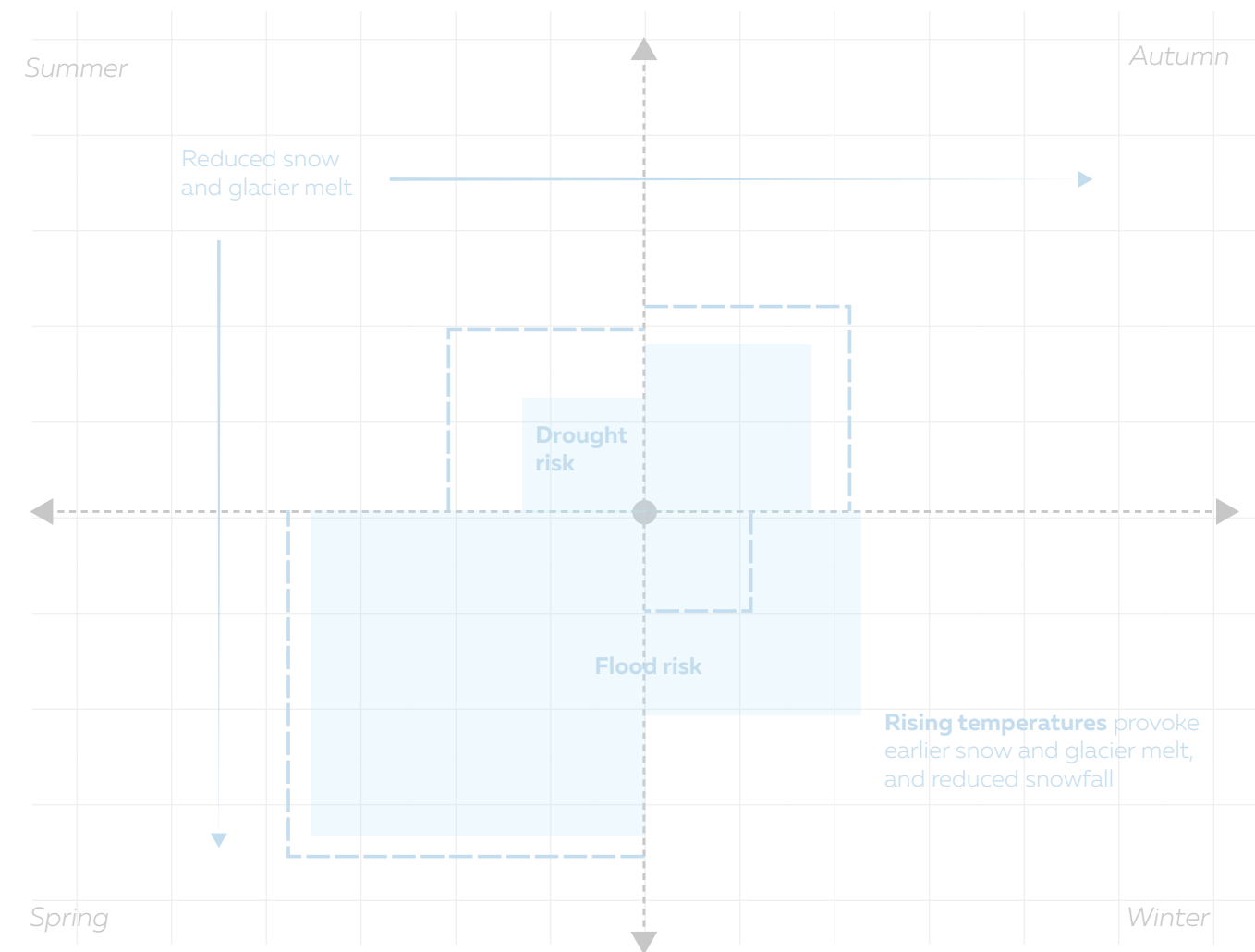


Figure 34: Changing river runoff pattern  
Source: EURAC Research, 2018

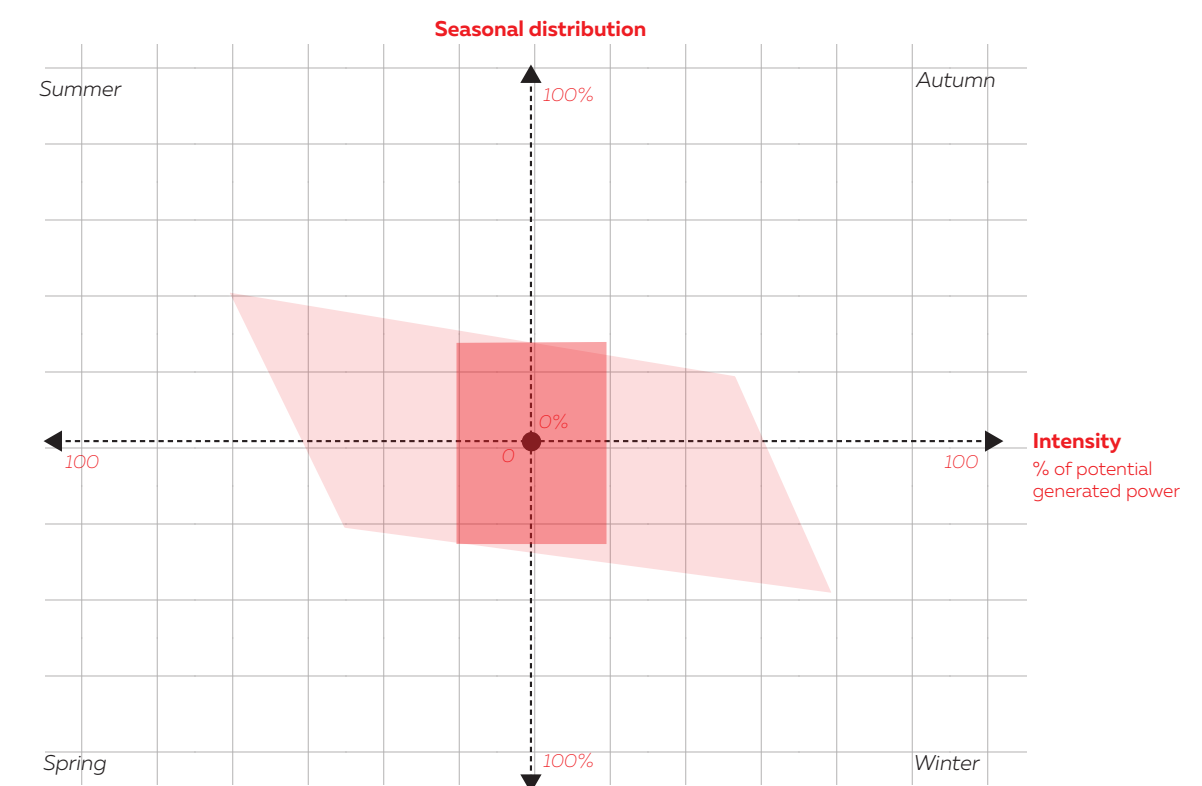
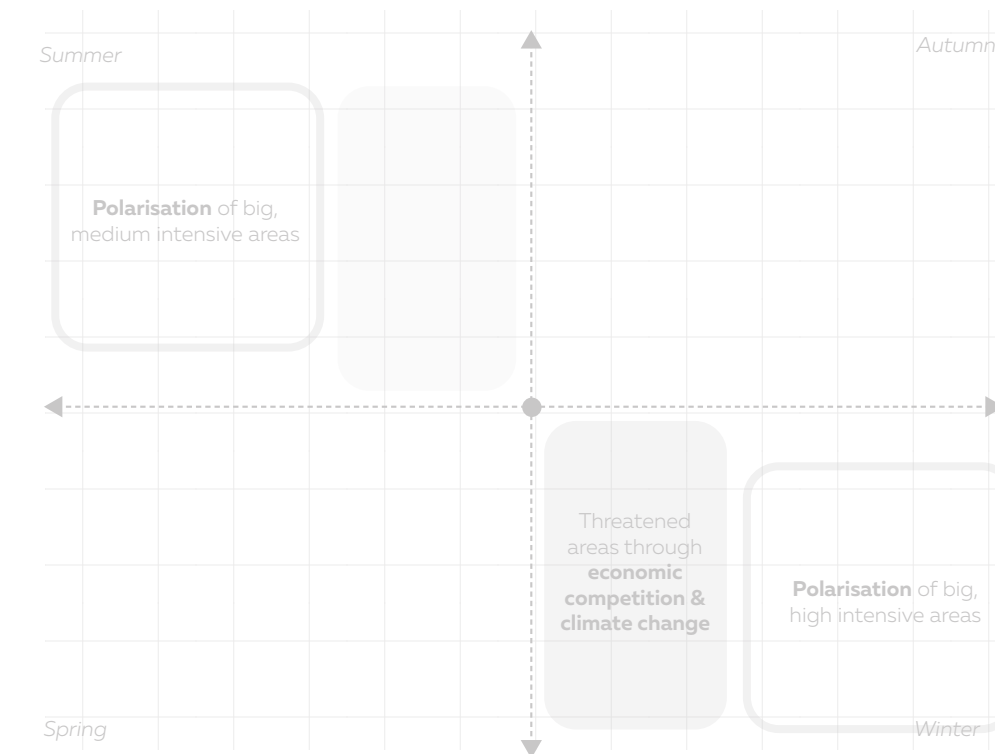
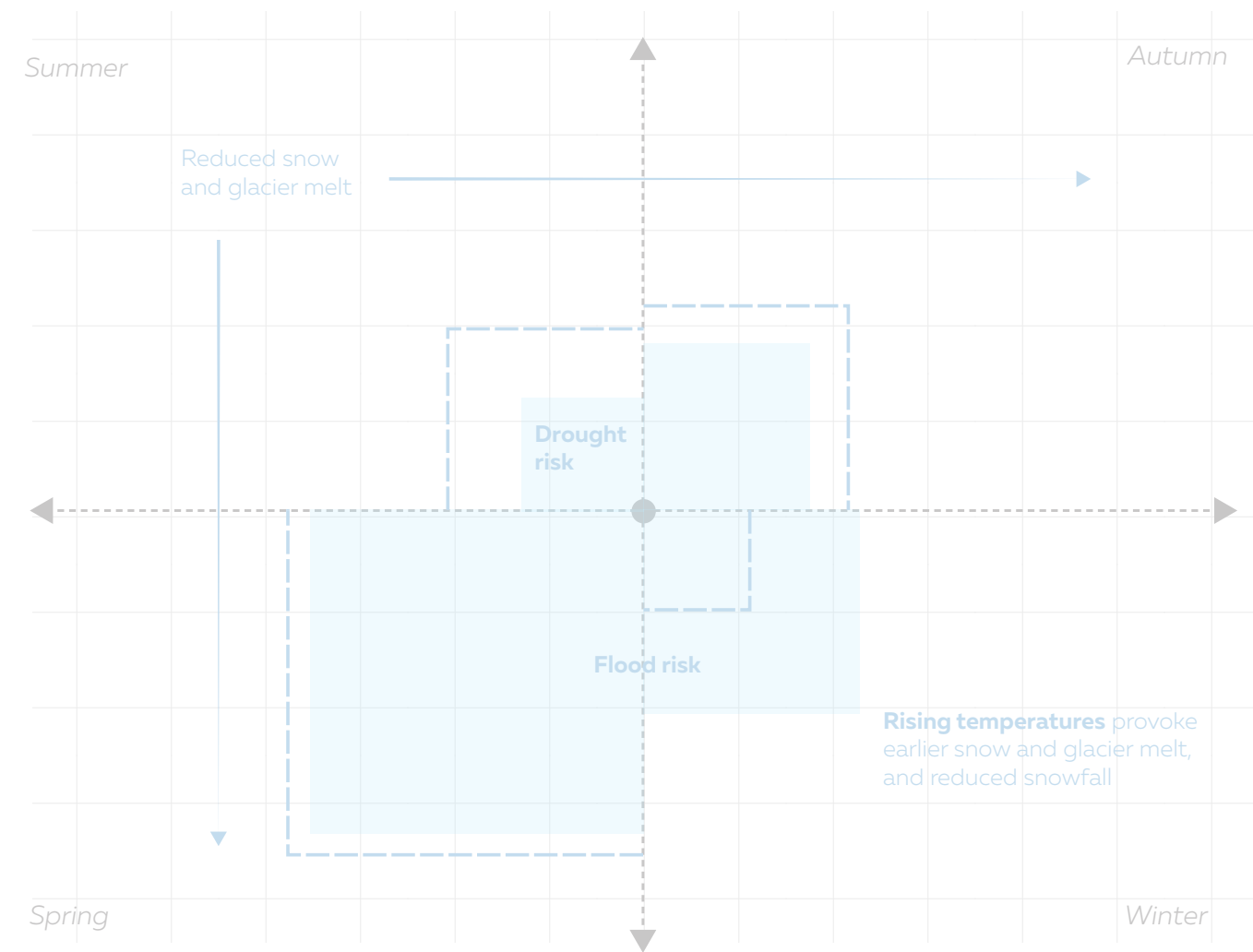




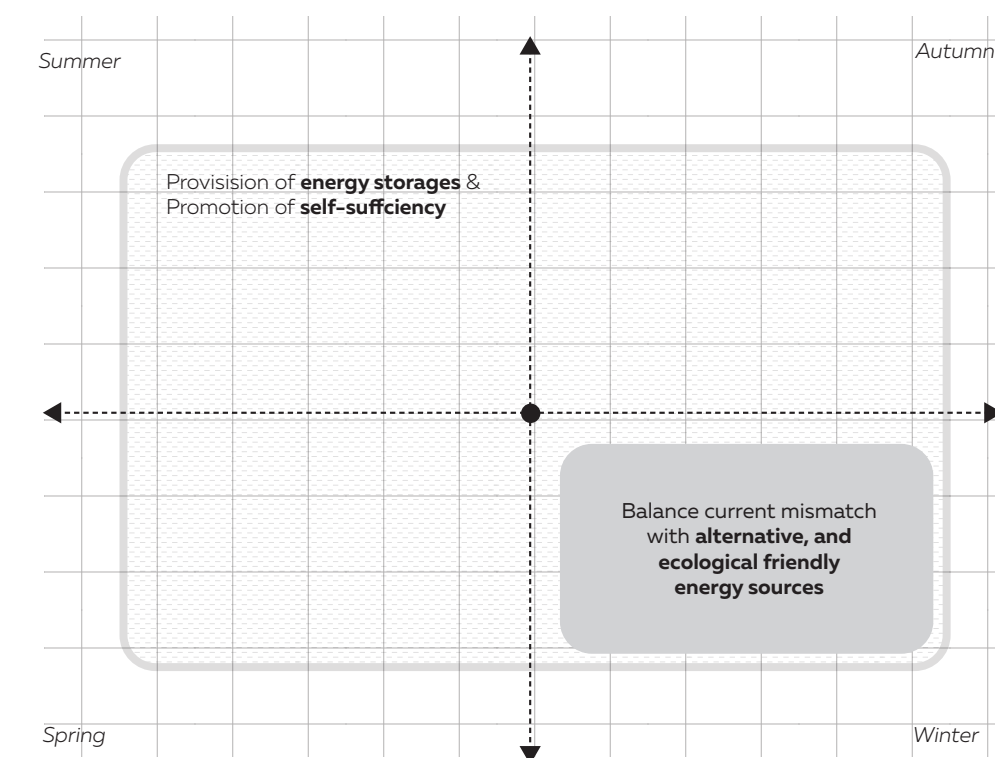
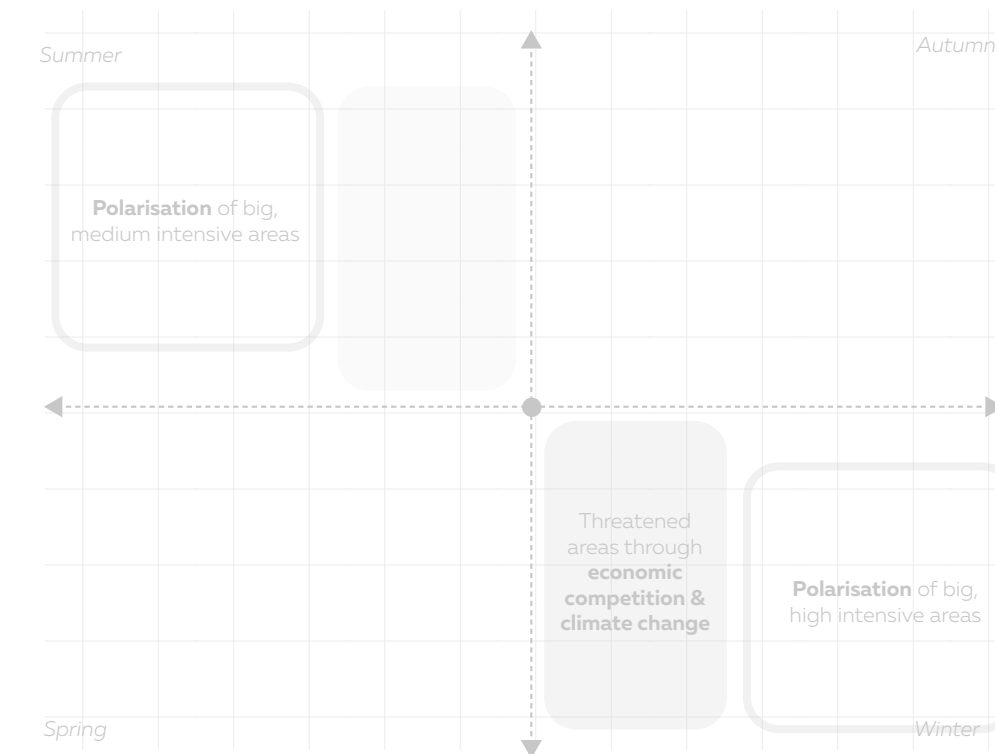
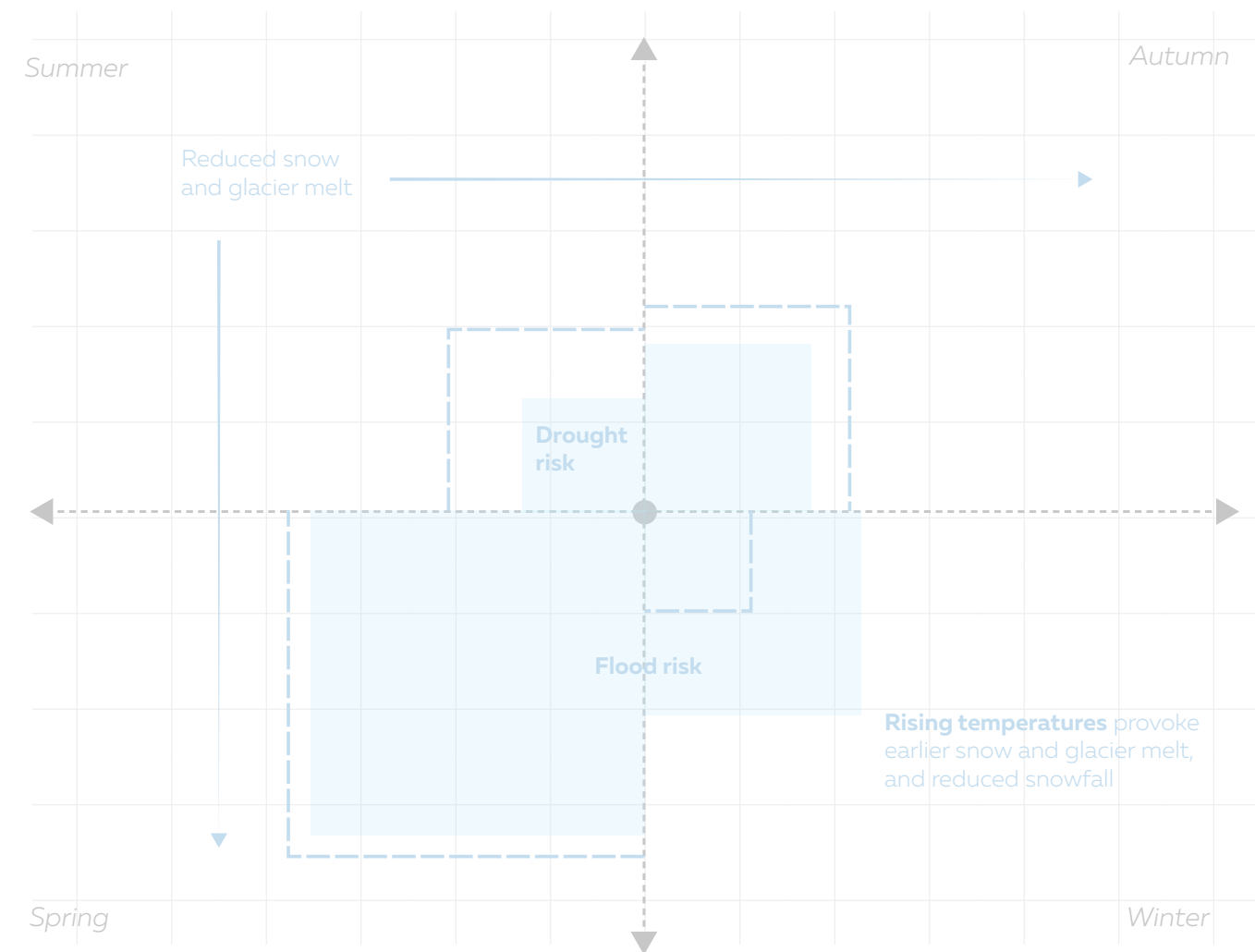














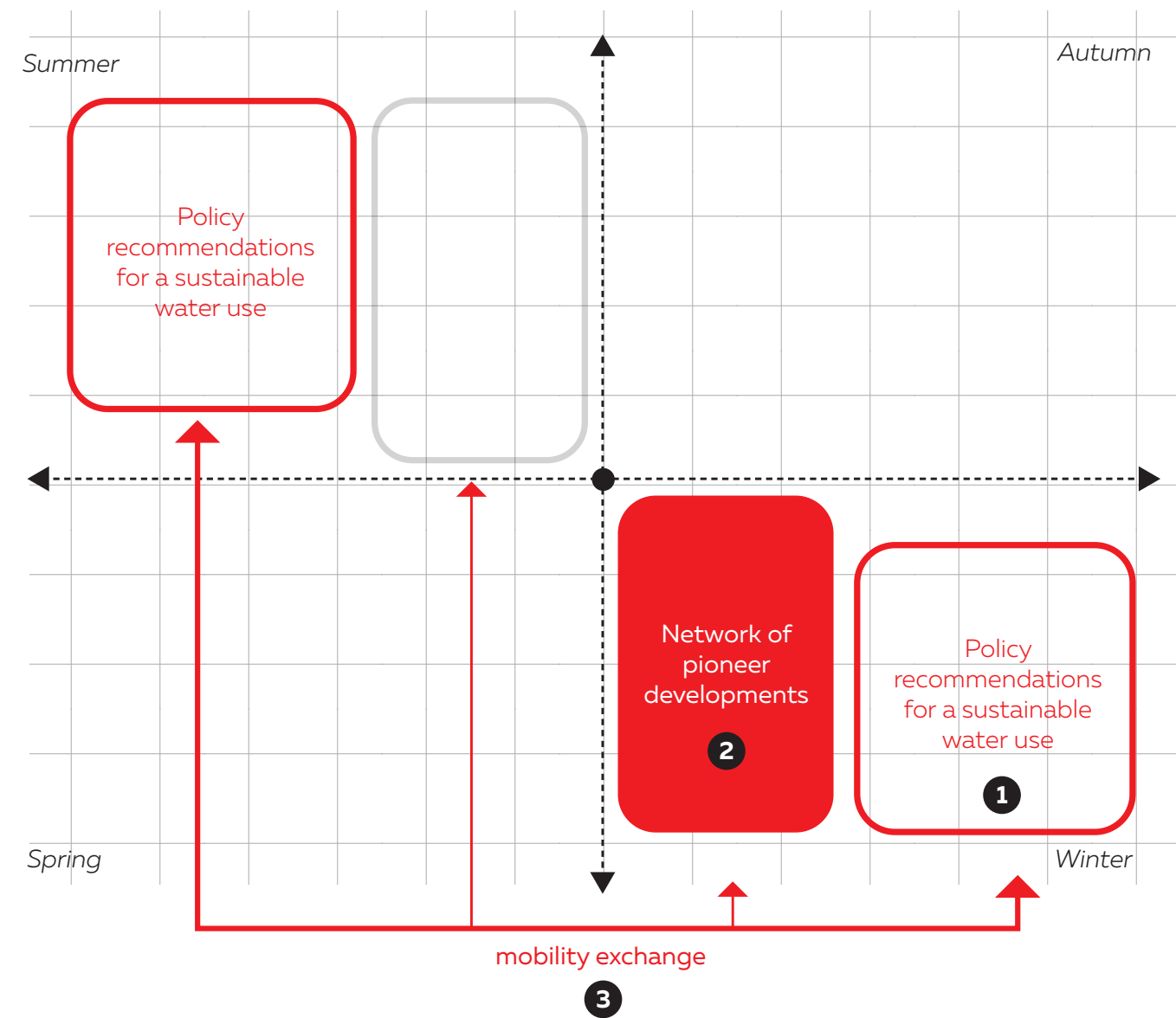
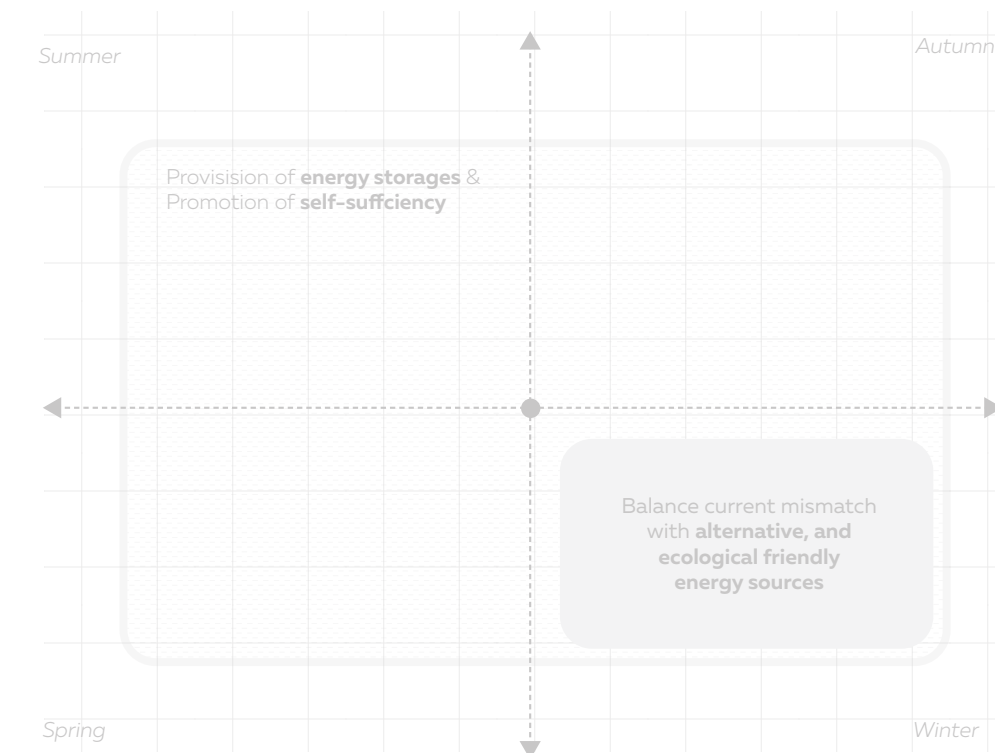
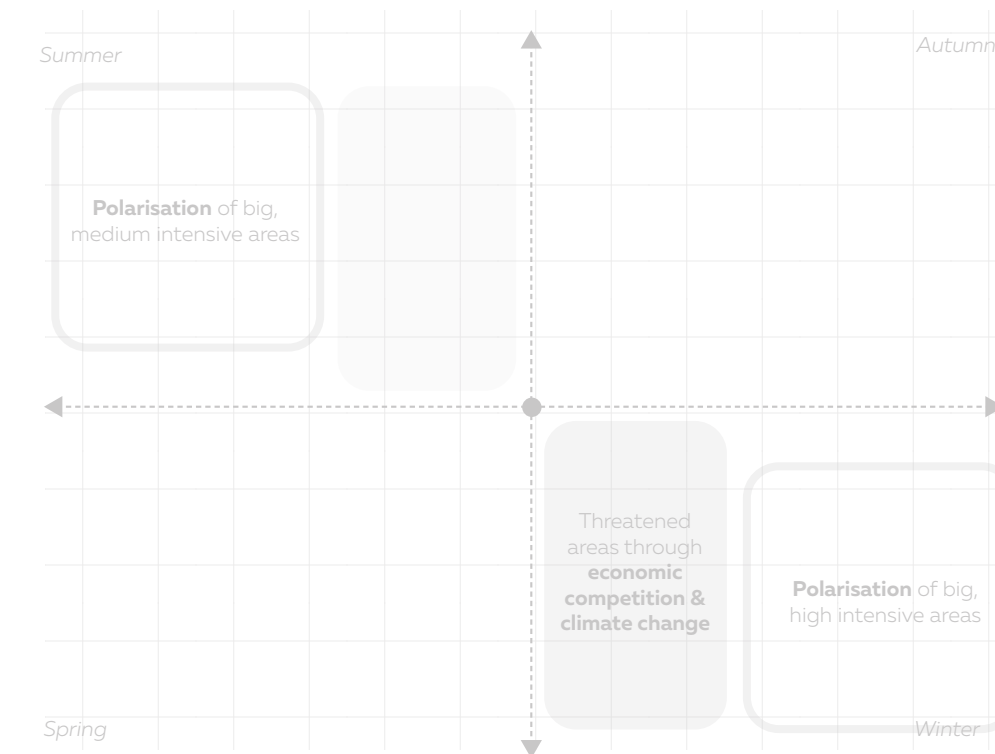


Figure 35: Key strategic actions  
Source: Author





Use of existing infrastructures  
for electricity generation

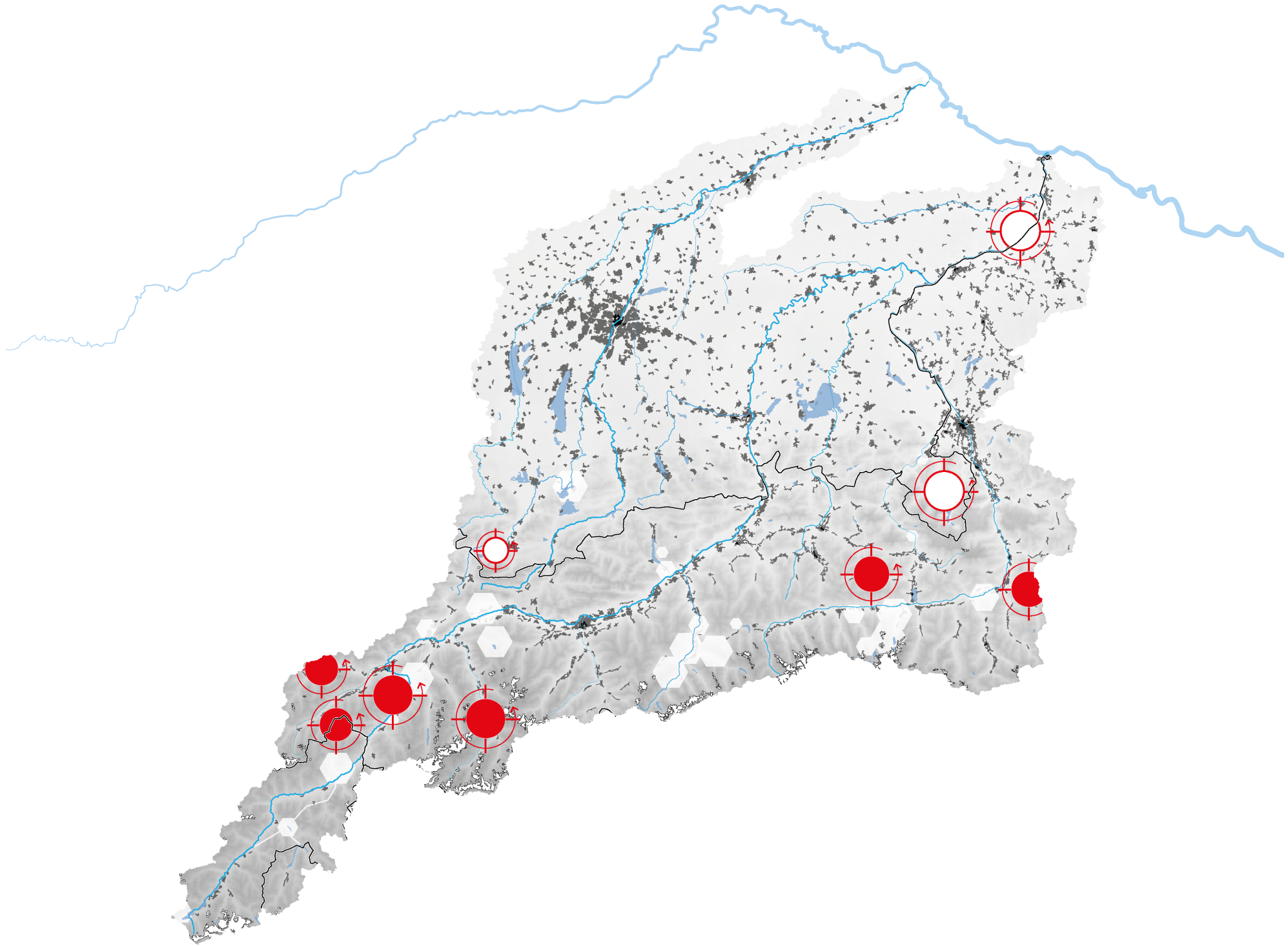
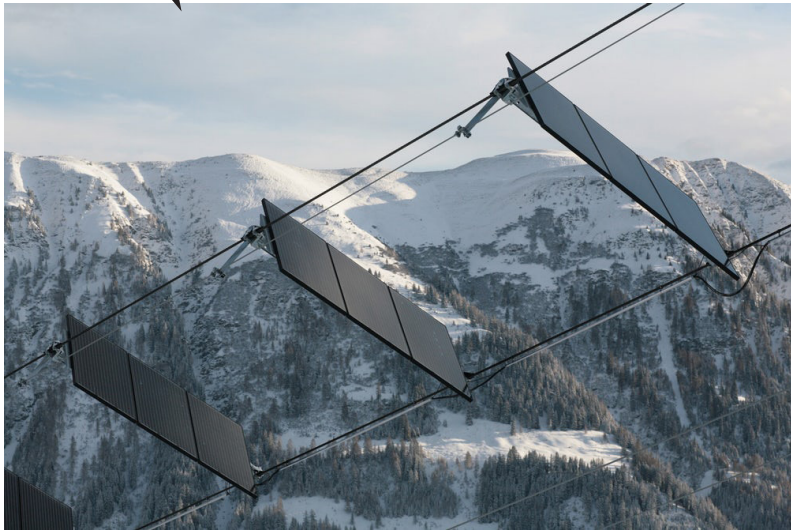
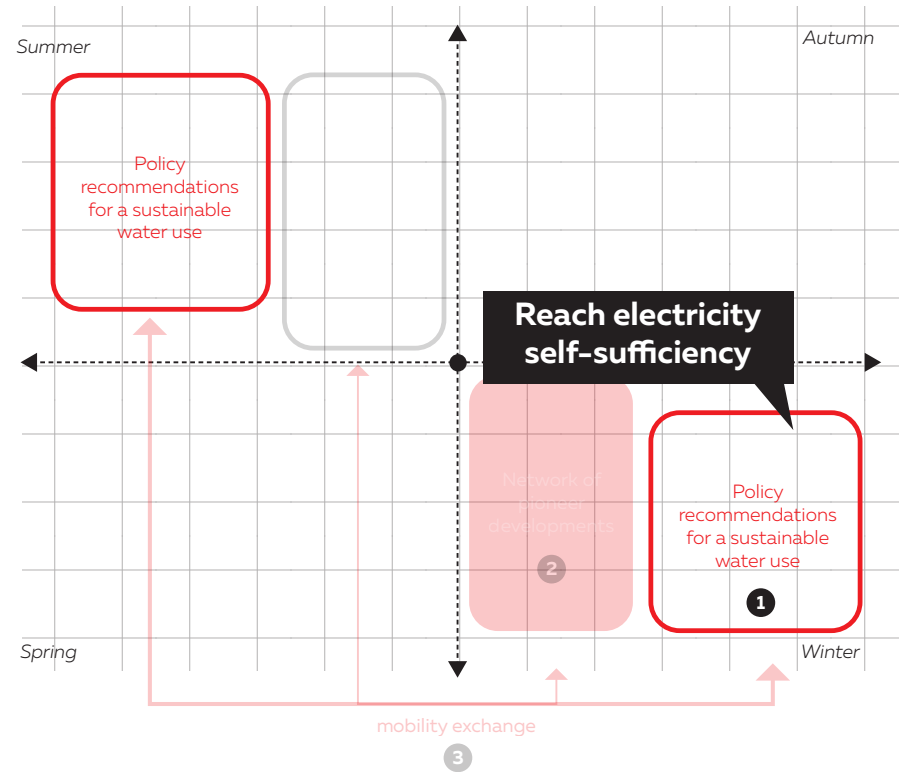


Figure 36: Solar panels in mountain areas, Source: [www.nature.com](http://www.nature.com)



A new tourism paradigm

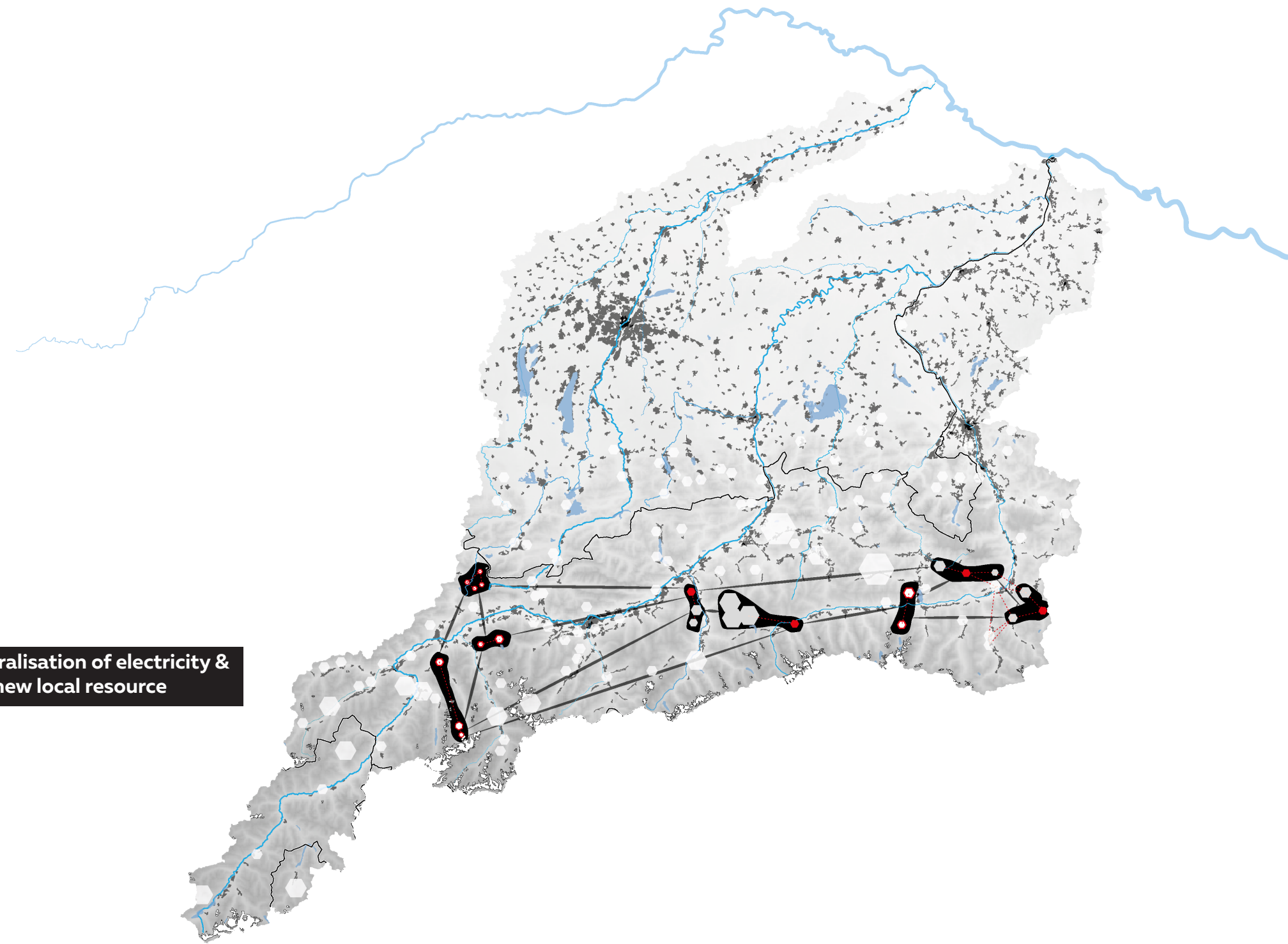
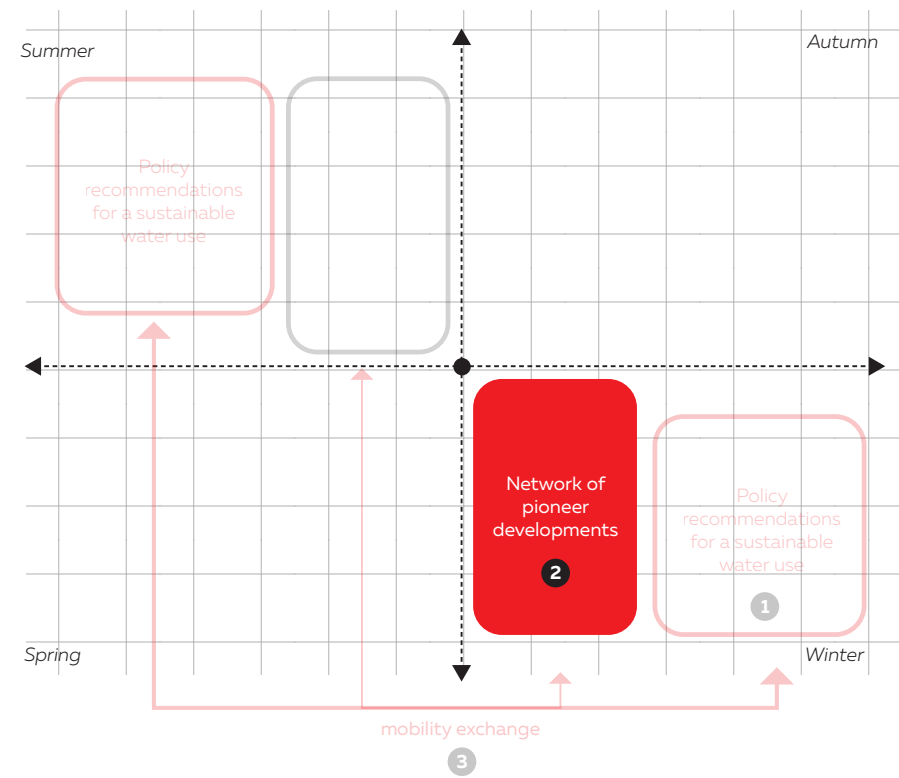


Figure 37: Soft tourism activities, Source: [www.alpenverein.de](http://www.alpenverein.de)



Figure 38: Wood heating plant in Lermoos, Source: Author

Decentralisation of electricity & new local resource





Seasonal mobility stock exchange

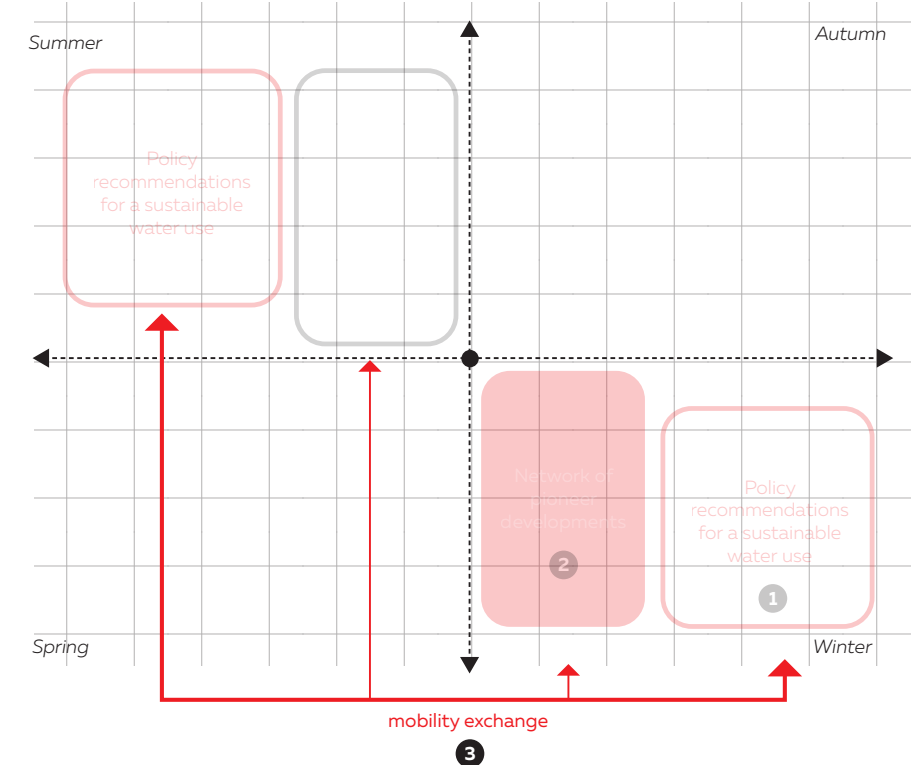
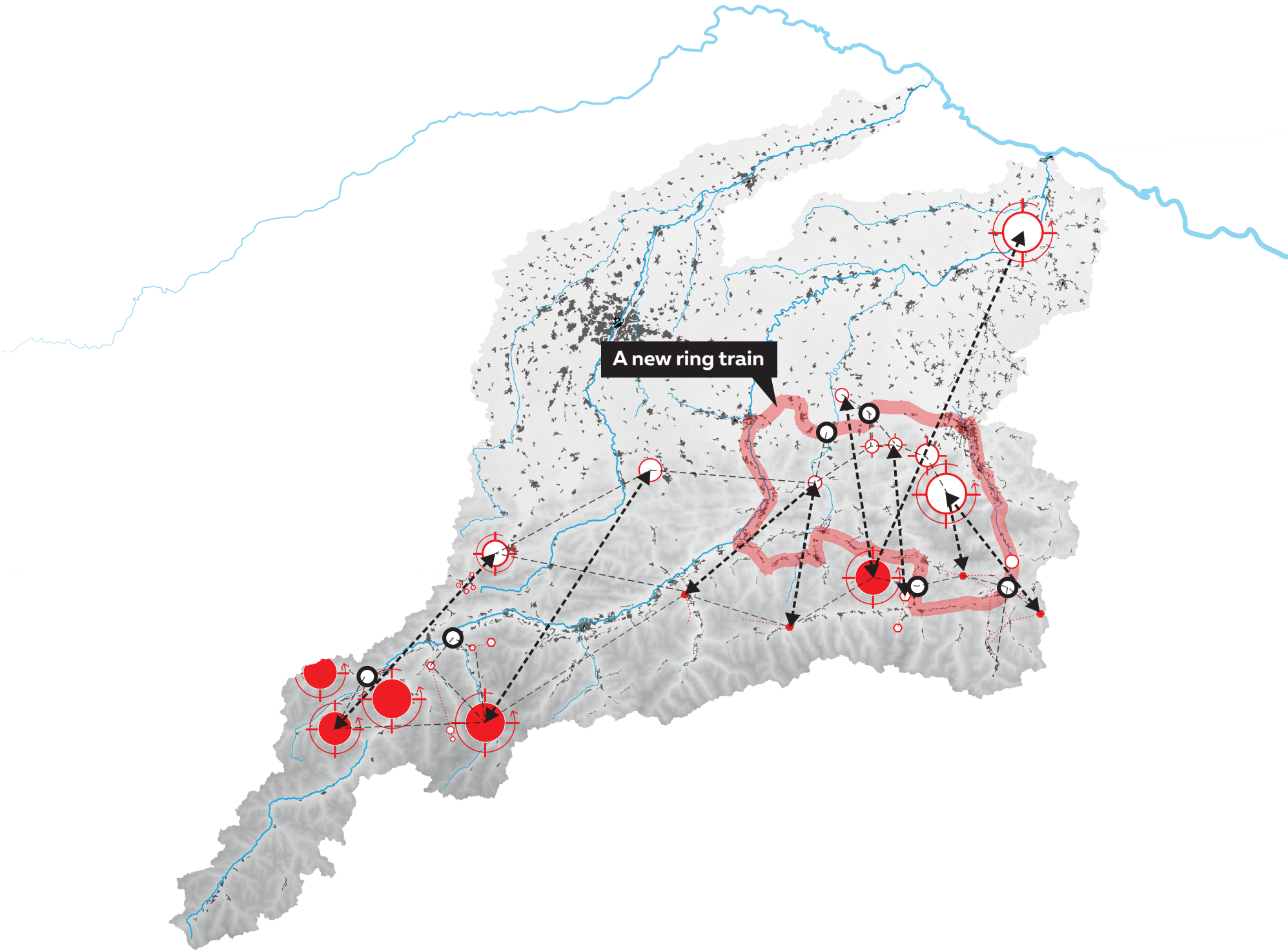


Figure 39: Digibus in Salzburg  
Source: [www.digibus.at/](http://www.digibus.at/)



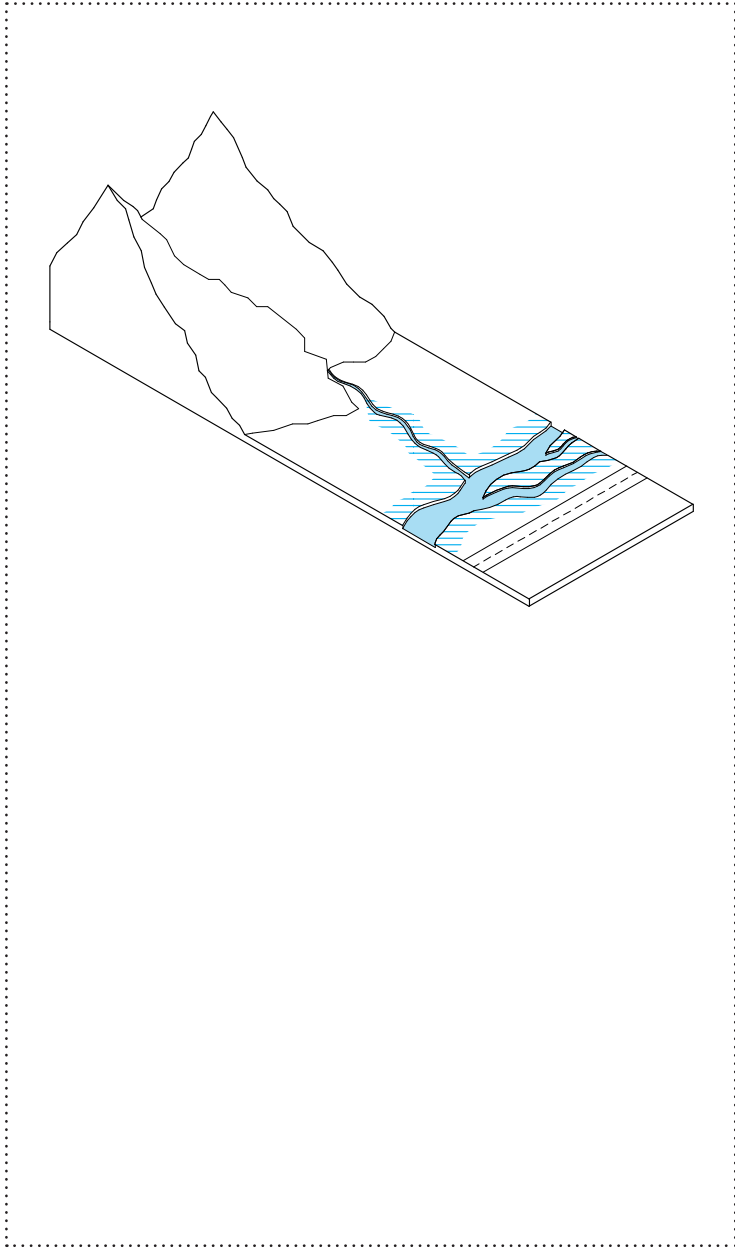
Figure 40: Samo Card of Werfenweng  
Source: [www.werfenweng.eu](http://www.werfenweng.eu)



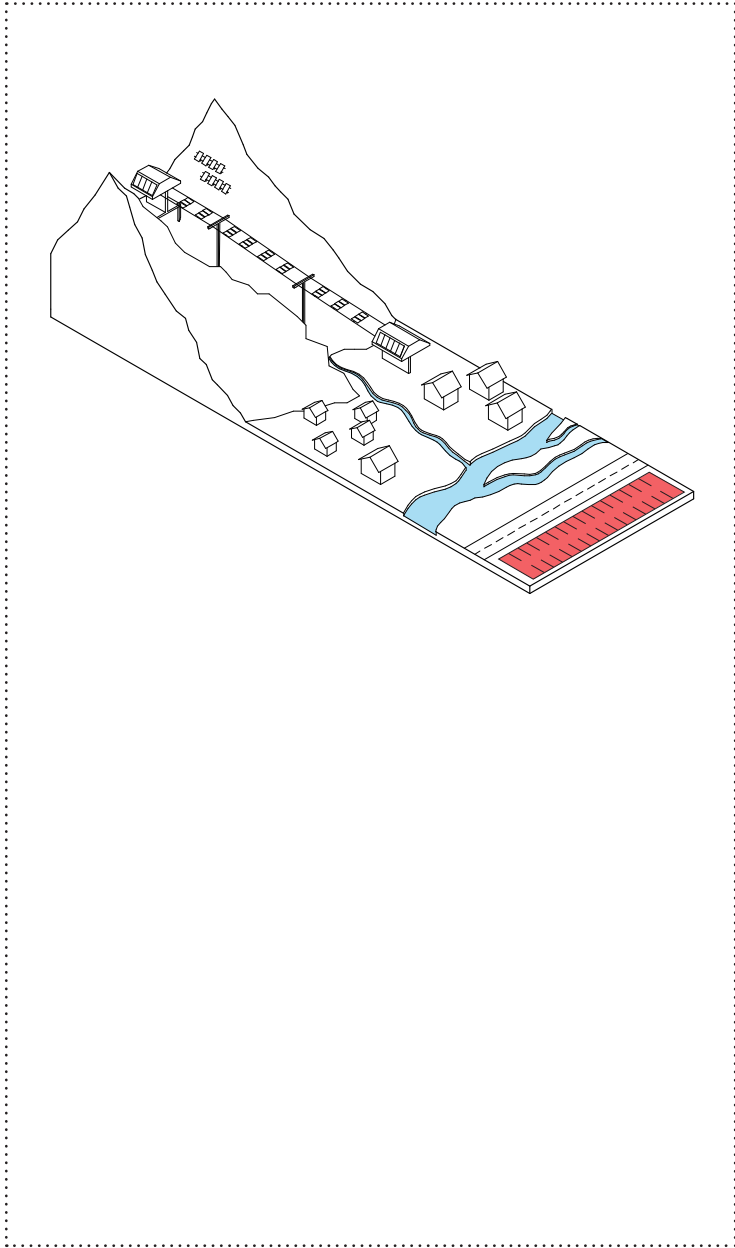


# Design principles

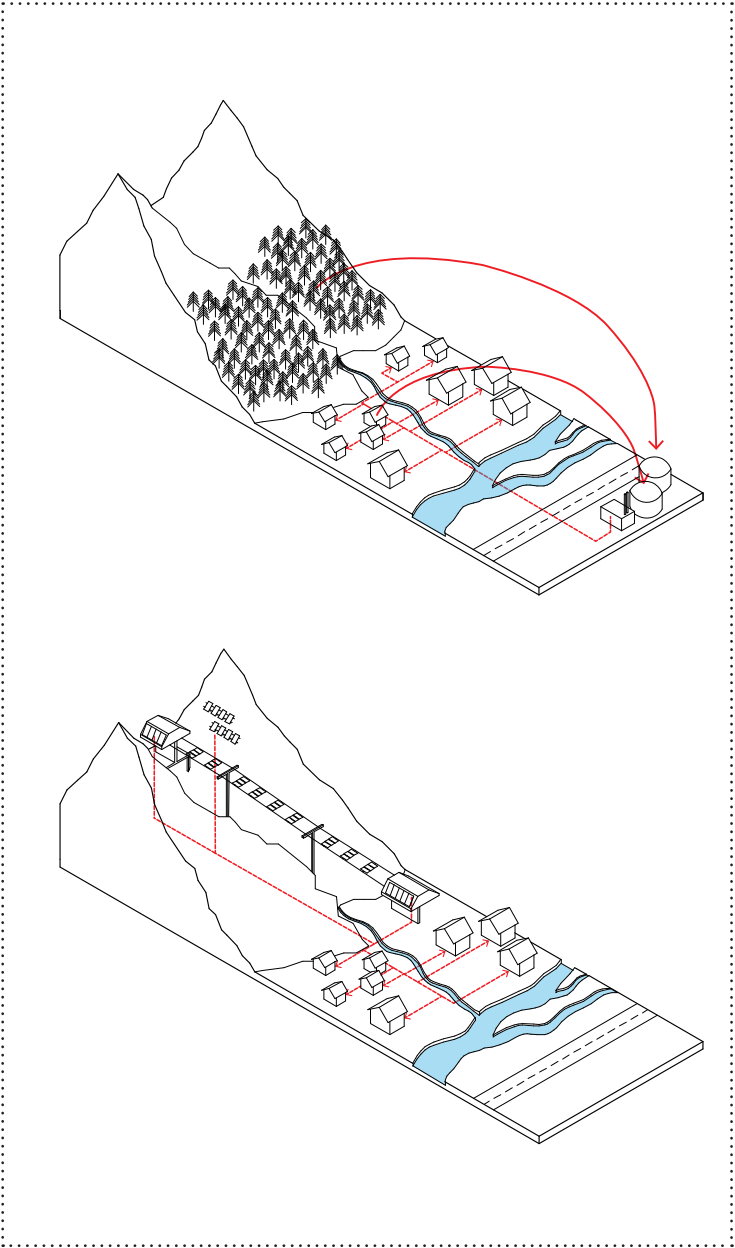
River ecosystem



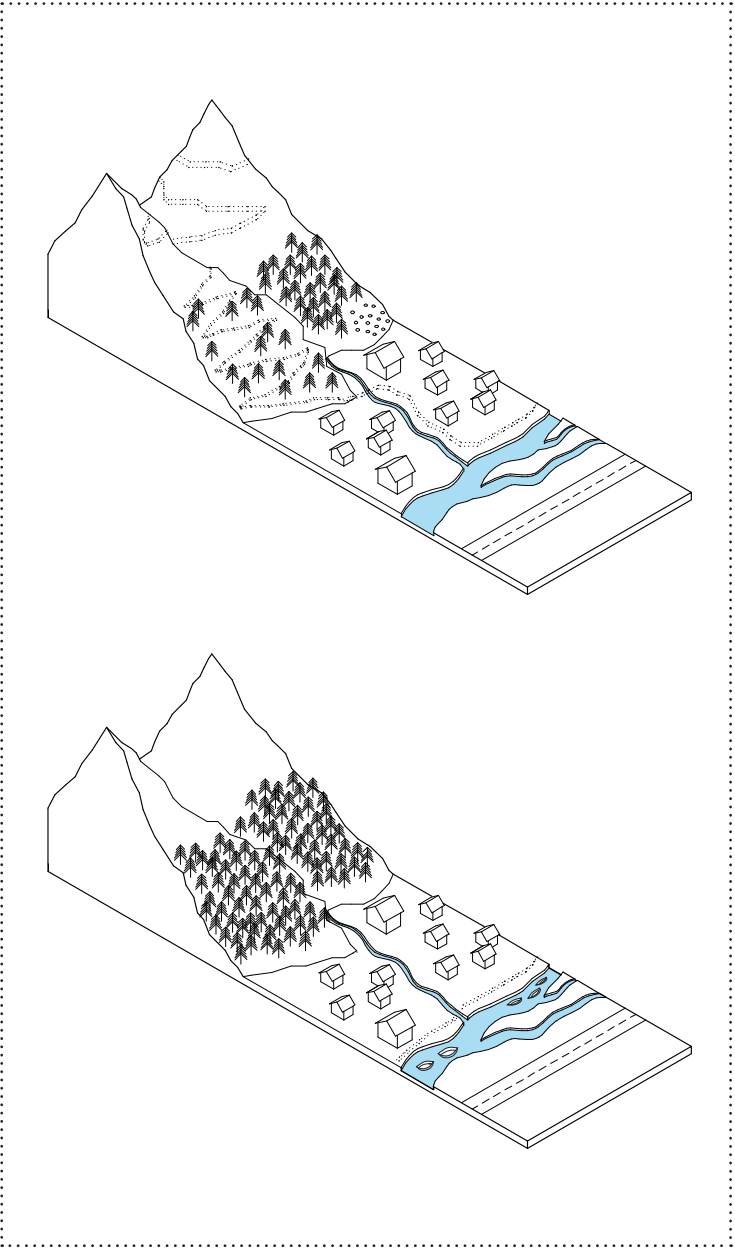
Sustainability  
Mobility



Decentralisation of  
energy



A new tourism  
paradigm





## Key area: Strategic interventions

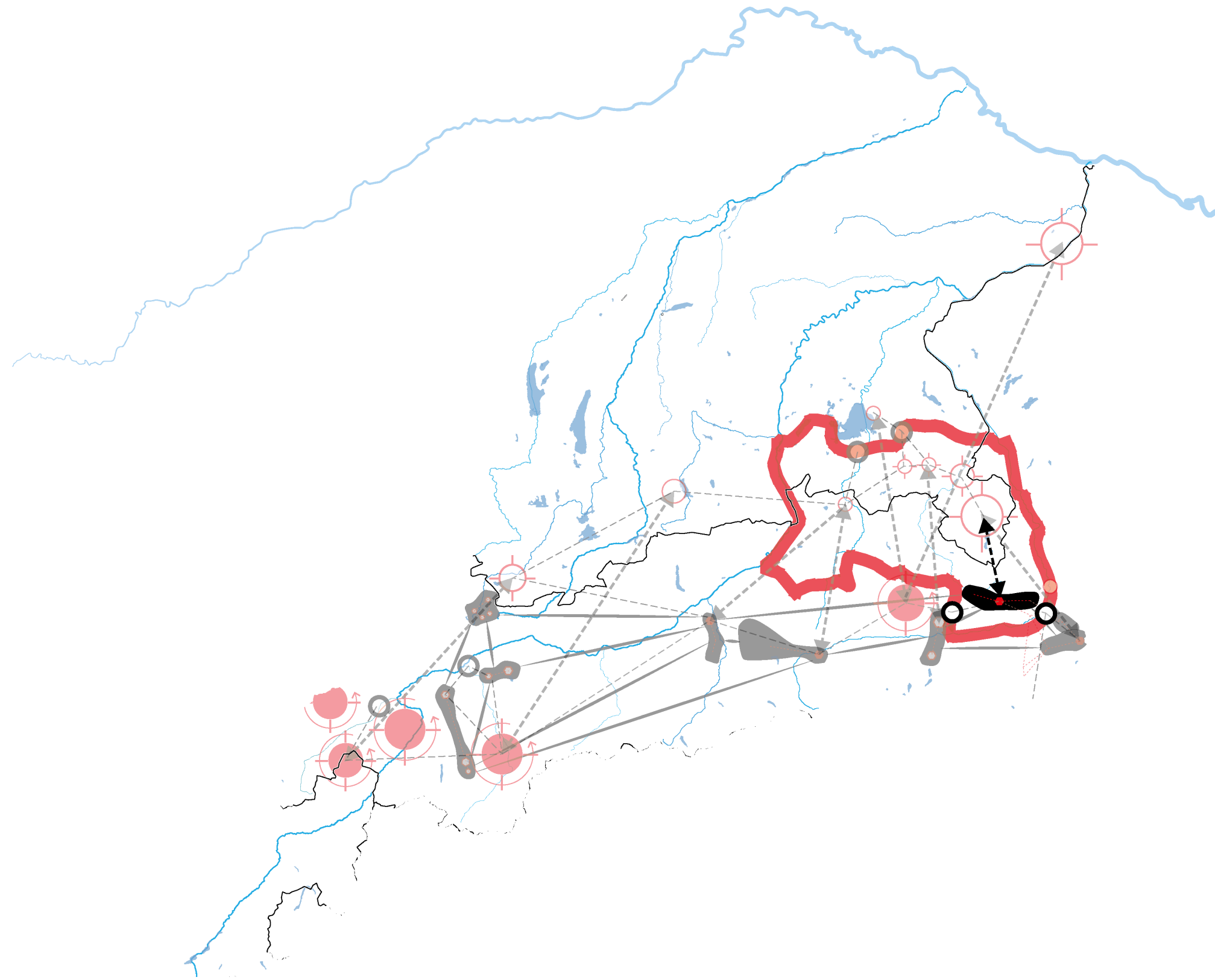






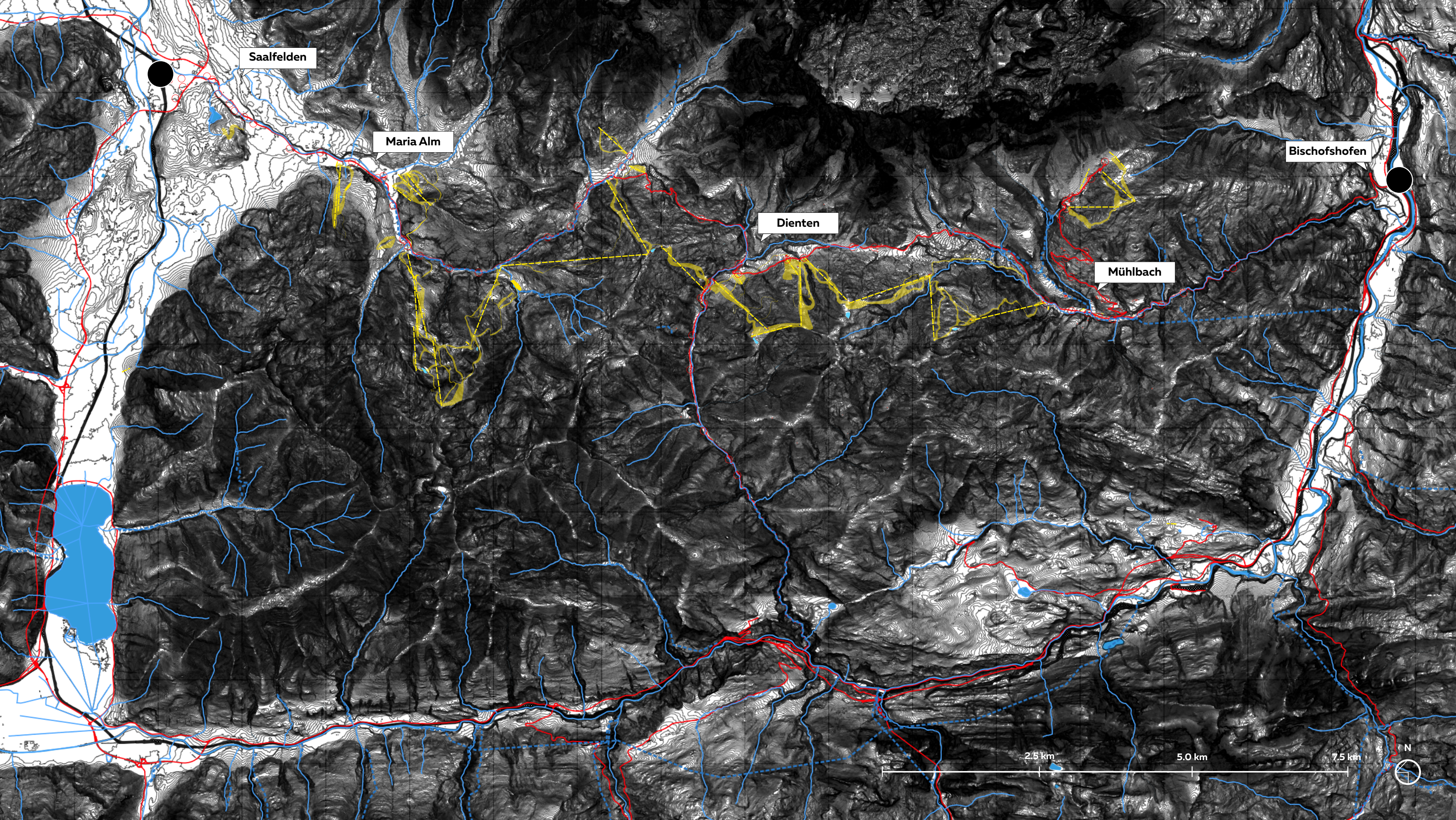
Figure 41: View on Mühl Dorf and Hochkönig  
Source: [www.bergfex.de](http://www.bergfex.de)





Figure 42: View on Mühlendorf and Hochkönig  
Source: [www.bergfex.de](http://www.bergfex.de)





Saalfelden

Maria Alm

Dienten

Mühlbach

Bischofshofen

2.5 km

5.0 km

7.5 km

N



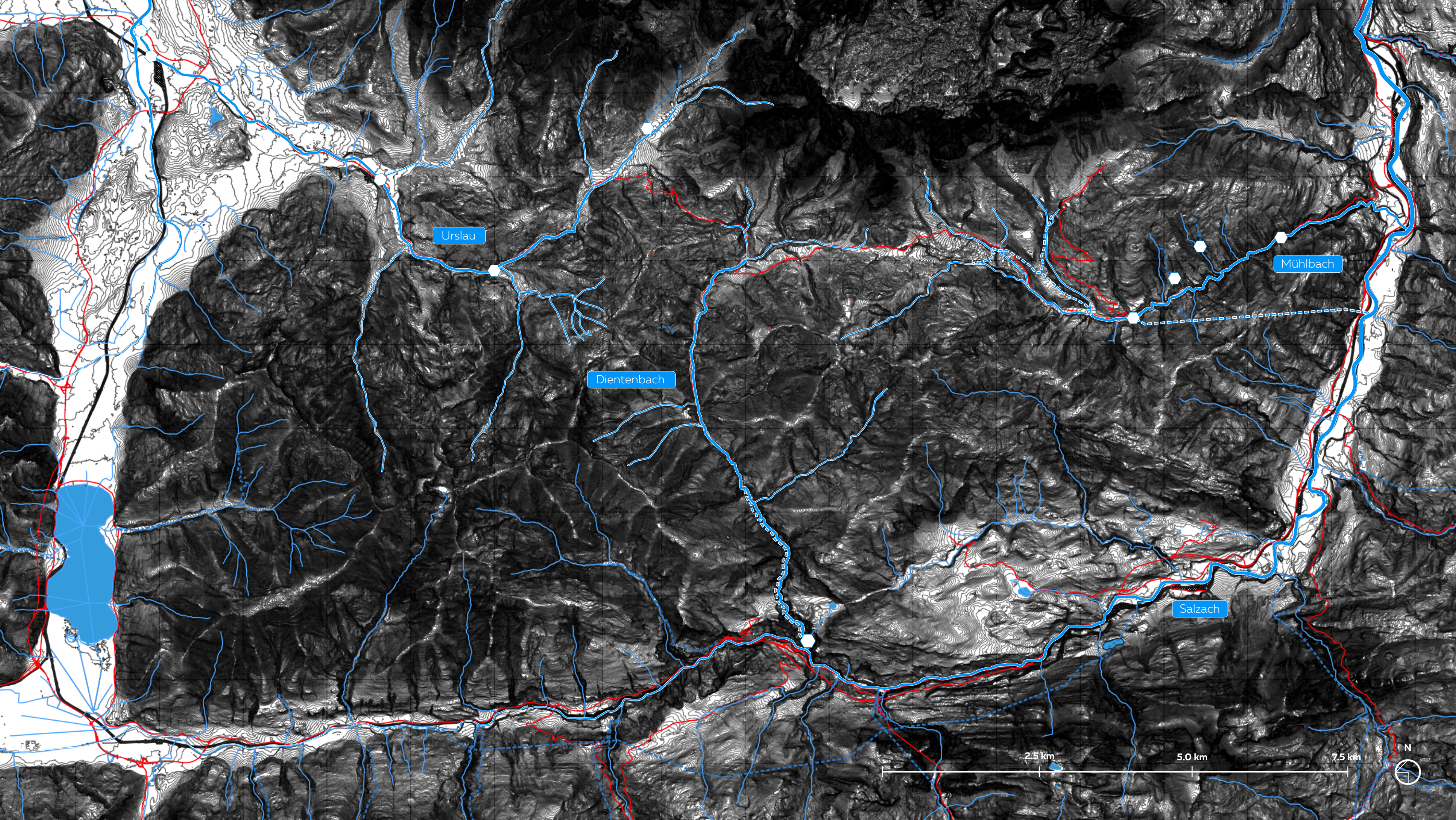






Figure 43: View of alpine torrent, Source: Author





Figure 46: Mud flow in Bondo, Switzerland 2017  
 Source: [www.suedostschweiz.ch](http://www.suedostschweiz.ch)



Figure 44: Barrier structure in the torrent 'Leoganger Ache'  
 Source: Author



Figure 45: Drop structure in torrent  
 Source: [www.biberberti.at](http://www.biberberti.at)





Bio  
digester

Solar powered  
ski area

Wood gasifica-  
tion plant

2.5 km

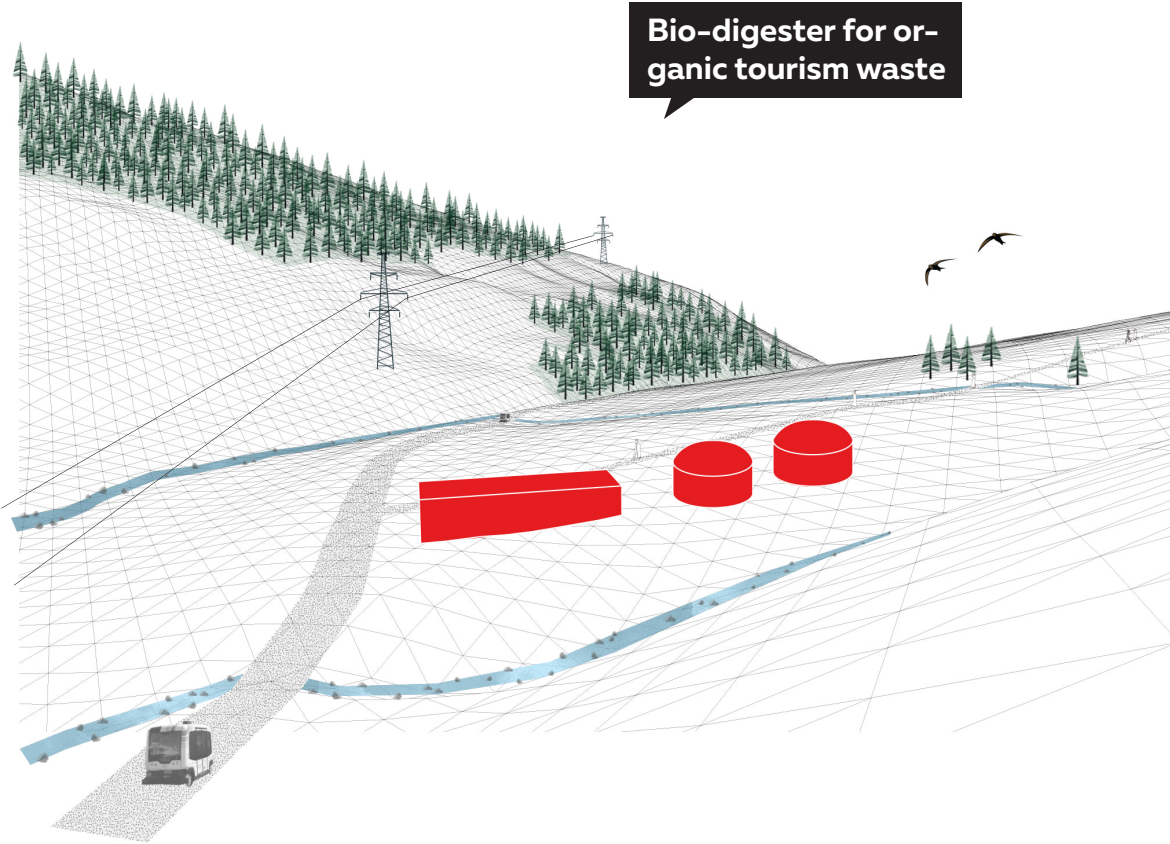
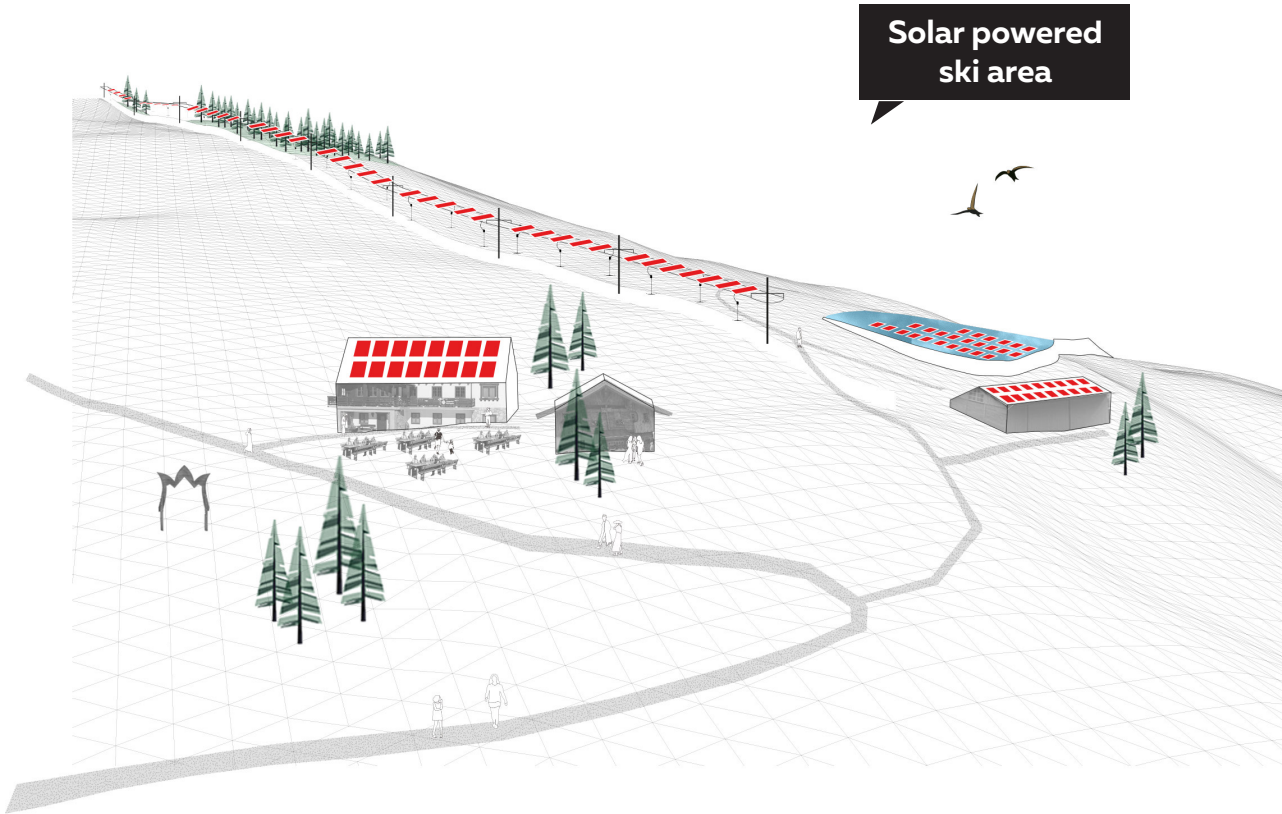
5.0 km

7.5 km

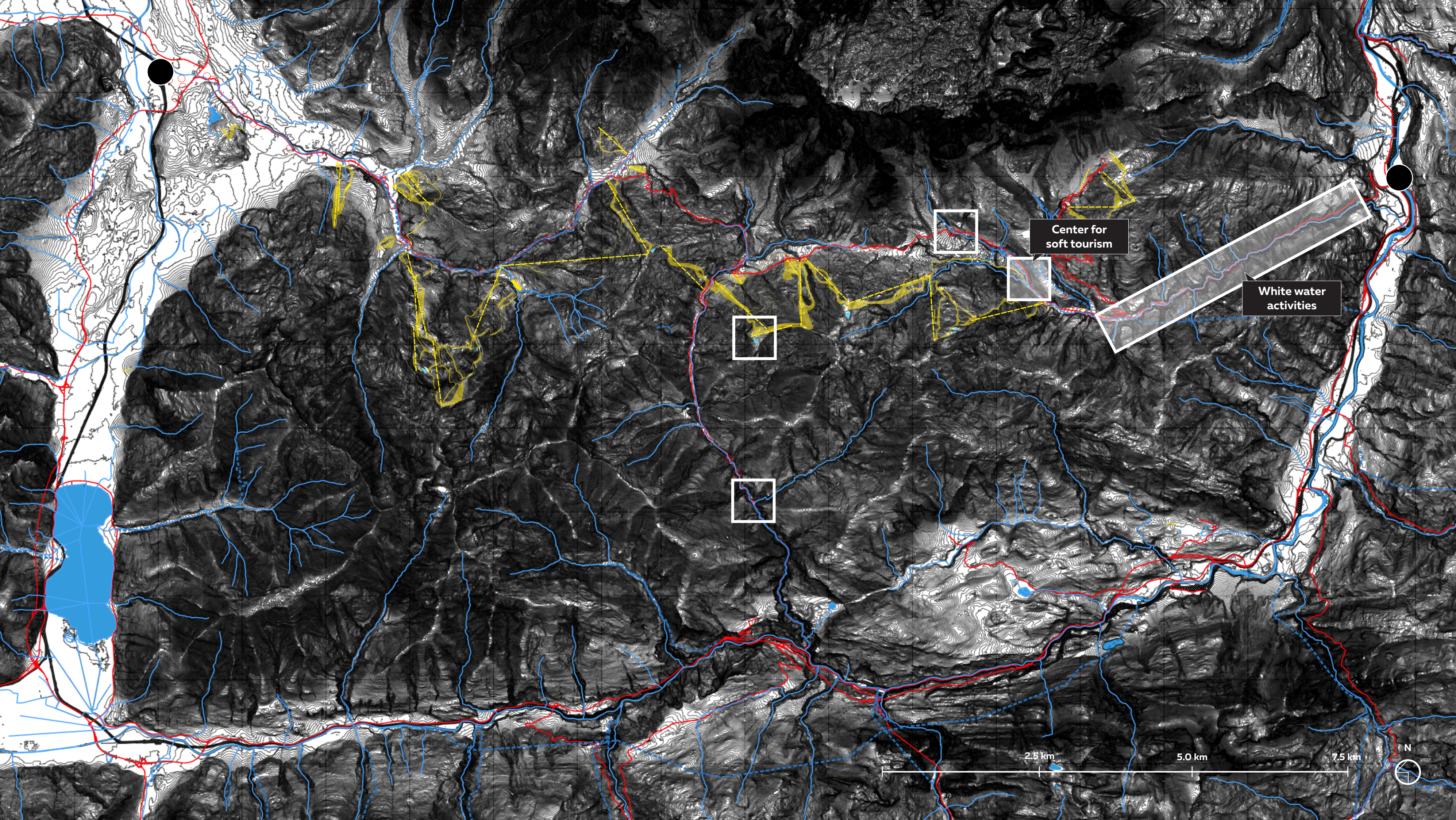
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# Local electricity generation







Center for  
soft tourism

White water  
activities

2.5 km

5.0 km

7.5 km



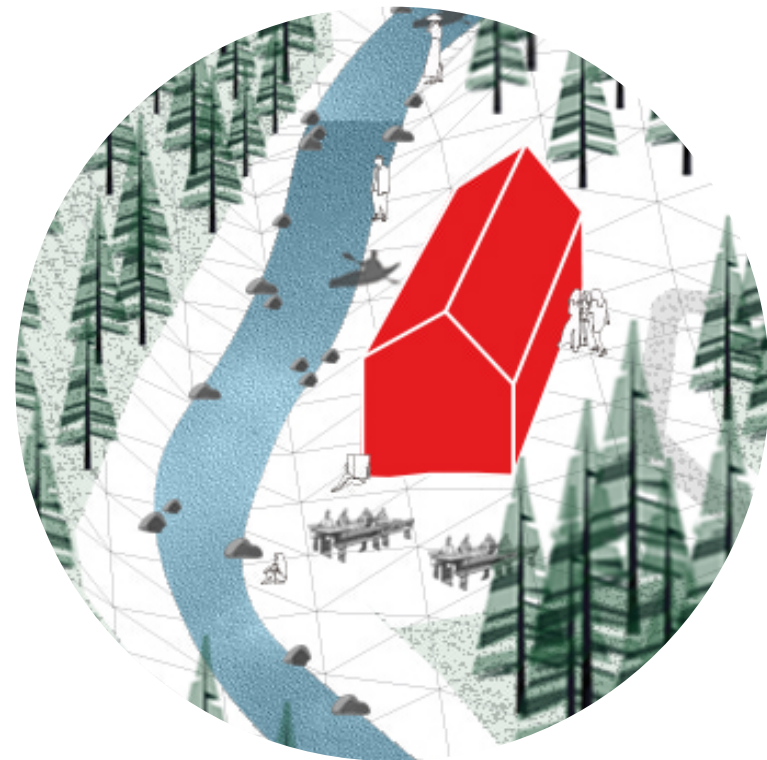


# White water activities

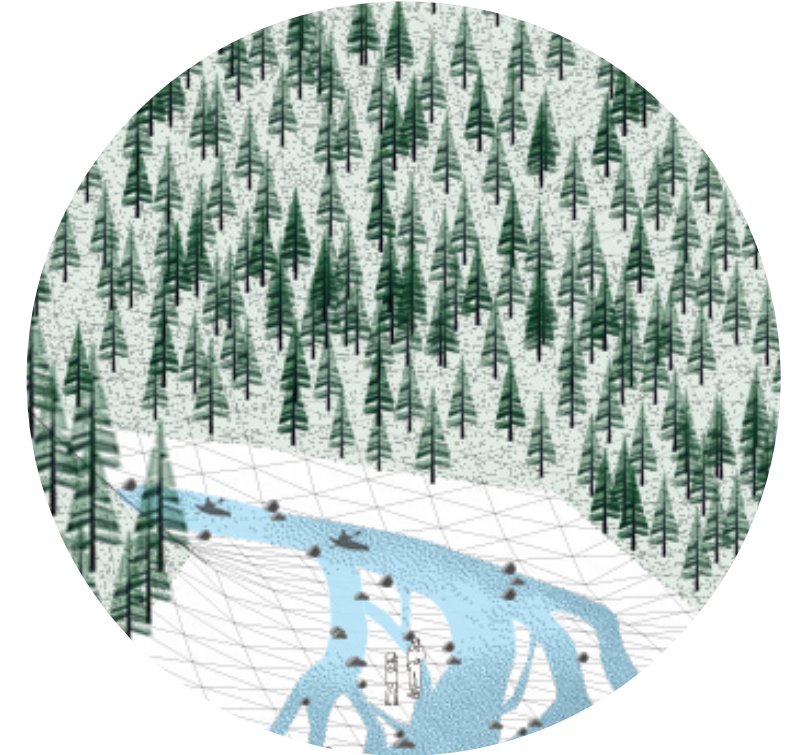
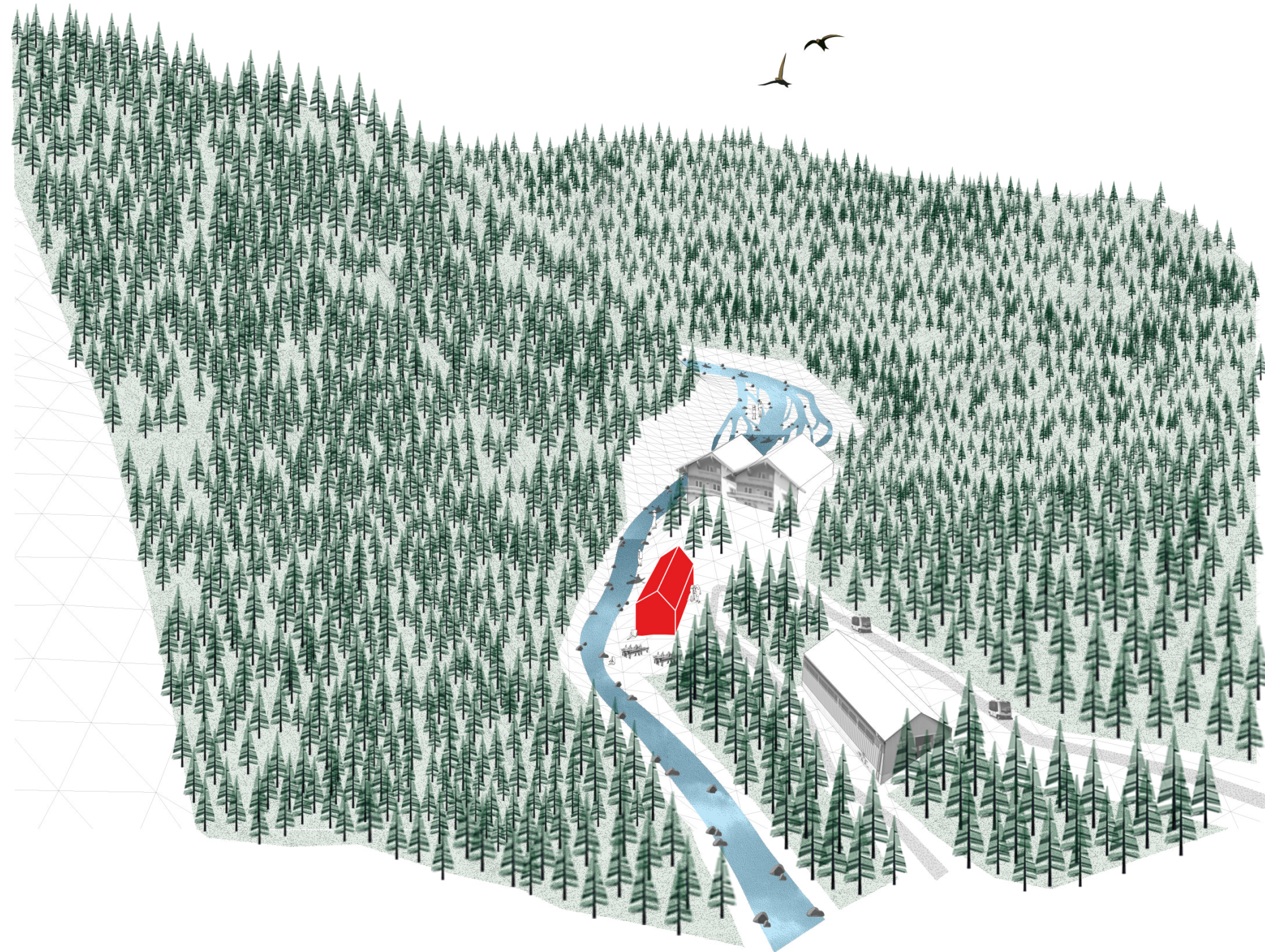




# White water activities



Ending point



Water retention area

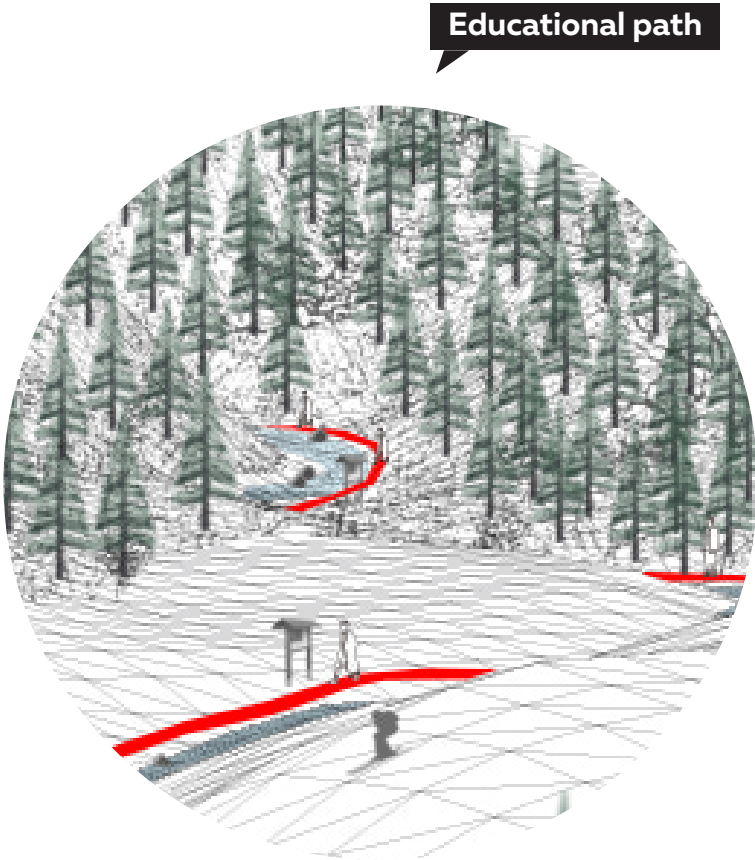


## A center for soft tourism

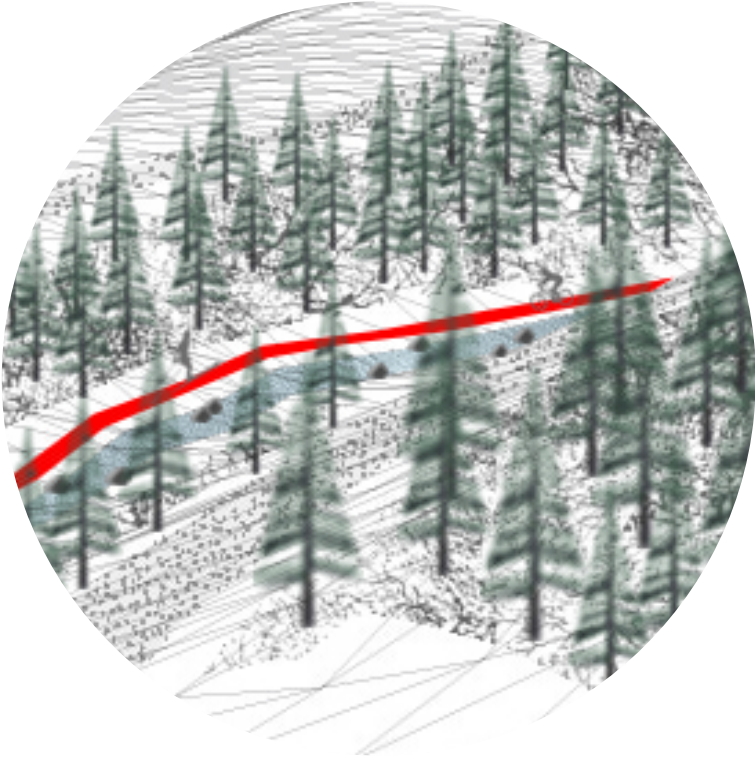
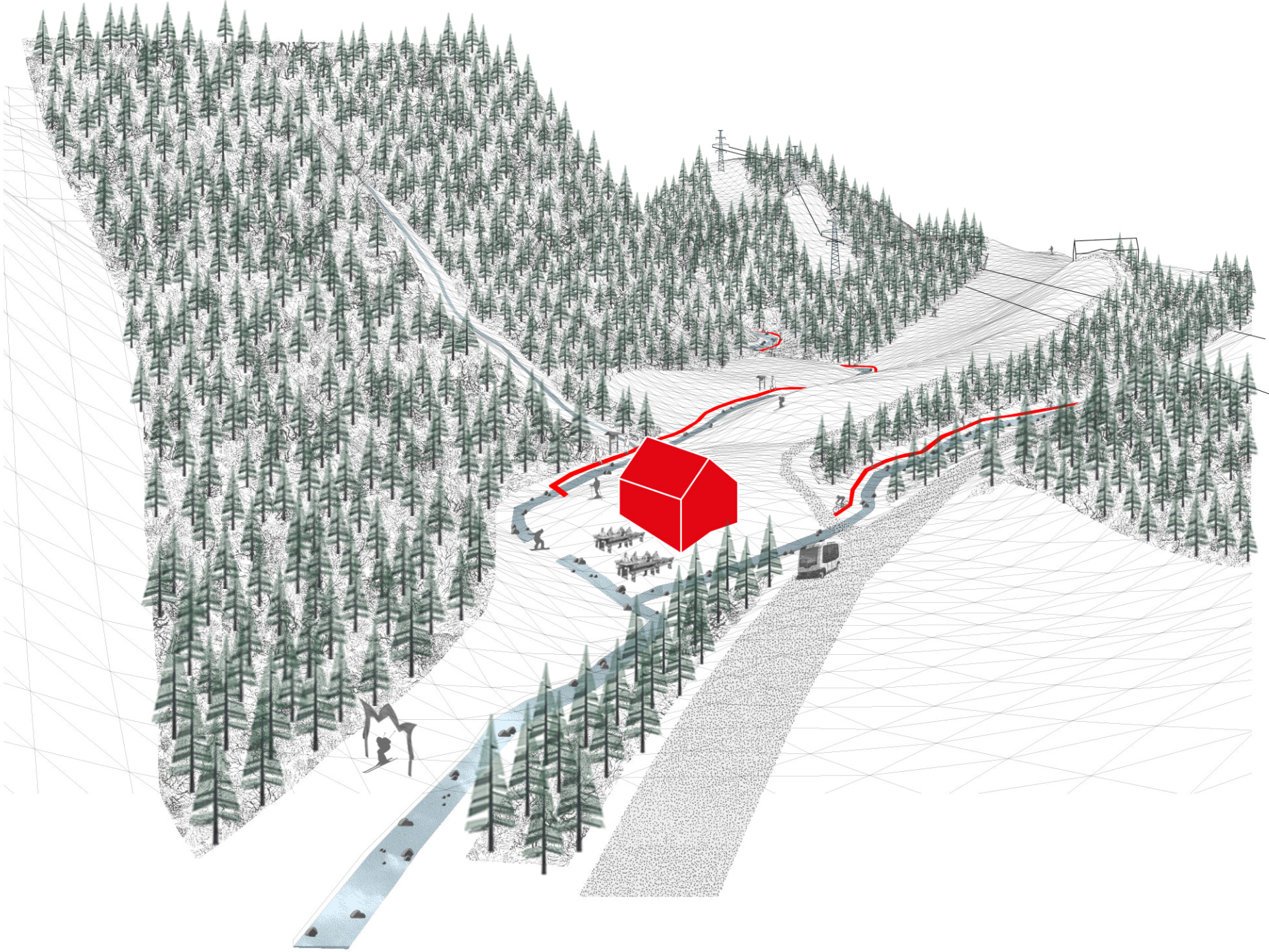




# A center for soft tourism



Educational path



Sport path



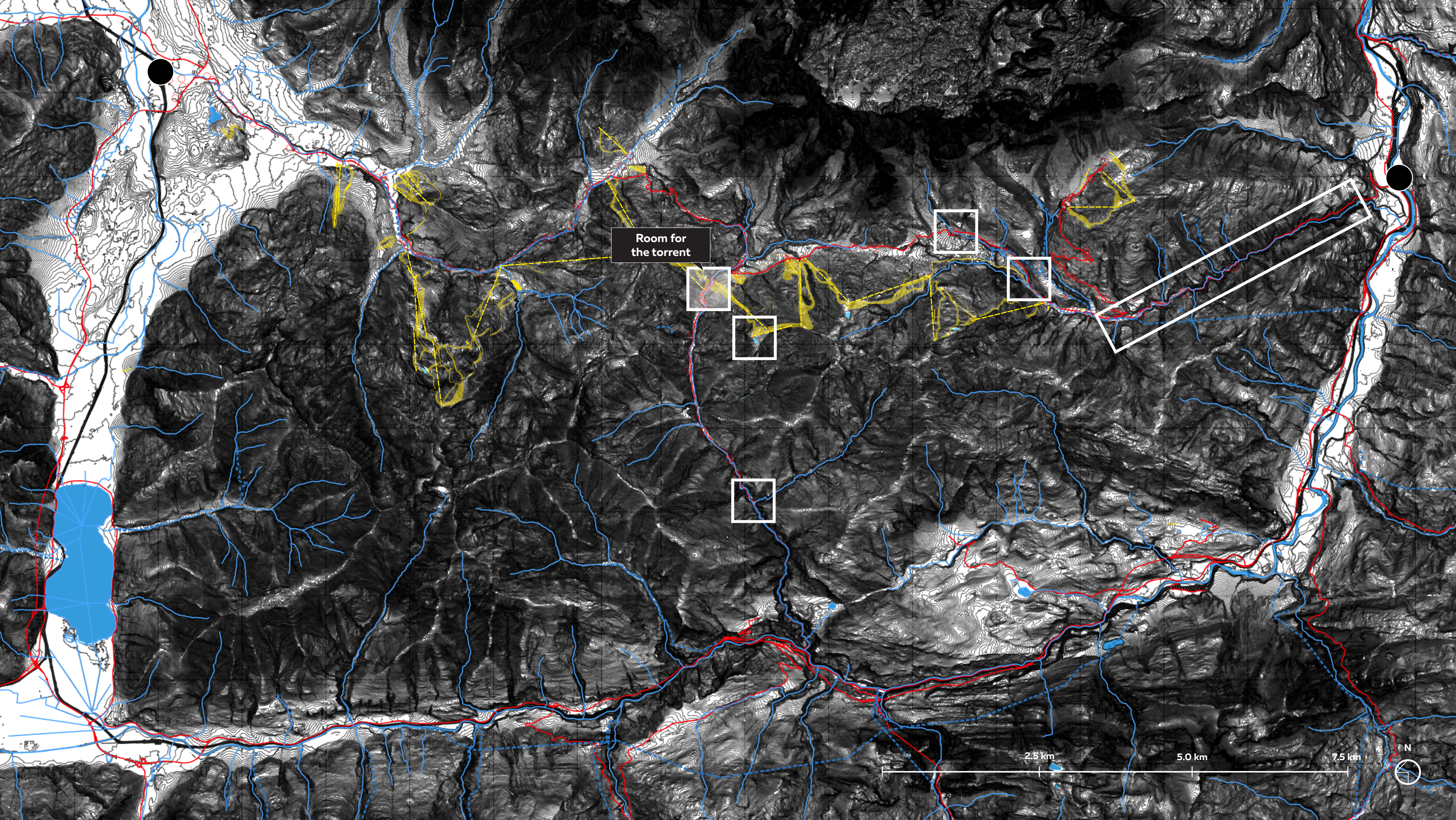
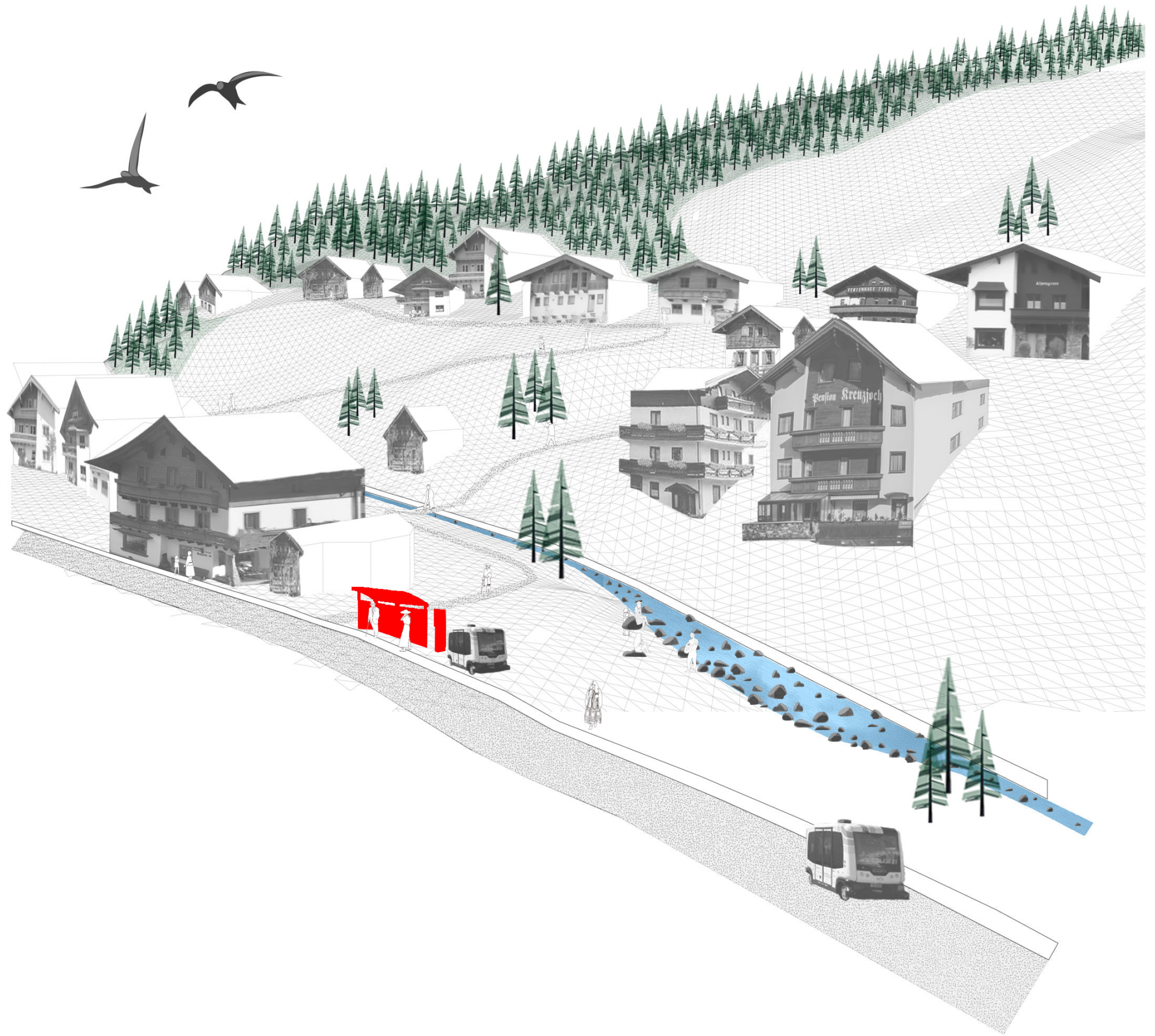






Figure 47: Torrent 'Dientenbach' in Dienten  
Source: Author

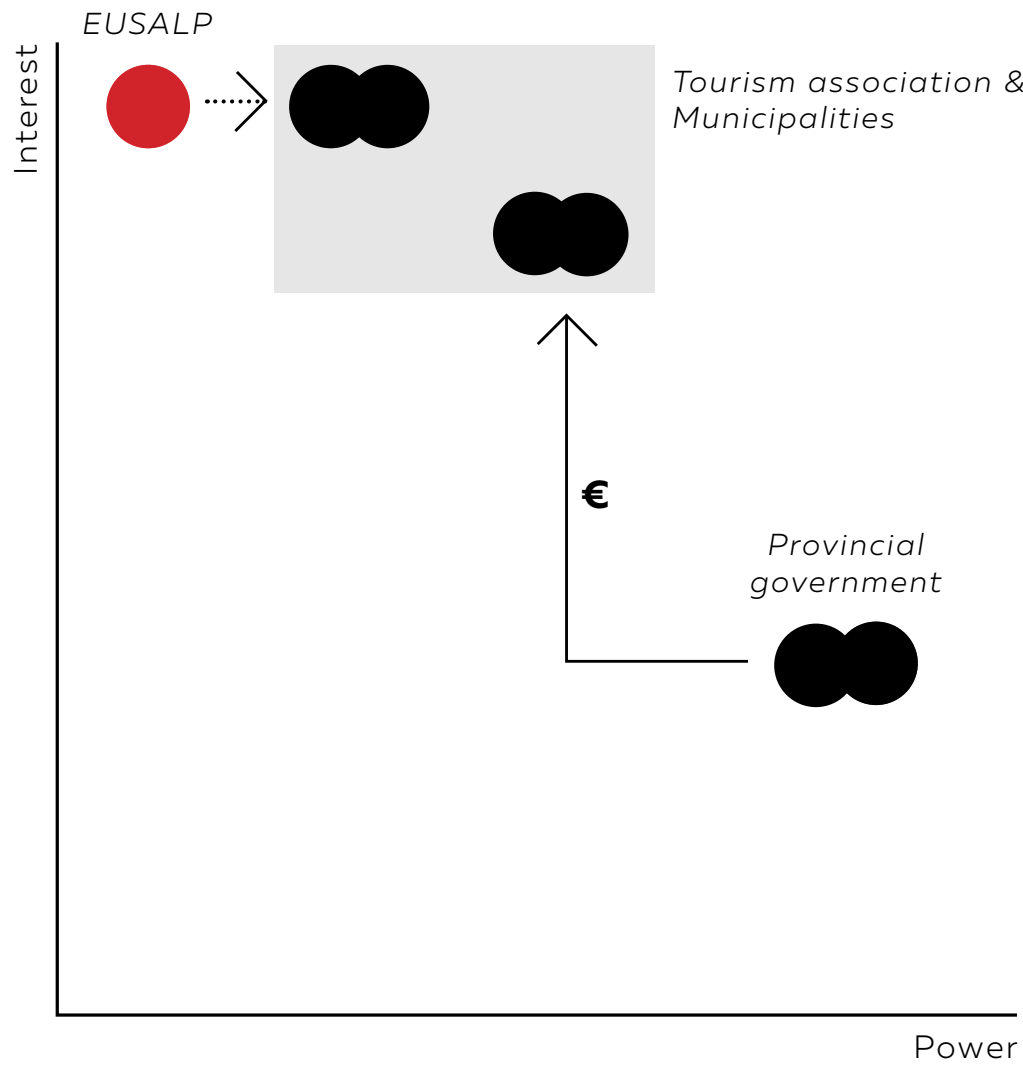




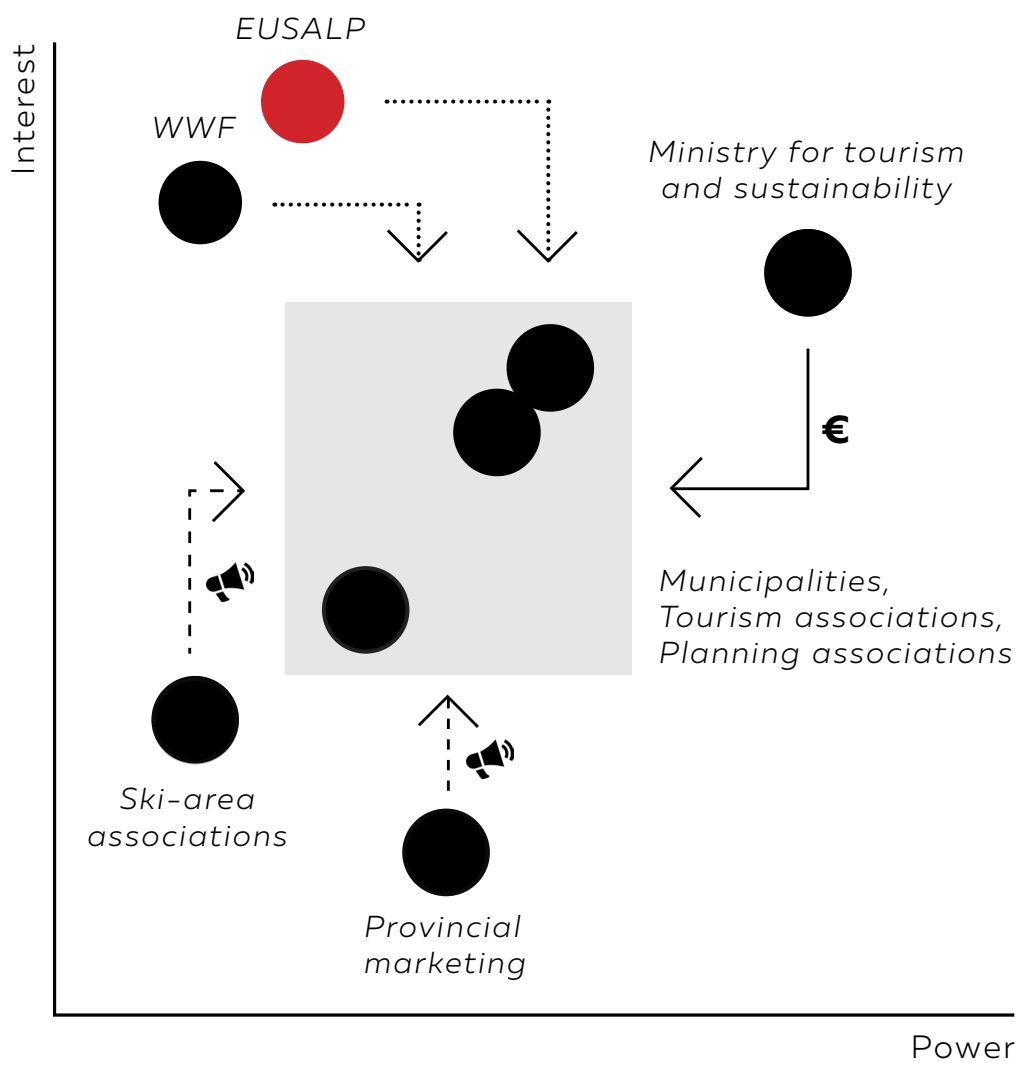
# CONCLUSION & REFLECTION



# The role of EUSALP



Mobility exchange



Pioneer network

Advice / Knowledge .....  
Marketing / Promotion .....  
Financial flows ———



# Transferability

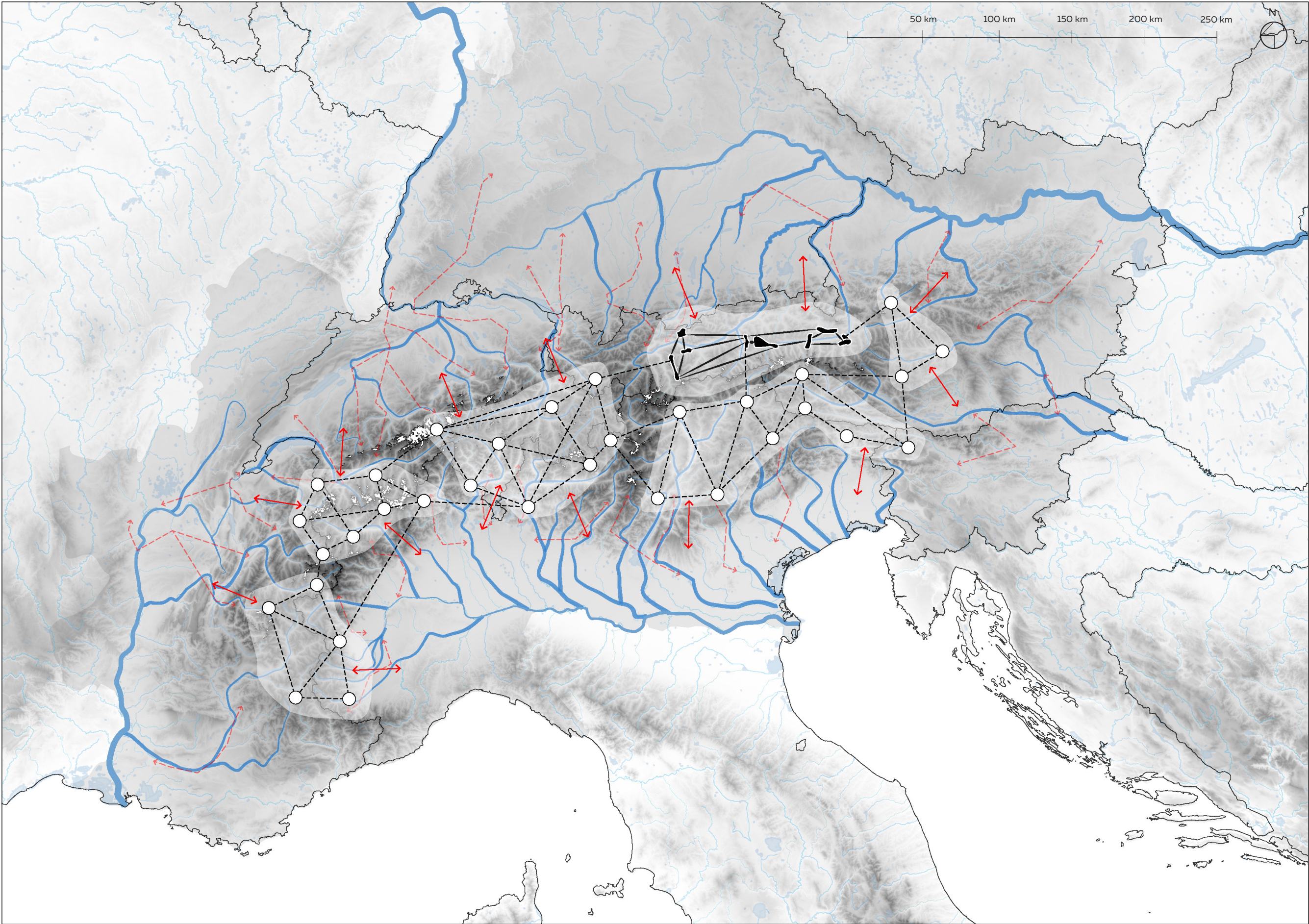
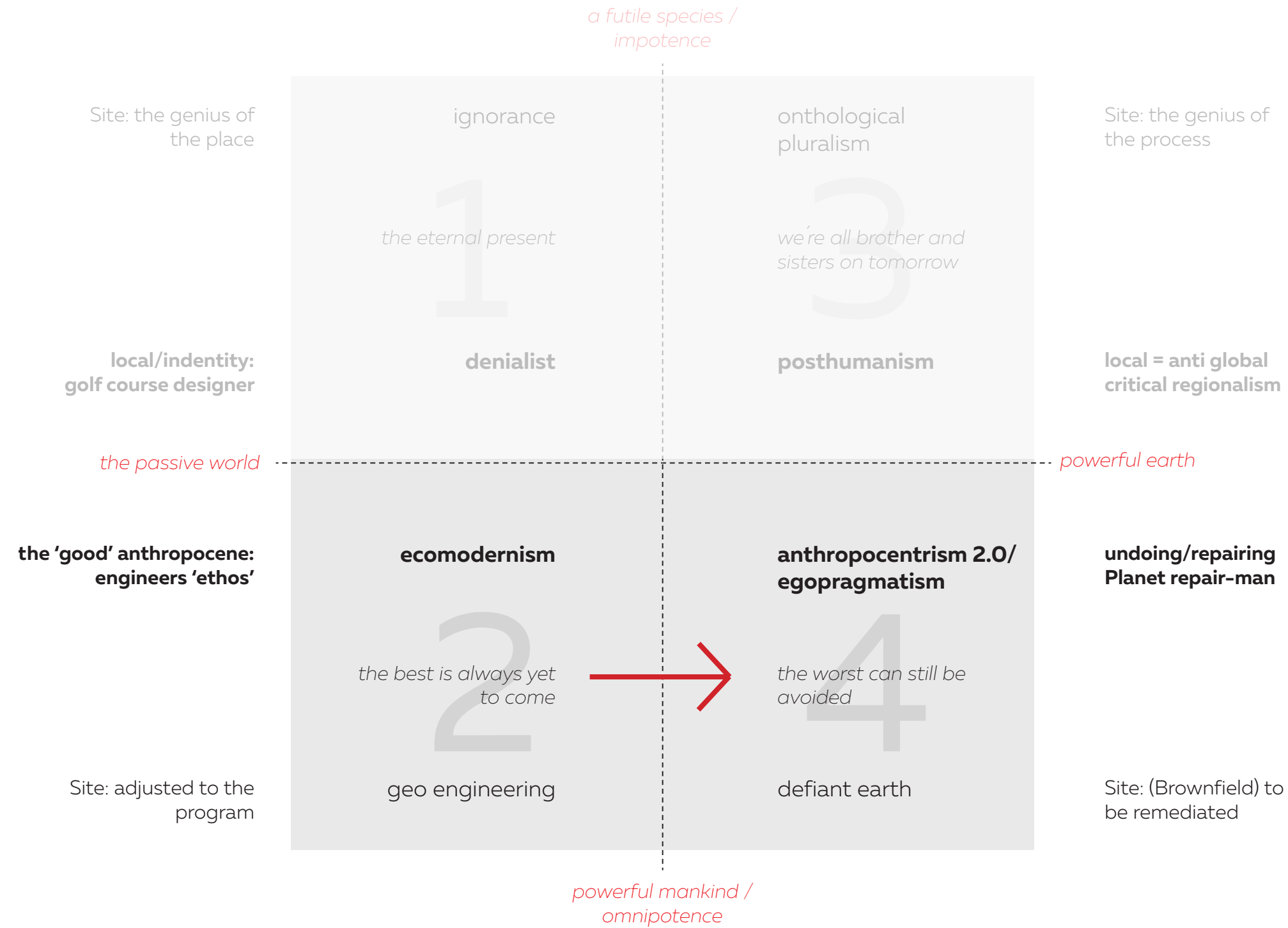


Figure 48: Reflection and transferability to other regions and scales, Source: Author







**Thank you!**





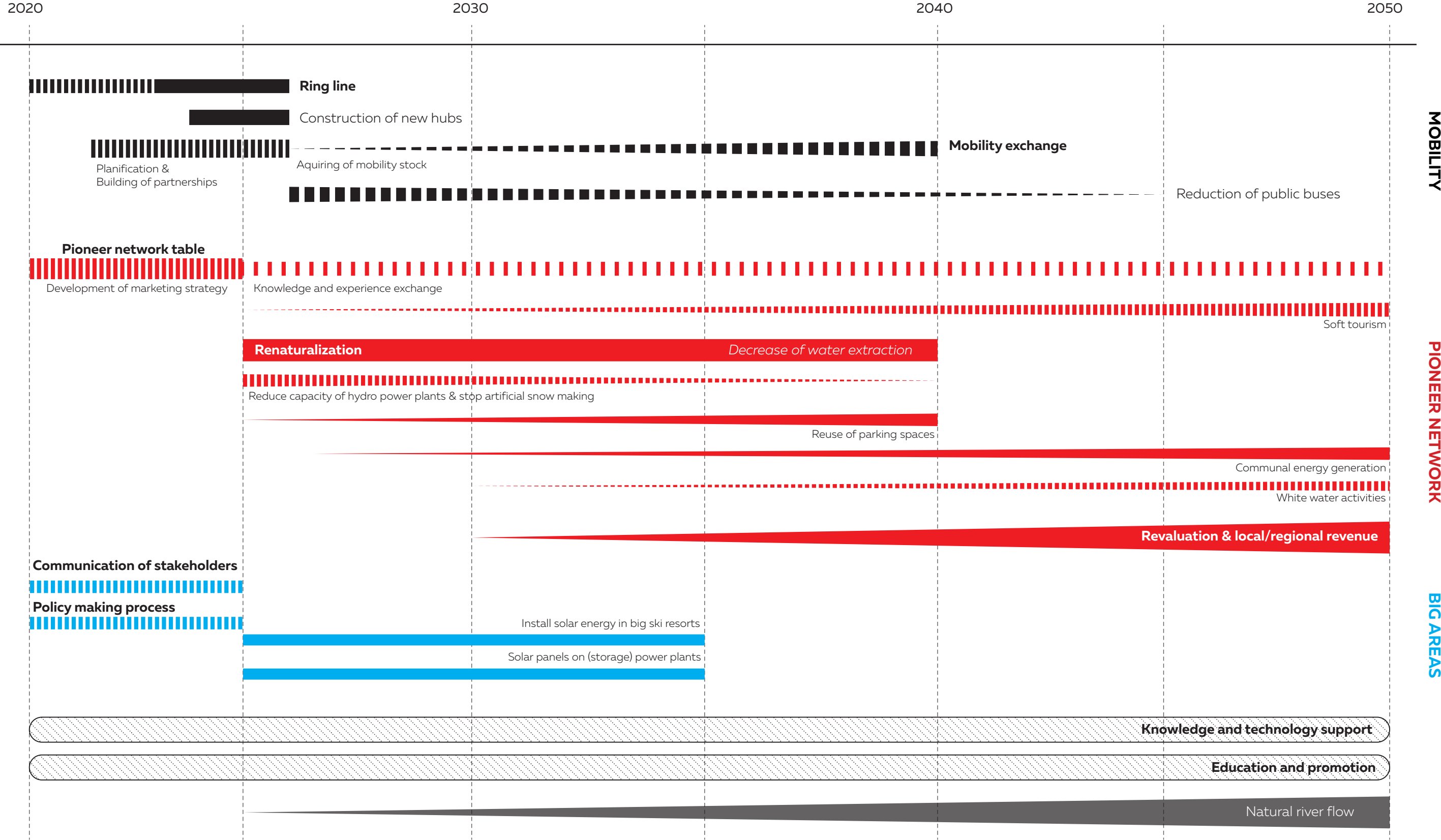


Figure 50: Roadmap of spatial strategy  
Source: Author



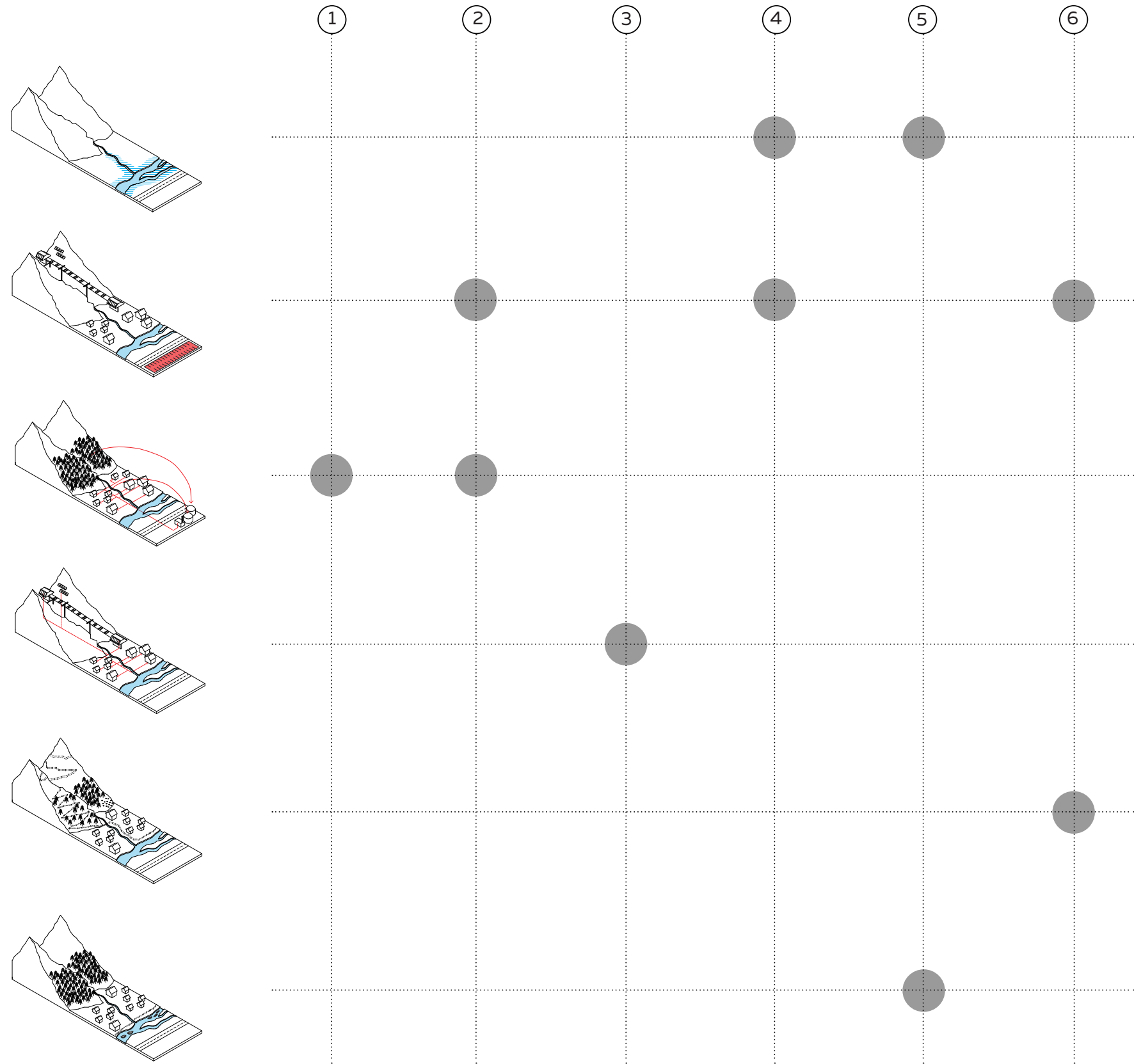


Figure 51: Applied design principles, Source: Author



..... Advice / Knowledge  
----- Marketing / Promotion  
—— Financial flows

○ Austrian  
○ German  
○ Cross-border

● Public  
● Public/Private  
● Private  
● Civic Society

