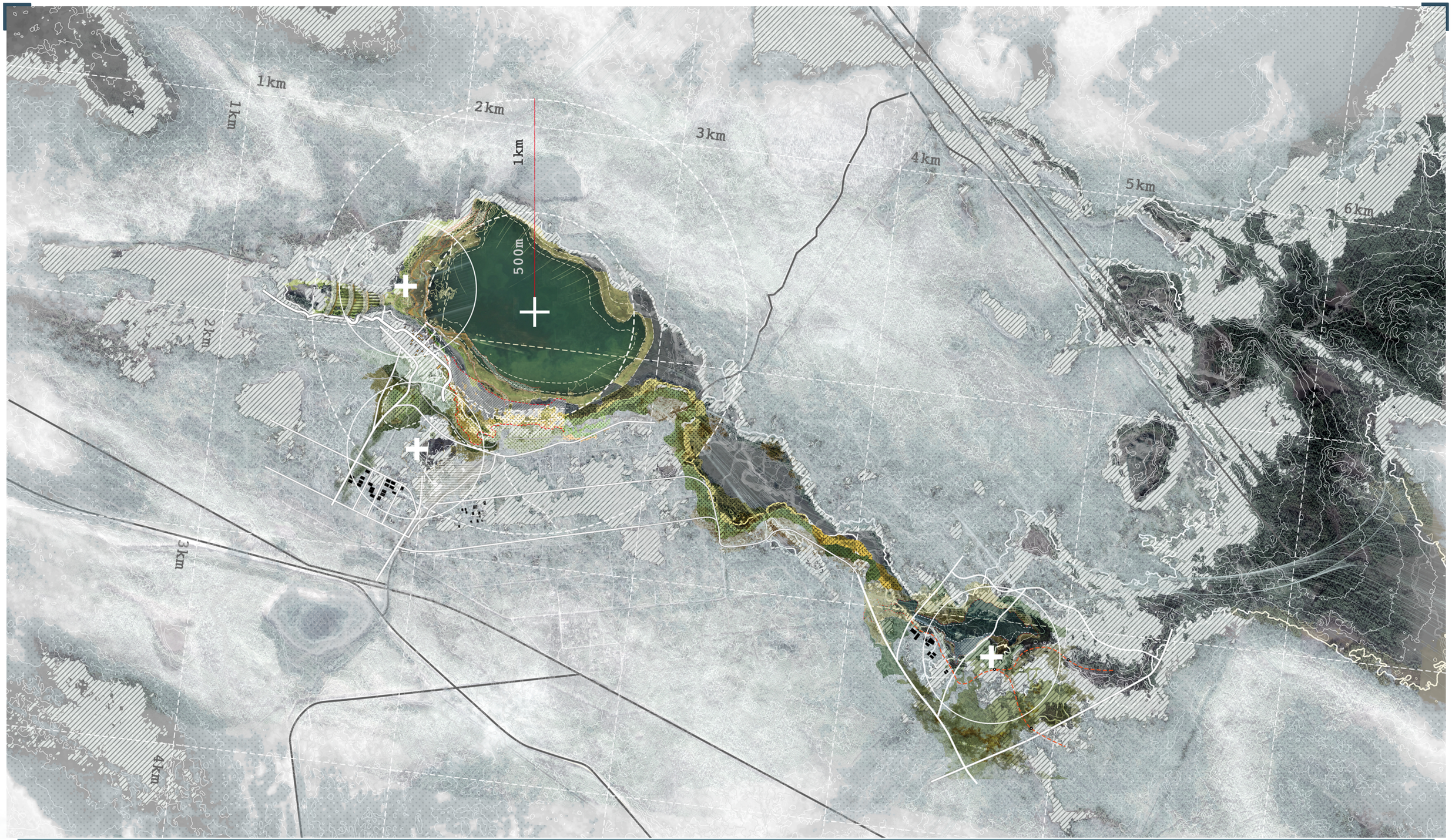

Country / City	Beijing, China
University / School	School of Landscape Architecture, Beijing Forestry University
Academic year	2018-2019
Title of the project	Post Alaas Landscape- The Construction of Anti-Freeze-Thaw Oasis on Permafrost Area
Authors	OU Xiaoyang, WANG Jing, ZOU Tianjiao, Huang Sihan

TECHNICAL DOSSIER

Title of the project	Post Alaas Landscape- The Construction of Anti-Freeze-Thaw Oasis on Permafrost Area
Authors	OU Xiaoyang, WANG Jing, ZOU Tianjiao, Huang Sihan
Title of the course	Landscape Architecture Design Studio
Academic year	2018-2019
Teaching Staff	ZHENG Xi
Department/Section/Program of belonging	School of Landscape Architecture
University/School	Beijing Forestry University

The project recognizes and takes advantage of the short-term positive impact of climate change on the ALAAS thermal karst lake region while focusing on the sustainable development of the more resilient civilization. It focuses on the changing mechanism of permafrost ecosystems and the mechanism of plant community degradation succession. By optimizing plant community allocation, planning semi-natural areas, and constructing elastic ecological facilities, the project maximizes water and soil properties and make the region strive in permafrost, increases the vitality of flexible regulation and healthy growth facing permafrost degradation. Landscape interventions were taken as critical opportunities to resolve regional contradictions and translate global macro-related issues into small-scale interventions with ecological, social, and economic resilience potential, and gradually build an ALAAS oasis for the region. This comprehensive proposal provides an updated opportunity for the region that once lived in the permafrost region to face both ecological and civil degradation through a landscape-based framework to rebuild confidence in the land of degraded permafrost. The project won the Honor Award of Analysis and Planning of ASLA Student Awards, 2019.

For further information
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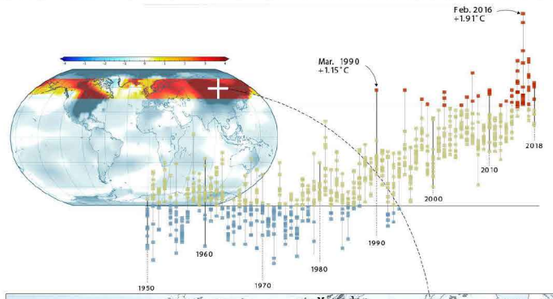
CLIMATE CHANGE AGAIN

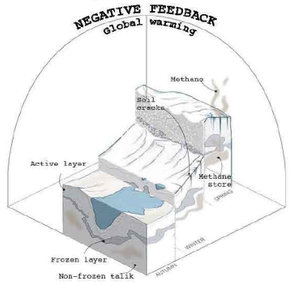
11th International Biennial Landscape Barcelona

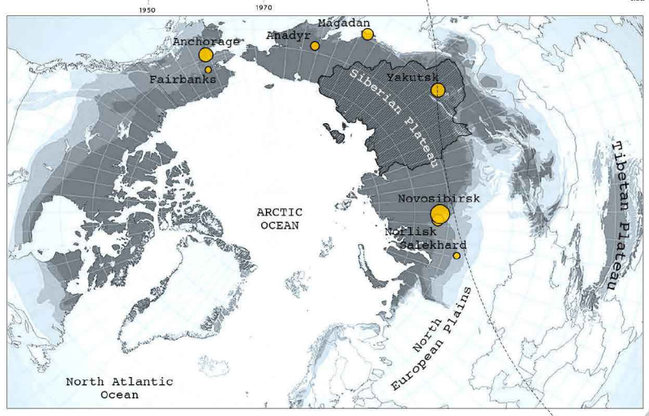
Barcelona September 2020

SCHOOL PRIZE

GLOBAL WARMING & PERMAFROST DEGRADATION





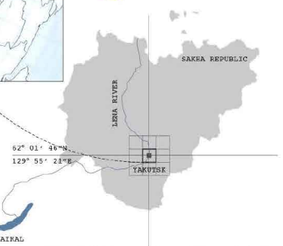


Permafrost State

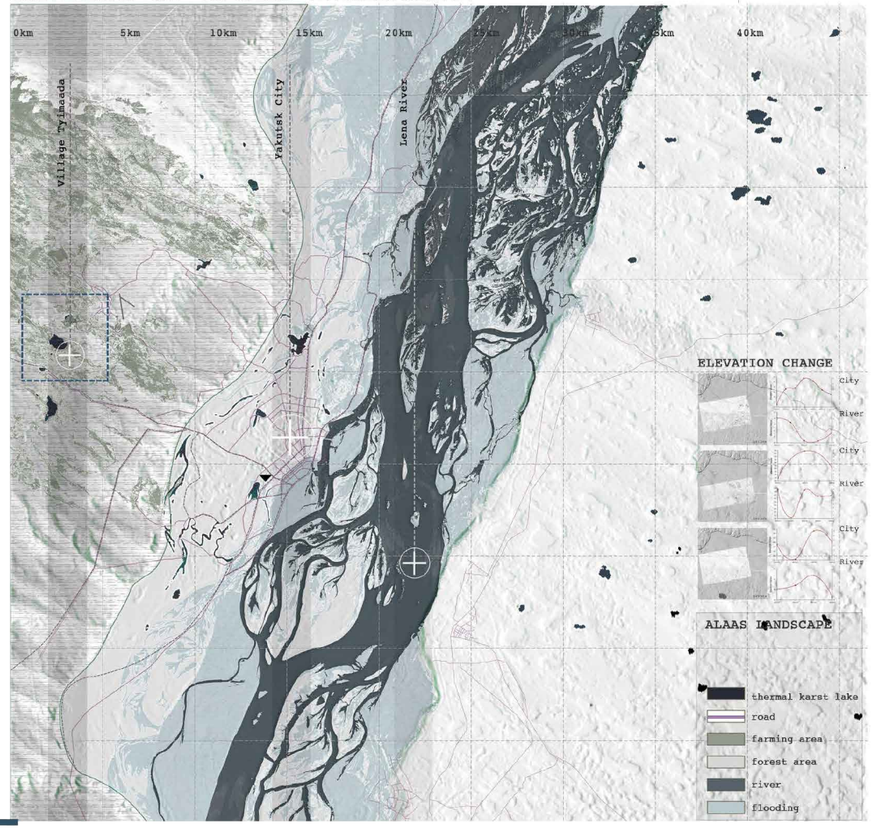
- Continuous
- Discontinuous
- Sporadic
- Isolated

Population

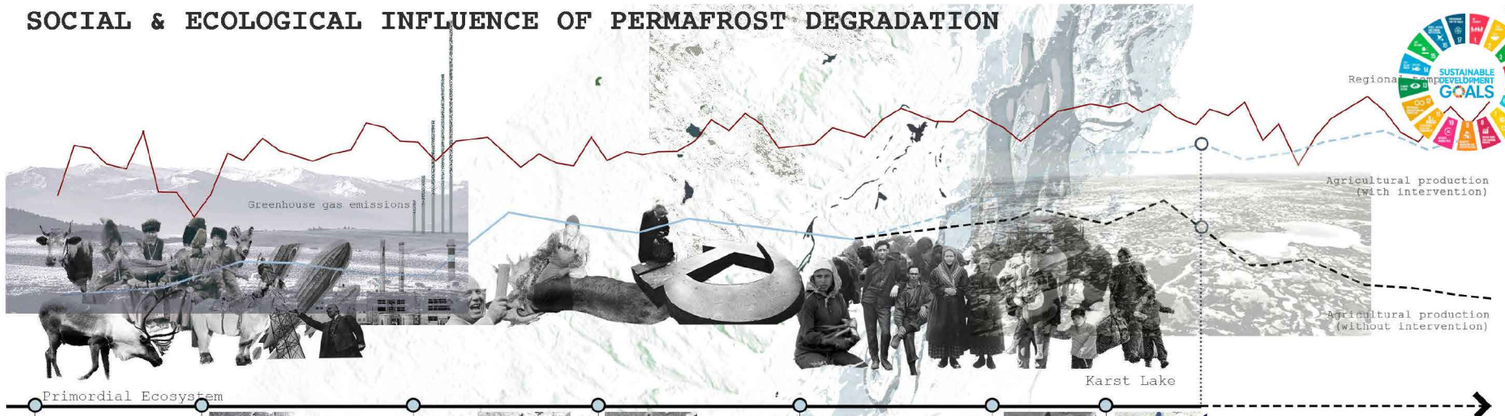
- 10,000–50,000
- 50,000–100,000
- 100,000–200,000
- 200,000–500,000
- 500,000–1,000,000



MAPPING OF ALAAS LANDSCAPE



SOCIAL & ECOLOGICAL INFLUENCE OF PERMAFROST DEGRADATION



YEAR 1632

YEAR 1920
After the founding of the Soviet Union, the first round of the "Great Leap Forward" climax was set off. Its over-speed industrialization produced a large amount of greenhouse gases and pollution emissions, which became an important factor for the rapid melting of frozen soil in the region.

YEAR 1960
Khrushchev's reform of agriculture and industry, excessive reclamation and production, disturbed the regional ecological balance, resulting in the death of many species.

YEAR 1991
The Soviet union disintegrated because of political, economic and other contradictions, and the national, historical and social contradictions were enlarged.

YEAR 1997
In July 1997, the independent reported that nine out of ten families lived below the poverty line and one out of four were in abject poverty.

YEAR 2010
Due to the destruction of nature and economic depression in the past, a large number of rural people went to cities to make a living, which aggravated the pressure and pollution of urban life.

YEAR 2032
In 2012,current mayor Aysen Nikolaev requested his team to study the basic issues of the city of Yakutsk.Throughout the analysis,the team concluded that,in oredr to tackle challenges such as housing scarcity, a weakening economic foundation and multiplying environmental impacts,a shift from ad hoc reactions to farther-reaching and longer-term solutions was needed.

YEAR 1993
Permafrost distribution area and decreases, means that the underground water-resisting layer disappears, the aquifer thickness under the condition of relatively constant with the decrease of frozen layer of water level and even completely supply deep aquifer.

YEAR 1998
Form of thermal karst lakes.

YEAR 2003
During summer seasons,thermal karst lakes expanded and summer floods brought about optimum conditions for grassland to develops.

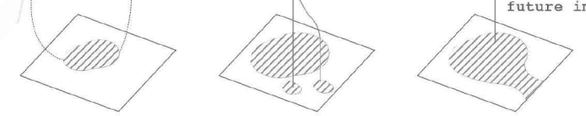
YEAR 2008
Lands became fertile for canopy growth.Forests benefit from flooding and forests developed.

YEAR 2013

lake expansion

permafrost degregation

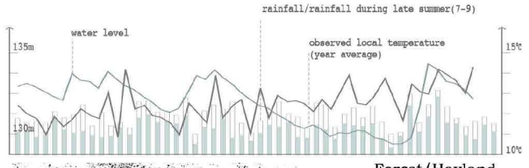
future impacts



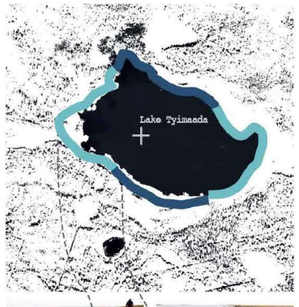
Climate changes melt permafrost layers to some extent. Flooding became extreme.

More thermal karst lakes formed due to melting of soil.

Water level drops.

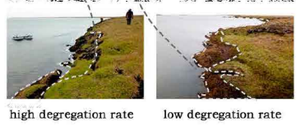


Forest/Hayland



Human Settlement

Water Resource



Topography&Elevation

high degregation rate

low degregation rate

Subgrade bearing capacity

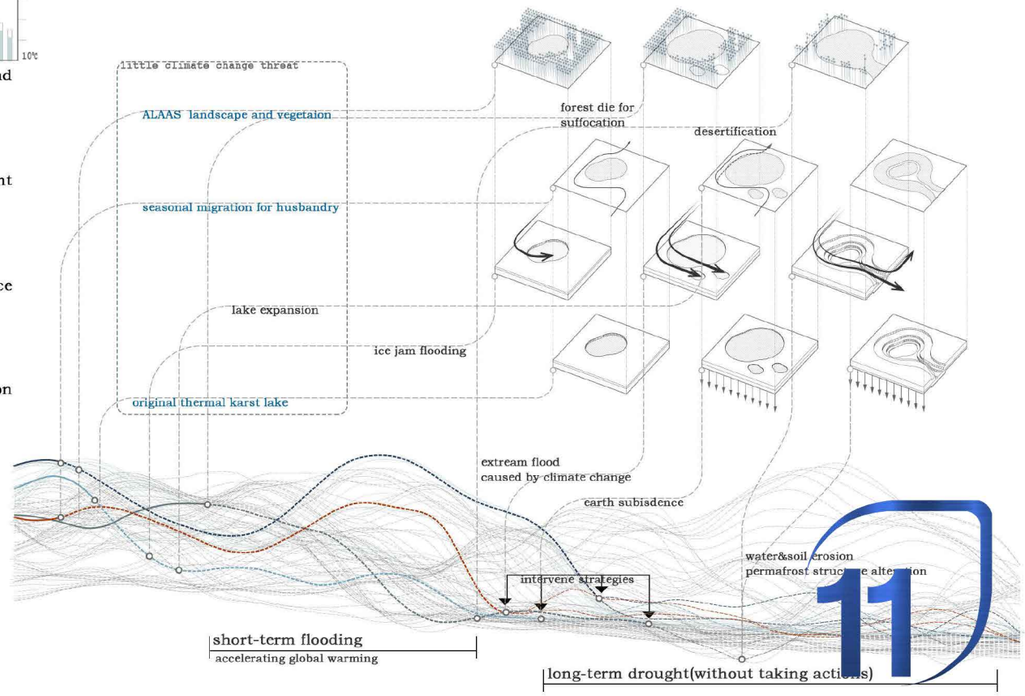
Frozen layer depth

Haylands productivity

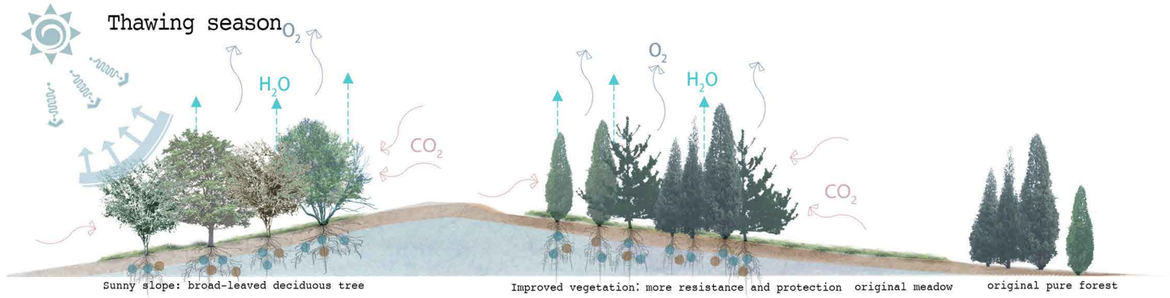
Water content of soil

Possible futures

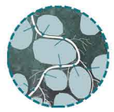
Local Crisis:Deterioration of ALAAS Eco-system



CORRELATION BETWEEN PERMAFROST AND VEGETATION

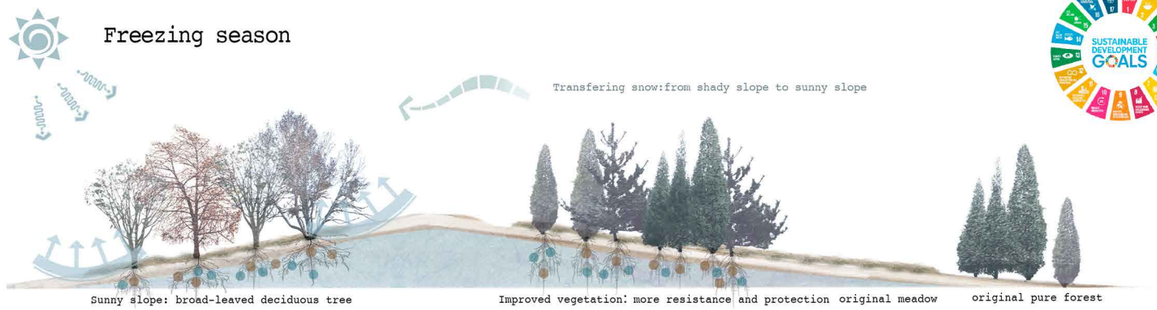


Plant deciduous broad-leaved trees on sunny slopes to slow down the melting process by shading the heat from the sun during the melting season.It also helps absorb greenhouse gases.

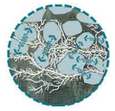


Rapid thawing of soil moisture content can be eliminated by absorption and transpiration.

Forming root soil mixture to improve cohesion and shear strength.



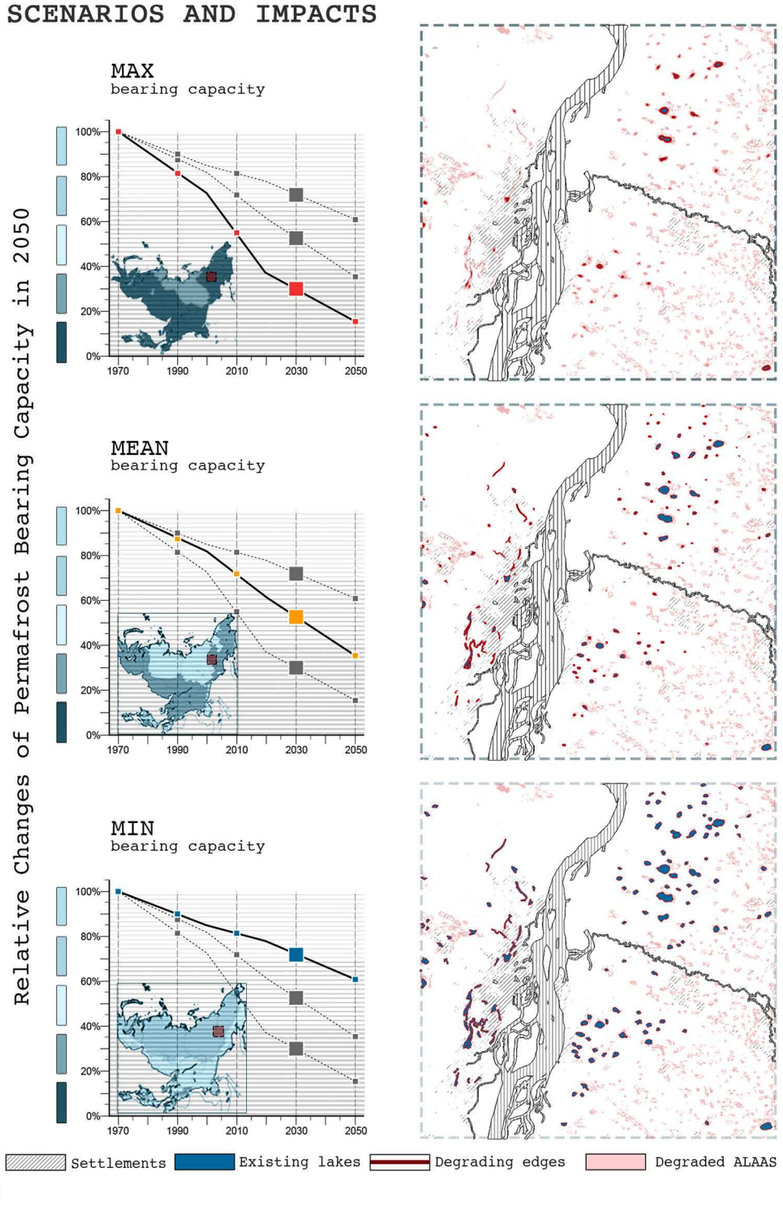
After deciduous trees have shed their leaves, covered snow during the freezing season can reflect more sunlight and provide a freezing low temperature.We can transfer the snow on shady slope to sunny slope to balance the soil temperature and freezing and thawing of them.



The root system absorbs excessive moisture in the soil, preventing and controlling the ground frost heave caused by the sudden drop of temperature.

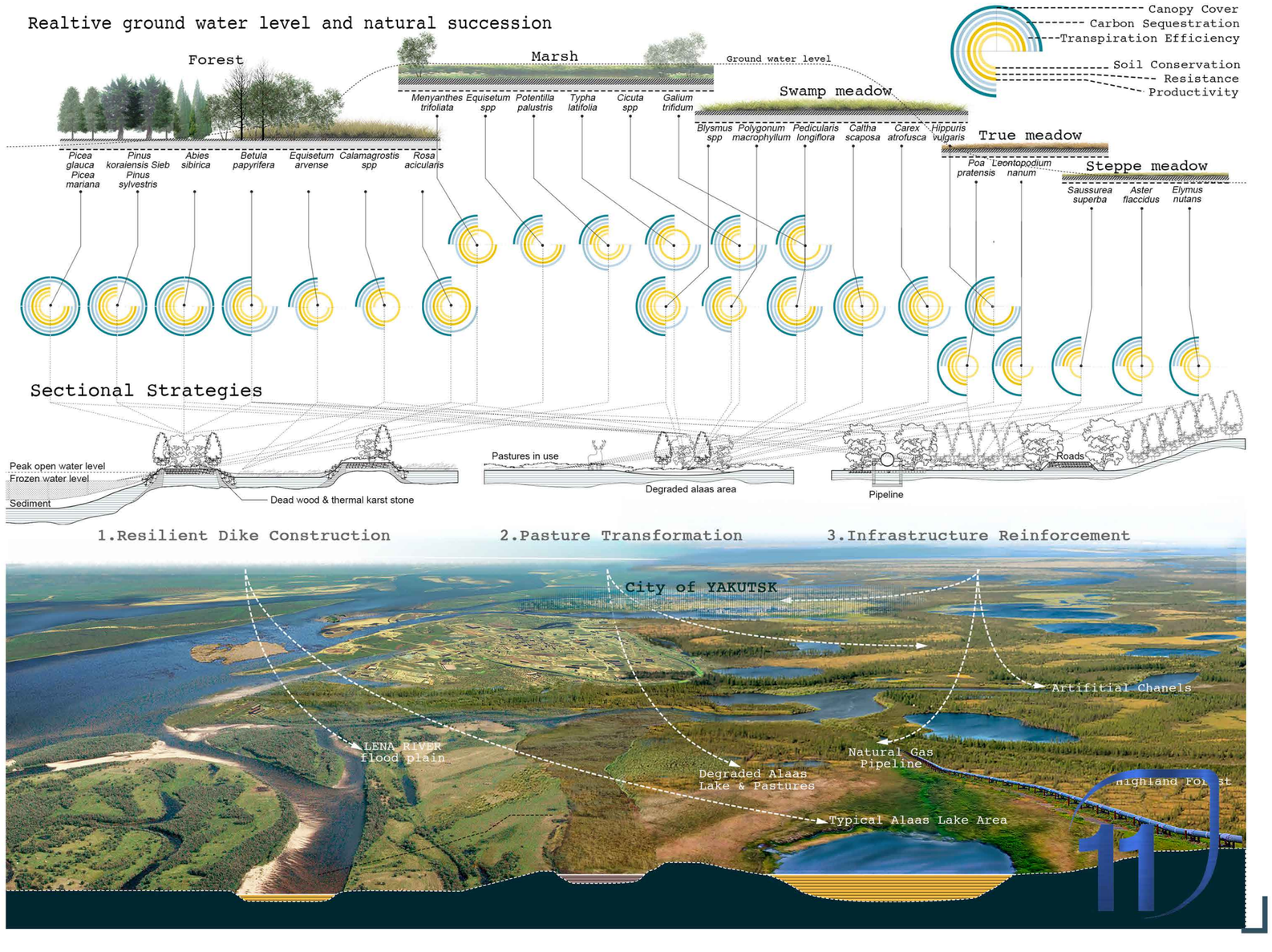
Increasing the specific heat capacity of soil particles, reduce the disaster of temperature sudden change.

SCENARIOS AND IMPACTS



Settlements
Existing lakes
Degrading edges
Degraded ALAAS areas

PLANT ANTI-FREEZE THAW CAPACITY SCALE



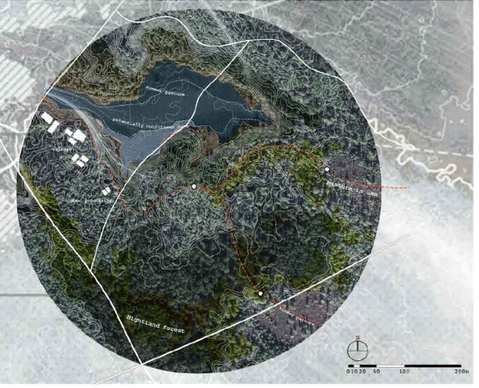
MASTER PLAN

1km
2km
3km
4km
5km
6km

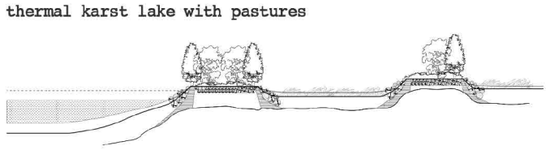
SITE 1
RESILIENT DIKE CONSTRUCTION

SITE 2
INFRUSTRUCTURE REINFORCEMENT

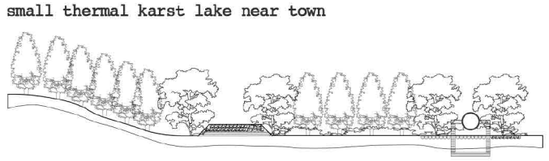
SITE 3
PASTURE TRANSFORMATION



thermal karst lake with pastures



small thermal karst lake near town



seasonal dried waterbody with pastures