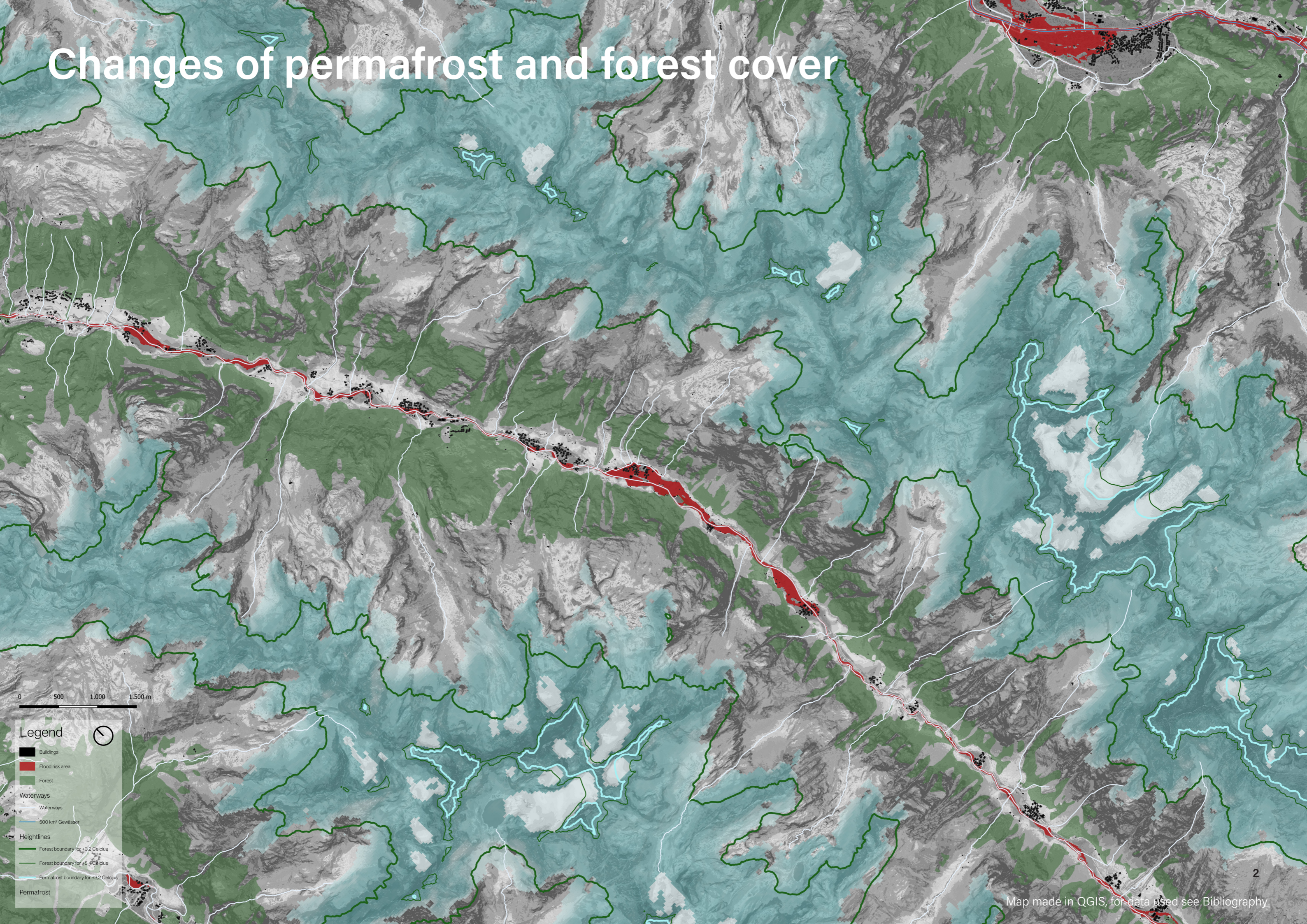


Future design scenarios & flood risk in Pitztal, Austria

Design Workshop 852304, WS24
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Changes of permafrost and forest cover



0 500 1.000 1.500 m

Legend

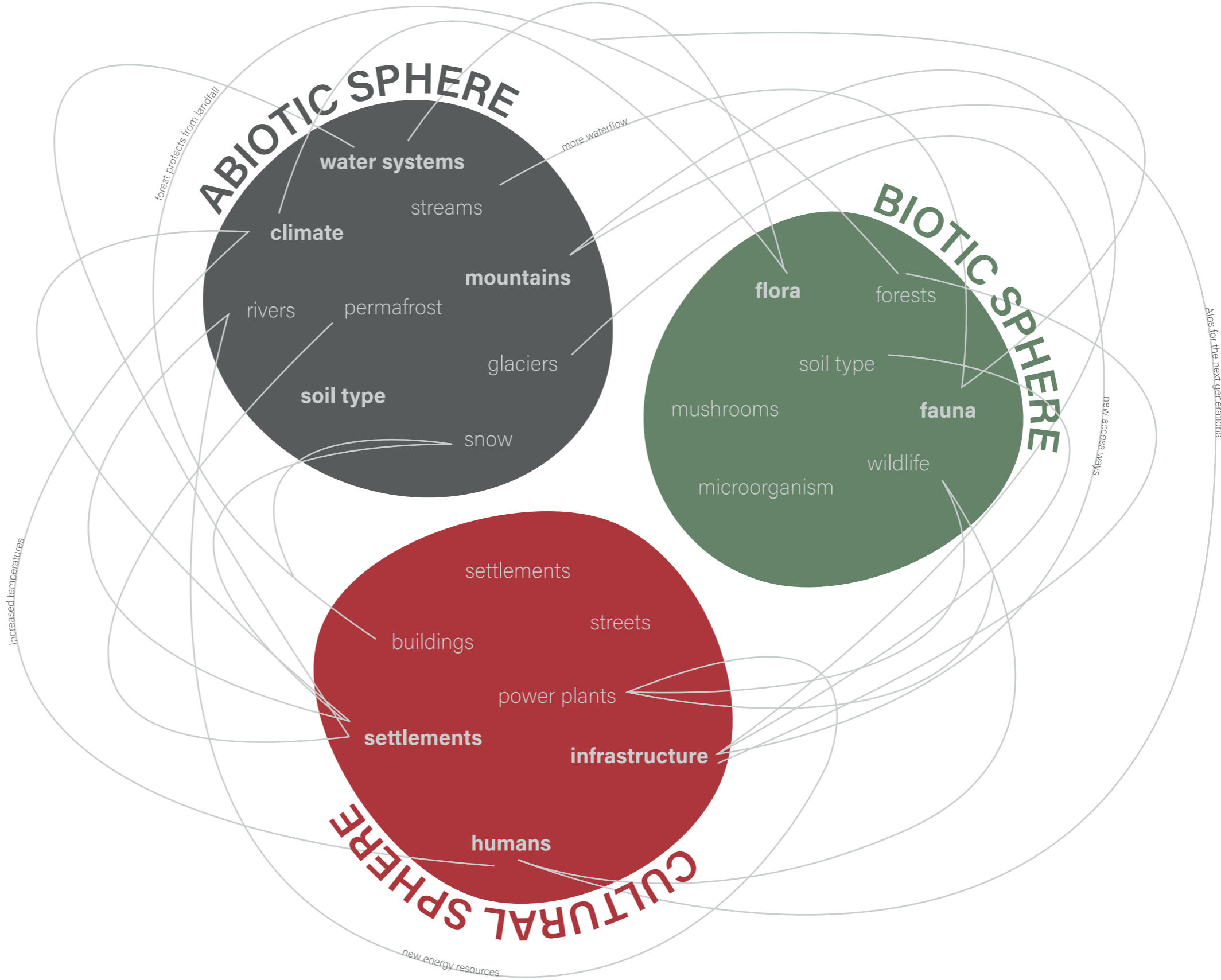
- Buildings
- Flood risk area
- Forest
- Waterways
- Waterways
- 500 km² Gewässer
- Heightlines
- Forest boundary for +3.2 Celcius
- Forest boundary for +5.4 Celcius
- Permafrost boundary for +3.2 Celcius
- Permafrost

Actors & actants in the Pitztal

The map Future Scenarios and Flood Risk in Pitztal shows the current forest and permafrost areas, but also their predicted future state. The prediction is based on the temperature increase of the RCP 8.5 scenario of the IPCC, which entails an increase in temperature between 3.2 and 5.4 degrees Celcius. This increase was translated into height by using the rough rule of a 0.5 degree Celcius change per 100 meters of elevation. The thinner green lines show the possibility of expansion of the forest, given that the tree line is only influenced by temperature and not by topography and soil conditions. The thinner blue lines show the decrease of the permafrost area, following the assumption that the boundary of permafrost corresponds with 2400m altitude.

In the map, the data of the forest and permafrost are combined with the steepness of the topography and location of buildings, and can therefore be used to assess increased risk of flooding and landslides. There can be assumed that risk increases when buildings located at the bottom of a very steep area with melting permafrost on top, or when the slope is too steep for trees to grow, that could capture and stabilise the loose underground.

This analysis shows that the factors of topography, landuse and waterflows, strongly interact with each other. Some of the connections between the actors and actants that are active in the area are shown in the diagram on the right. The goal of this attempt to map the actors, actants and their relations and influences was not to be comprehensive, but to better understand the complexity of the systems that are present in the case study area.



Climate change scenarios

When the RCP 8.5 scenario of the IPCC becomes reality, the settlements of the Pitztal will need to adapt to the new circumstances. An expected, direct cause of climate change is the melting of the permafrost, accompanied with more extreme weather. This means that the water discharge in Pitztal will significantly increase, causing floods in the existing settlements.

There are several reactions thinkable to increased flooding events. They are mapped in the following scenario study.

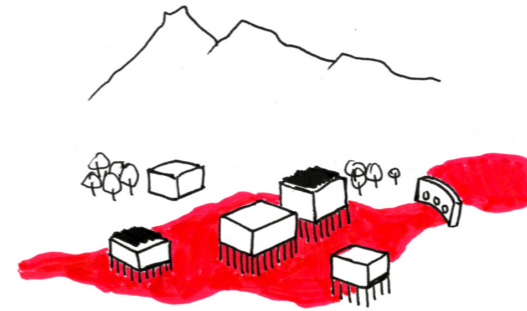
Preserving

PROTECTING TRADITION



- Preserving existing settlements
- Building dams
- Individual first aid flood protection measures (i.e. sand bags)
- Insurances

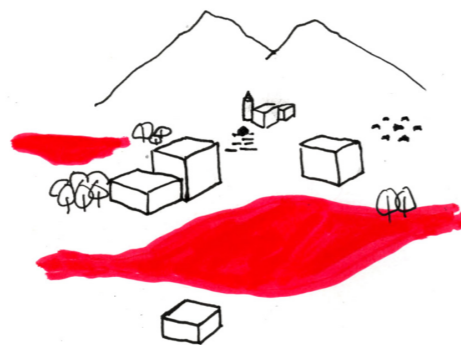
ELEVATED REPOSITIONING



- Preserving the location of the settlements
- Using new ways and technologies to live in flood areas (e.g. liften housing, temporary first floor etc)
- Hydro/solar energy production (use the increased water flow and become more self sufficient)

Avoiding Risks

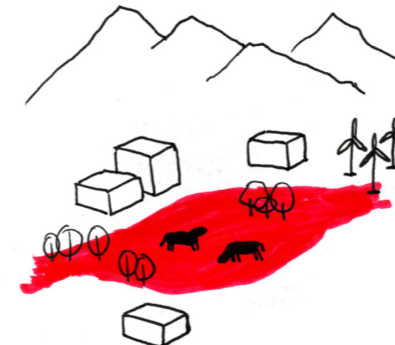
FLEEING FROM THE WATER



- Building and moving outside of flood areas (e.g. higher/lower elevation)
- Water retention areas
- Artificial lakes as buffers
- Rewilding the river

Grasping Opportunities

CHANGEMAKERS



- Moving outside of flood areas
- Changing land use, more space for other usages
- New forms of energy and food production
- Rewilding the river
- Flood resistant communities

Developing

Climate change scenarios



Manifesto for 2100

ECHO OF THE ALPS

„It is the year 2100 and the postcard view of the Alps looks more of grey rather than shining white. I have seen tons of photos of the Alps and watched documentaries about what it looked like in 2025 when my parents were teenagers. People conquered mountain peaks and hiked long ways in this beautiful, awe-inspiring snowy world.

My friends' parents tell stories about going on ski holidays and the legendary après-ski. Apparently, people used to go to the Alps from all around Europe just to slide down these huge hills, party, listen to schlager, drink lots of beer and get wasted. It is so weird for me because my mother always tells me that the mountains are very sacred and because of these ski tourists, we are not allowed to walk on the snow in the Alps anymore.

I have also read articles, that back then they were worrying a lot about preserving the rainforests and coral reefs. I am very happy about that, because thanks to this, the presidents of the USA and EU teamed up already in 2054. Now we have a lot of sanctions, rules and laws protecting them. The union and agreement talks took such a long time and snow melts as a reflection of our past. They were just late. In addition to the rainforests, coral reefs and oceans, they also pay more attention to the mountains on all continents.

Nowadays there have happened big changes to save the environment of the Alps, but this was not the case from the beginning. It started with small steps around the year 2025. To escape the floodings caused by the melting glaciers, the first floors of homes in the flood risk area were removed so the homes became elevated. Some villages even moved up or down the slopes to find better conditions.

There was also planted vegetation in the floodplains and on the mountain slopes to form a barrier against fast flowing waters and erosion. Later, many more natural based interventions were implemented to realise this protected mountainscape that we now know today. There are even forecasts that some mountaintops have cooled down enough that new glaciers can be formed in the coming 100 years!“



Visuals made with ChatGPT

„Please also visualise a same moment in the same scenario where people expand the existing riverbed areas by planting new plants there that can handle seasonal flooding. Please make the green less vibrant and more watercolour earthy tone. Sunshine less intense. For sure, include plants that are familiar to the Alps region“

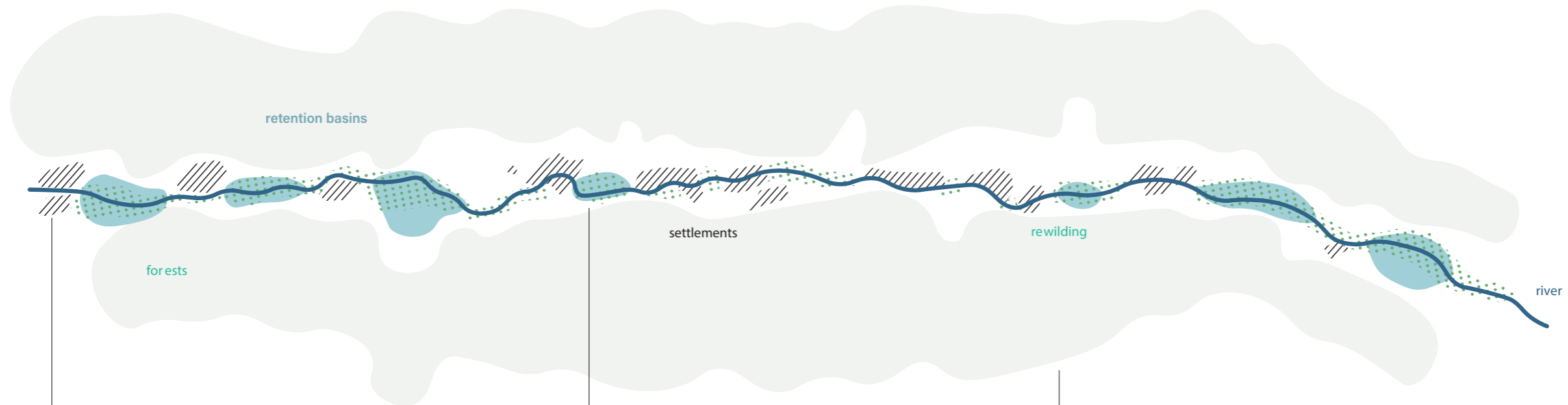
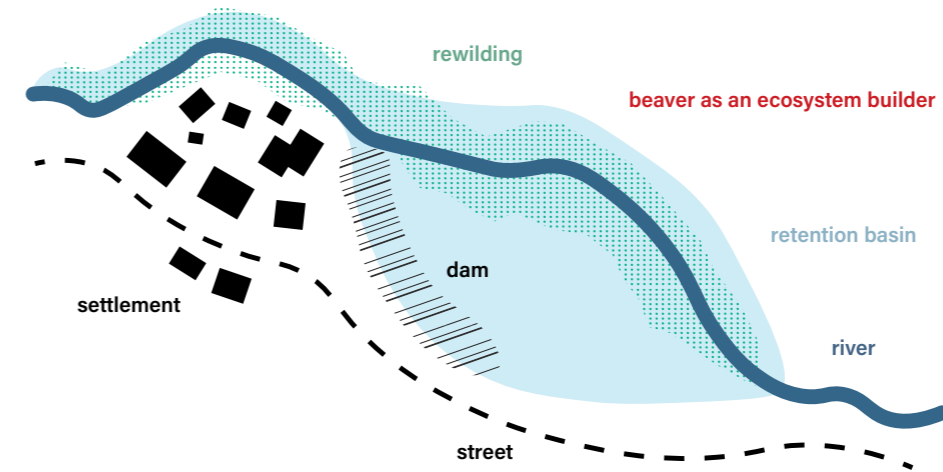
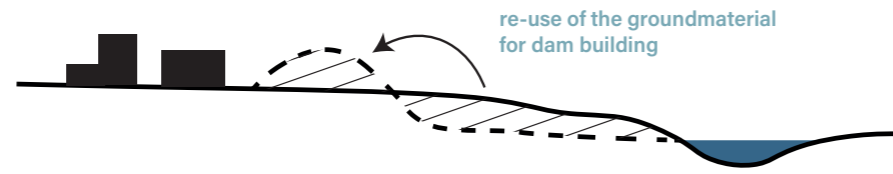
„Create a realistic photograph of a settlement in the Pitztal in the austrian alps in 2100. In the photograph the climate change scenario RCP 8.5 by the ipcc has become reality and the civilization has to deal with severe floodings“



„Visuals for a scenario design course where we work with snow, alps and future. The project area is Pitztal in Austria. Architectural watercolour painting style, using also black marker, earthy tones. Scenario: As there will be lots of floods from the melting snow from the Alps, people are getting ready to adapt their environment for upcoming floods. They start renaturing the paved areas and drag off the paving as it does not let the runoff water absorb to the ground. The locals themselves renature and regreen the area, as it is the first measure they can do to prevent the causes of the disaster of flood. In the distance you can also see the Pitztal mountaintops that still have their natural glacier and snow. Sun is shining and mood is still good, but hard times are ahead. Please visualize particularly a close up of a person taking away their home yard's paving stones and making it green again“



Design strategies



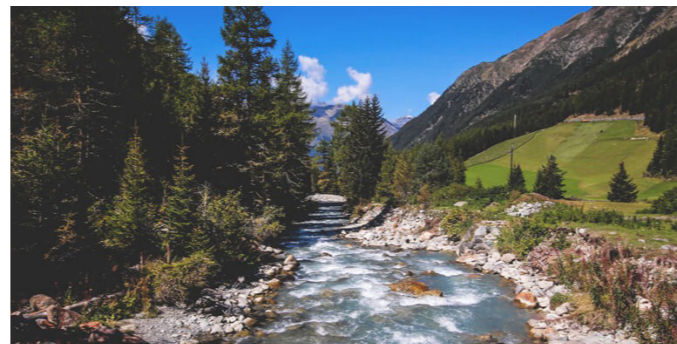
Lifted buildings



(Remorker Architects, 2016)

Due to increased seasonal flood risk, it is necessary to adapt the housing to prevent big-scale damages. It is cheaper to invest into flood-tolerant solutions beforehand, rather than repairing the damages later. Lifted housing or temporary seasonal flood-tolerant floors could be a solution for this.

Rewilding the riverbed



(Komm Wir Machen Das Einfach, n.d.)

Softening and extending the riverbed as excess water retention area would help with coping with seasonal flood periods. Native planting would make a vibrant ecosystem for animals and insects.

Reforestation in higher altitudes



(Fondation Yves Rocher, n.d.)

Roots of the trees act as natural binder for the slopes and therefore prevent erosion. The forest acts as a buffer around the valleys. That is why it is important to keep the forest, limit the wood industry and plant more.

Reflections on the discussion

Agnes

Our held debate with different parties included lots of vibrant views. I think it was nice to hear the funny acting from all participants standing up for their values. The voting and discussions between the fungi, ski tourists, entrepreneurs, glacier, cable car owner and earth worms, included various thoughts and reminded of a reality where taking into account all the parties will be very difficult. I often find myself wondering whether it even is possible to find solutions that suit everyone. Who should be the ones suffering? Will we give up on our own comfort or forget for a while about fungi, microbes, wolves and small entrepreneurs, because „they will be okay in the end“ and „they will recover anyway“? This is a question I probably still have to find out on my life-long studies.

Marte

On the last day of the course Design Workshop, the three groups presented their scenarios and Manifesto, and although we all had the same starting point of the 8,5 RCP climate change scenario in the Ötztaler Alps, there were many different outcomes. Although the consequences of climate change and the proposed adaptations to the situation are quite impactful, the discussion stayed very polite and respectful. Everyone got the chance to express their opinion and there was no heated discussion between stakeholders with opposing viewpoints. I thought it was very interesting to use the different roles in the discussion of the Manifestos, which also contained non-humans. Raising the discussion from another point of view than human-centric brought interesting insights and let me see a broadened picture. As a MSc Planning student, I have worked with participation processes before, but if there is nature involved, you ask the opinion of the relevant nature organisations, not the actual organisms and other non living actors. So the roleplay certainly brought me new perspectives. This is also an aspect that I will take with me from this course, to remember the stakeholders that do not have a voice to express themselves.

Dominic

In our final course discussion, each group presented unique future scenarios for the Ötztal Alps, all based on the 8.5 RCP climate pathway. It was fascinating to see the different approaches we each took to similar challenges, especially through the role-playing exercise where we had to represent non-human beings such as mycelium, glaciers and wildlife. This added an insightful layer, pushing us to look beyond human-centred perspectives and consider the needs and values of ecosystems as real stakeholders. The experience highlighted the complexity of finding shared solutions that respect both human and ecological needs. It left me wondering how real-world decisions can balance these often conflicting interests. Going forward, I'll carry with me a heightened awareness of the 'silent' stakeholders in planning, that I hope will guide me towards more inclusive and balanced approaches in my future work.

Reflections on the course

Agnes

Working with the Alps and the snow during the week was very exciting for me. As I would describe myself as a complete „flatlander“, this task opened up a whole new world for me. I also found our approach very exciting and innovative. As I had never done a scenario design like this before, I found myself immersed in the foreseeable future of our planet. Taking into account all the parties we mapped during the stakeholder exercise, I realised how complicated and important the Alps and snow are in this climate change, mitigation and adaptation.

Looking back at my notes, I could list some of the most important issues and approaches that touched me. I was fascinated by the diagram illustrating „What is a scenario?“, which placed different points on the axes of „normative“, „empirical“, „now“ and „future“. The results of this scheme were actually something I had never thought of before. I also found it very hard to believe that most people in the world are ‚solutionist‘ and ‚denialist‘ when it comes to believing in climate change. Of course I knew that most people think this way, but seeing it visualised in this way made me think very critically about where I am myself and how I would like to change, adapt and prioritise my own values. I was also very moved by the distinction between the EGO and ECO perspectives. I consider myself to be someone who cares about the planet and my daily habits are probably better in this respect than many people around me, but the fact that everyone has to let go of their ego in order to become more one with the planet reminded me why this is not so self-evident for some people.

This course has given me a lot of promising but also hard thoughts. The kind of anchors we would like to be is up to us and the actions we take today. I got a lot of inspiration on how to approach large-scale future designs and scenarios, as well as many inspiring sources and visuals. I am very grateful for this opportunity and for Emelie’s input.

Marte

The course took place in a short timespan and was therefore quite intensive. With such courses, I am always surprised to see the quality of the end products that were produced in such a short time and still look nice and are thought through.

I liked the structure of the course, with the morning and afternoons of each day divided in blocks with a clear corresponding topic and task. I enjoyed working with the different frames to look at the area, that became more specific each day. So we started with mapping the area, then mapping the actors and actants and lastly developed the scenarios. I was therefore able to learn a lot about the Alps in a short amount of time. I had visited the Alps before so I knew what they look like, but I had no further background knowledge of the processes and actors there. Since there are no mountains in the Netherlands, I was very unfamiliar with the challenges the Alps are facing, but it was a very interesting and relevant topic to work on and learn about. I had worked with stakeholder mapping and scenario planning before, but it is nice to apply the methods in a different context.

Elements from the course that I will take with me are GIS skills; I learned some new steps and data retrieving methods. I also enjoyed thinking about the contents of the Manifest. I had never used this method before, but I thought it really helped to connect futuristic ideas and world views to practical first steps that can be taken to realise this imagined future, as a kind of back-casting process.

Dominic

Reflecting on the course i feel both inspired and challenged. Although i’m originally from bavaria and i have a close relation to the alps, the course opened my eyes to new and complex dynamics within the alpine region. Especially as it faces the potential of extreme weather events and eventually the loss of snow due to climate change. The scenario-based design approach was new to me. It made me a little disoriented at first but as we explored possible futures it showed that there are new ways of living in the alps and dealing with future climate, which in the end made me more optimistic.

Mapping the interactions between stakeholders, ecosystems and the climate, where we considered the needs of both human and non-human actors, highlighted how interconnected the relationships are in such an ecologically sensitive area. It made us reflect not only from the human-centered perspective but also from all the other parts of the ecosystem like wildlife and the glacier. In this context, the idea of the parliament of things, made me think about my own values and priorities and put them into relation to other non-living entities. A thought process I haven’t really integrated in my own studies before.

The structured progression of the course, from mapping the area to identifying stakeholders to constructing scenarios and implementing a specific design idea, provided a clear path to understanding the scenario planning process. I found the design exercise particularly exciting, as it linked broad, futuristic ideas to practical, initial actions which made abstract scenarios feel achievable. This course has made me more aware of the impact of our choices on future landscapes and inspired me to pursue approaches that honour both people and all the other parts of the system.

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Figures

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Mapped data sources

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<https://www.data.gv.at/katalog/dataset/c8bc08ab-c987-4be5-8d54-07f3a815684d#additional-info>

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