STOREHOUSE OF THE EARTH

To Document the Fast-Changing Environment

by

Namjoo Kim

Bachelor of Architecture
Korea University, 2012

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STOREHOUSE OF THE EARTH

To Document the Fast-Changing Environment

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Namjoo Kim

Submitted to the Department of Architecture
on January 14, 2016 in partial fulfillment of the
requirements for the Degree of
Master of Architecture

ABSTRACT

In the book Silent Spring, Rachel Carson argues that humans are one species that could modify its surroundings so drastically as to cause damage to the Earth. Currently, as a consequence of accumulated modification, the rapidity of environmental change accelerates and causes hazards all over the world. Though the earth is always changing, the current speed of change is unprecedented and problematic.

The site of this thesis, the Rhone glacier and surrounding area, shows the drastic speed of change. The Rhone glacier, 11,500 years old, is one of the oldest glaciers in the Alps. However, scientists estimate that this glacier, along with 94% others in the Alps, will disappear in 100 years due to climate warming. When the environment changes slowly flora and fauna can adapt to the change. However, species that are vulnerable to small changes become extinct.

Numerous disciplines document the alarming changes taking place including art, science, photography, and film. Each uses unconventional methods to document the rapidly-changing world. I call this new type of documentation culture the “culture of capture.” Its preconditions are [1] a shared concern about the extinction of species and the loss of the landscape and [2] the use of new technology to document every detail of change.

This thesis argues that architecture is a unique medium that can both document the changing environment as well as have a positive impact on the physical form. I propose two architectural interventions: a ‘glacier blanket’ and a ‘mountain hat’ to delay change and to archive the physical remnants of the melting glacier and nival plants. The future scenario of the site, which consists of four aspects, Glacier retreat, Bio-Diversity, Tourism, and Infrastructure, is complicated and constantly varying. The architectural documentation will also be an intricate system that adapts its function and form.

Thesis Supervisor: J. Meejin Yoon
Title: Head, Department of Architecture
Professor of Architecture
This thesis would have been impossible without supports from my committee members, friends, and my family.

Meejin, thank you for your excellent guidance, caring and sharp criticism throughout the whole process. I have felt truly happy to have had the chance to work with you during my thesis time.

Miho, thank you for being with me during my time at MIT from Surabaya studio and giving me positive and brilliant feedback always.

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6  Appendix
The history of life on earth has been a history of interaction between living things and their surroundings. To a large extent, the physical form and the habits of the earth's vegetation and its animal life have been molded by the environment. Considering the whole span of earthly time, the opposite effect, in which life actually modifies its surroundings, has been relatively slight. Only within the moment of time represented by the present century has one species—man—acquired significant power to alter the nature of his world.

Rachel Carson, *Silent Spring*
INTRODUCTION

Storehouse of the Earth, an architectural Documentation
In the book Silent Spring, Rachel Carson argues that humans are one species that could modify its surroundings so drastically as to cause damage to the Earth. Currently, as a consequence of accumulated modification, the rapidity of environmental change has accelerated and has caused hazards all over the world. Though the earth is always changing, the current speed of change is unprecedented and problematic.

The site of this thesis, the Rhone glacier and surrounding area, shows the drastic speed of change. The Rhone glacier, 11,500 years old, is one of the oldest glaciers in the Alps. However, scientists estimate that this glacier, along with 94% others in the Alps, will disappear in 100 years due to climate warming. When the environment changes slowly flora and fauna can adapt to the change. However, when the speed of change is rapid like today, species that are vulnerable to small changes become extinct.

Numerous disciplines document the alarming changes taking place including art, science, photography, and film. Each uses unconventional methods to document the rapidly-changing world such as replicating, scaling, capturing etc. I call this new type of documentation culture the “culture of capture.” Its preconditions are [1] a shared concern about the extinction of species and the loss of the landscape and [2] the use of new technology to document every detail of change.
This thesis argues that architecture is a unique medium that can both document the changing environment as well as have a positive impact on the physical form. I propose two architectural interventions: a 'glacier blanket' and 'mountain hat' to delay change and to archive the physical remnants of the melting glacier and endangered nival plants.

The future scenario in which this thesis is projected consist of four categories, Glacier retreat, Bio-Diversity, Tourism, and Infrastructure. I have extracted the future scenario that I use in this thesis from different disciplines such as climatology, glaciology, geology, biology, economy and policy. Each of this discipline has its own scenarios, which stands alone. I drew from these multiple scenarios to make one combined scenario where architecture can intervene in.
**Glacier**

The Switzerland glacier is melting every year, with 18% of the ice having disappeared in the last 20 years. Thus, there are a series of efforts to slow down this environmental change. For example, the oldest part of the Alps is covered by a giant white cloth, which reflects the sunlight in order to diminish the melting. The Andermatt ski-lift company had covered 2,500 square meters using polyester and polypropylene fabric, which was produced by nonwoven manufacturer in Switzerland.

**Bio Diversity**

The future scenario for bio diversity predicts the migration of alpine plants and trees will invade the upper elevation zone and disintegrate the nival plant habitat above 2800m, which is called summit trap phenomena. The high mountain plants are vulnerable to the environment change so they are used as a sensitive bio indicator of mountain area. The upward shift of treelines and alpine plants are already witnessed and in the future, the nival plant such as Saxifraga exarata and S. oppositifolia eventually become extinct.²

**Tourism + Infra Structure**

The future environmental change also affect human economy including tourism and infrastructure. Every year, around 120 million tourists visit the Alps: The area of ski resort area exceed 3,400 km² and the network of hiking route in the Switzerland Alps is more than 60,000 km. As the glacier and permafrost melt, more proglacial lakes will be created and the natural hazards such as landslides, avalanches and floods threaten the villages in this region.
The architectural documentation here is an intricate system, which is composed of many elements that are related to four categories in the future scenario. The form and function of this architectural documentation will change to adapt to the environmental change. This thesis propose an occupiable documentation; therefore, in this thesis, architecture is both a medium to document and a space to archive. Finally, this thesis will propose a new relationship between architecture and the environment by becoming a storehouse of the earth.

1 Wallinga and S.W. Van de Wal, "Sensitivity of Rhonegletscher, Switzerland, to Climate Change: Experiments with a One-Dimensional Flowline Model.", 390

2 Gottfried et al., "A Fine-Scaled Predictive Model for Changes in Species Distribution Patterns of High Mountain Plants Induced by Climate Warming.", 250
NEW METHOD OF DOCUMENTATION

Background Research: Documentation in the Fast-Changing Environment
Numerous disciplines document the alarming changes taking place including art, science, photography, and film. Each uses unconventional methods to document the rapidly-changing world such as replicating, scaling, capturing etc. I call this new type of documentation culture the “culture of capture.” Its preconditions are

[1] A shared concern about the extinction of species and the loss of the landscape


As the capacity of the storage medium becomes almost unlimited and 3D scanning technology has a capability to scan the exact form of landscapes or buildings, people can store every detail of the world in digital form. This enables artists, researchers, and film directors to record and archive the precise replication of the endangered environment, especially landscapes, and this become a new type of documentation culture. For example, ‘Cyark’, which is an international Non-Profit Organization, is working on creating 3D digital models of the world’s cultural heritage sites in order to ensure that the next generation can share the same knowledge with us regardless of the condition of the physical sites. Another example is “Frozen Relics” project that scanned the arctic floes and recreated them in a gallery space so that people could observe the secret of the arctic landscape.
CATALOGUE

Replicating / Scaling

Frozen Relic: Arctic Works
Scanlab
© Nick Cobbing/Greenpeace

Italian Limes
Folder and collaborators

The Sigrino landscape Project
LVML, at ETH

Digital Mapping

Field Expedition: Mongolia
National Geographic

Ascii-Art Mapping
J. M. Adovasio

Freezing

The Frozen Ark
The Frozen Ark

Dissection diagram is attached
I categorize documentation projects under the culture of capture according to the method they use. There are seven categories: Replicating, Scaling, Digital Mapping, Collage, Capturing, Freezing, and Abstracting. Especially, replicating and scaling are very interesting methods to document the landscapes, since they can replicate the original form precisely and display it in various sizes.

This thesis argue that architecture can borrow these methods from other media to communicate with the public and evoke a powerful memory of landscapes. This thesis also wants to demonstrate that architecture has a capability to document the outside world by itself instead of being a container of other media. This is a very interesting argument because historically, architecture has been a repository of maps, art, and documents but not an active medium to document the world. The next chapter will discuss the history of architecture as a repository.
CATALOGUE

Collage

The Victory Atlas
Elena Damiani

Traces of Nature in Japanese Suburbs
Yukiko Suto

Early Map Works
Sol LeWitt

Capturing

Heterotopia, the Tragic Fall
Vincent J. Stoker

the Landsat Program
NASA

The Ethics of Dust
Jorge Otero-Pailos

Abstraction

Meteorographica
Francis Galton

The Map as an Artistic Territory
Eduard Imhof

Mnemosyne Atlas
Aby Warburg
Dissection Diagram 01

Replicating / Scaling

Project Name: Frozen Relic: Arctic Works
People: Scanlab
Method: Scanning / Replicating / Scaling
Contents: Ice Floe, Landscape
Motivation: The Melting Glaciers Display
Discrepancy: Very Low
Year: 2014
Type: Digital Document

Method
Replicating
Scaling

Content
Ice Floe
Replica

Result
Concern about
Climate Change

Culture of Capture
Replication of Arne's Floe
12 January - 9 February 2013
Monday to Friday 10am-7pm
Saturday 10am-3pm
Melting and Disappearing Everyday

Arne's Floe
Captured at 17:01:07hrs on 16 September
at 79 22.558 N, 003 04.611 W
Arctic
Melted and Disappearing After.
Dissection Diagram 02

Digital Mapping

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Field Expedition: Mongolia</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>National Geographic</td>
</tr>
<tr>
<td>Method</td>
<td>Mapping / Collaborating</td>
</tr>
<tr>
<td>Contents</td>
<td>Mongolia Landscape</td>
</tr>
<tr>
<td>Motivation</td>
<td>Find Ancient Relics</td>
</tr>
<tr>
<td>Discrepancy</td>
<td>Getting Lower, Ongoing</td>
</tr>
<tr>
<td>Year</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Type</td>
<td>Collaboration Work</td>
</tr>
</tbody>
</table>

Method

Mapping/Collaborating

Content

Artifacts in Mongolia

Result

Digital Map

Concern about Historical Heritage
Dissection Diagram 03

Collage

Project Name: The Victory Atlas
People: Elena Damiani
Method: Collage
Contents: Map, Images Of Landscapes
Motivation: Question about the Meaning of Representation
Discrepancy: High, Subjective
Year: 2012
Type: Collage

Culture of Capture
Dissection Diagram 04

Capturing

<table>
<thead>
<tr>
<th>Project Name</th>
<th>The Ethics Of Dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>Jorge Otero-pailos</td>
</tr>
<tr>
<td>Method</td>
<td>Capturing (Dust)</td>
</tr>
<tr>
<td>Contents</td>
<td>Dust</td>
</tr>
<tr>
<td>Motivation</td>
<td>Pollution Display</td>
</tr>
<tr>
<td>Discrepancy</td>
<td>Medium</td>
</tr>
<tr>
<td>Year</td>
<td>2009</td>
</tr>
<tr>
<td>Type</td>
<td>Art Work</td>
</tr>
</tbody>
</table>

Project: Capturing (Dust)

Method: Capturing Dust on the Wall of a Historic Building

Concern about Conservation of Buildings

Culture of Capture
Doges Palace built in 1340.
New Method of Documentation

2.2 ARCHITECTURE TO DOCUMENT

Historically, architecture has provided a space to display the drawings and paintings about landscapes. Cave painting was the earliest example, in which animals and natural environment was stored inside a built form. For example, the Cave of Altamira in Spain, which is believed to have been created between 16,400 and 14,000 years ago, contains detailed figures of animals. The map gallery in Vatican Museum which was built in the 16th century is another example that Italy's geography was documented as the new cartographic techniques were developed. It curated 40 maps of regions or cities in Italy during that period. These historical precedents are repository architecture where other media was stored.

However, this thesis imagines a new architectural typology, the architectural documentation, which is both a medium to document and a space to archive.
Gallery of the Maps in the Vatican Museum
©https://vaticanpatronsocalifornia.org
Galleria Delle Carte Geografiche, Vatican Palace

The Gallery of Maps, 120 Meter Long
Ignazio Danti, 1578 - 1580

Perspective Diagram from Franco Cosimo Panini Publisher
RETREAT OF GLACIERS IN THE ALPS
Background Research: the Switzerland Alps, a rapidly-changing landscape
3.1 WHY THE ALPS?

An urgent crisis in the 21st century, climate change causes great damage to landscapes, particularly glaciers, which reacts to even small temperature increases. Glaciers have been melting all over the world since the end of the Little Ice Age (around 1850), especially from the late 20th century glaciers have begun retreating rapidly.

The site of this thesis, the Rhone glacier, 11,500 years old, which is one of the oldest glaciers in the Alps shows the drastic speed of change. Scientists estimate that this glacier, along with 94% others in the Alps, will disappear in 100 years due to climate warming.¹

The melting or retreat of glaciers poses several problems. The glaciers in the Alps are tourist attractions, a natural water source and a buffer against natural hazards.

¹ Wallinga and S.W. Van de Wal, "Sensitivity of Rhonegletscher, Switzerland, to Climate Change: Experiments with a One-Dimensional Flowline Model.", 390
Retreat of glaciers in the Alps

3.2 MAPPING THE ALPS

MAP 1. GLACIER BOUNDARY OF CENTRAL EUROPE
MAP 2. RHONE GLACIER ICE THICKNESS AND BED ROCK SECTION

The overdeepening (dark blue in the map) is potential sites for pro-glacial lakes, which is also related to the natural hazards.\(^1\)

Calculated Ice-Thickness Distribution

\[\begin{align*}
\text{a} & \quad \text{b} & \quad \text{c} \\
\text{d} & \quad \text{e} & \quad \text{f} \\
g & \end{align*}\]

 Glacier Top
 Glab Top 1
 Glab Top 2
The natural landscape in the Alps is dynamic with a great diversity of plant species and wild animals. The site of this thesis includes the montane forest, the alpine grasslands and the nival elevation zone.
The oldest part of the Alps is covered by a giant white cloth, which reflects the sunlight in order to diminish the melting.

© EPA
NOTE

1 Linsbauer, Paul, and Haeberli, “Modeling Glacier Thickness Distribution and Bed Topography over Entire Mountain Ranges with GlabTop.”

MAP 1

Data adapted from
2. GLIMS and NSIDC (2005, updated 2015): Global Land Ice Measurements from Space glacier database. Compiled and made available by the international GLIMS community and the National Snow and Ice Data Center, Boulder CO, U.S.A.

MAP 2

Data adapted from

MAP 3

Data adapted from

Retreat of Glaciers in the Alps
4

FUTURE SCENARIO

Research on the Four Categories of the Future Scenario
The future scenario of this thesis is based on IPCC A1B scenario, which is a moderate version compared to other scenarios (figure 1), because many GCM(Global Climate Model) and RCM(Regional Climate Model) of Europe use A1B scenario to estimate the climate changes in the future. Figure 2 shows the projected global annual mean surface air temperature change under the A1B scenario.

The future scenario in which this thesis is projected consist of four categories, Glacier retreat, Bio-Diversity, Tourism, and Infrastructure. I have extracted this four different lenses from different disciplines such as climatology, glaciology, geology, biology, economy and policy. Each of this discipline has its own scenarios, which stands alone. I drew from these multiple scenarios to make one combined scenario where architecture can intervene in.
Figure 1. Total cumulative carbon dioxide emissions

Figure 1, Data adapted from Nebojsa Nakicenovic and Rob Swart, “Emissions Scenarios” (IPCC, 2000), http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=0. Reproduced by Namjoo Kim

Figure 2. The global annual mean surface air temperature in A1B

Figure 2, Data adapted from Met Office Hadley Centre, “ENSEMBLES Climate Change and its Impacts at Seasonal, Decadal and Centennial Timescales,” 2009, www.ensembles-eu.org. Reproduced by Namjoo Kim
LENS 1. GLACIER RETREAT

The Switzerland glacier is melting every year, with 18% of the ice having disappeared in the last 20 years. Rhone glacier, which is the site of this thesis, will also vanish in 100 years. Thus, there are a series of efforts to slow down this environmental change. For example, the oldest part of the Alps is covered by a giant white cloth, which reflects the sunlight in order to diminish the melting. The Andermatt ski-lift company had covered 2,500 square meters using polyester and polypropylene fabric, which was produced by nonwoven manufacturer in Switzerland. However, it is difficult to prevent the melting process of the Alps glaciers.

![Figure 3. Calculated Future Change in Glacier Area](image)

*Figure 3. Calculated Future Change in Glacier Area

LENS 2. BIO DIVERSITY

The future scenario for bio diversity estimates the migration of alpine plants and the upward shift of treeline, which will invade the upper elevation zone and disintegrate the nival plant habitat above 2800m. This is called summit trap phenomena. The upward shift of treelines and alpine plants are already witnessed and in the future, the nival plant such as Saxifraga exarata and S. oppositifolia eventually become extinct. The high mountain plants are used as a sensitive bio indicator of mountain area because they are venerable to the environment change.

Figure 4. Bio Diversity in Switzerland Alps 1

Figure 5. Bio Diversity in Switzerland Alps 2

LENS 3 TOURISM

Every year, around 120 million tourists visit the Alps: The area of ski resort area exceed 3,400 km² and the network of hiking route in the Switzerland Alps is more than 60,000 km. The future environmental change also affect human economy including tourism and infrastructure. Since the snowline is also shifting and the landscapes are changing, the ski industry and other tourism industries need to adapt to the future change in order to survive.

Figure 6. Projected changes of the number of ski resorts

LENSE 4. INFRA STRUCTURE

The glaciers in the Alps is a water tower in Europe. For example, in Switzerland's Rhone Valley, melting glaciers have supplied fresh water to crop fields for hundreds of years. As the glacier mass balance decrease, the need for building more water reservoir will increase in the near future to maintain the ground water.

Also, as the glacier and permafrost melt, more proglacial lakes will be created and the natural hazards such as landslides, avalanches and floods threaten the villages in this region. The infra structure to prevent the natural hazards will become more essential in this region.

Figure 7. Annual flow volumes in the Mauvoisin dam (averaged over five years) in accordance with different climate scenarios


Future Scenario | 57
4.2 ELEMENTS IN THE FUTURE SCENARIO

2020 AD
Current situation of the Alps
2100 AD
Glacier retreat, proglacial lake formation, upward shifting of treeline and plants, bio diversity change, ski resort migration
1 Glacier buttercup
2 Poa alpinahinteregalm
3 Ibex
Future Scenario
B : Bio Diversity
G : Glacier
T : Tourism
I : Infra Structure

1 Ski resort
2 Cable car
3 Mountain hut
4 Hiking route

Future Scenario
1 Dam
2 Earth dam
3 Avalanche protection barrier
NOTE

1 Linsbauer, Paul, and Haeberli, "Modeling Glacier Thickness Distribution and Bed Topography over Entire Mountain Ranges with GlabTop." 1

2 Nicoletta Cannone, "Unexpected Impacts of Climate Change on Alpine Vegetation." 362

3 Gottfried et al., "A Fine-Scaled Predictive Model for Changes in Species Distribution Patterns of High Mountain Plants Induced by Climate Warming." , 250
ARCHITECTURAL DOCUMENTATION
Two Architectural Intervention, Glacier Blanket and Mountain Hat
This thesis argues that architecture is a unique medium that can both document the changing environment as well as have a positive impact on the physical form. I propose two architectural interventions: a ‘glacier blanket’ and ‘mountain hat’ to delay change and to archive the physical remnants of the melting glacier and endangered nival plants.

**Glacier Blanket**

As mentioned in the previous chapter, there has been attempts to diminish the glacier retreat by covering the glacier with a giant polyester and polypropylene fabric. “Glacier Blanket” aims to go beyond the mere protection and actually function as a tool to document the changing landscape.

The entire size of the glacier blanket is 4.8 km by 8 km to cover 2/3 of the Rhone glacier, under the permanent snowline. The function and form of the glacier blanket will change to cope with the environmental change. The glacier blanket will 1. Delay the melting process of the Rhone glacier by reflecting sunlight 2. Collect the physical and chemical
remnants of the glacier such as rock and mineral dusts. 3. Become a permanent archive of those remnants. Also, some tension structure, which has maintained the fabric, will be converted to the pedestrian bridges when the underneath glacier melts.

The mineral dusts from the melting glacier provide long-term records of the Earth and by archiving them in the architectural device, this valuable historical records can survive. In the glacier blanket, there are three different structure system: tension structures, which support the fabric, air structures, which provide indoor spaces for researchers and tourists, and flexible structures, which will become archives. The flexible part will sink when the glacier melts to collect gravels and mineral dusts from the melting glacier. Eventually, this archive will sit on the bed rock after the glacier disappear. The process and shape of the archive is similar to the moraine formation; therefore, I call the final stage of the archive "artificial moraines"
Mountain Hat

Nival plants in the Alps are in danger as alpine plants are migrating to the upper elevation zone. I propose this mountain hat, which will become a new habitat for the nival plants. The mountain hat consists of three parts: a surface, which is a nival plant habitat, a space, which provides huts for tourists, and an underground archive, which will archive the seed.

Mountain hat as well as glacier blanket aim to decelerate the speed of environmental change in order to gain time to document important natural elements.
Glacier Blanket
NEW FUTURE SCENARIO

with Glacier Blanket & Mountain Hat

Infra Structure

Phase 1
- Connecting the existing tourist routes
  (Cable car / Hiking routes)

Tourism

Phase 1
- Delaying the melting process

Glacier

Bio Diversity

Phase 1
- Mountain hut / Research center
Phase 2
- Preventing natural hazards such as the rockfall and flooding

Phase 3
- Proglacial lakes become water reservoir

Phase 2
- Archiving the physical and chemical remnants
- Providing indoor spaces to researchers and tourists

Phase 3
- Becoming artificial moraines and tension bridges

Phase 2
- Archiving the nival plant seed

Phase 3
- Archives become seed banks
Phase 1
The artificial moraine is a part of the glacier blanket. The primary structure, tension cables, holds the secondary structure, air beams.

Phase 2
As the glacier underneath the air structure melts, the artificial moraine is detached from tension cables.
Phase 3

When the artificial moraine lands on the ground, it will
[1] archive the mineral dusts and other physical remnants from the melting glacier

Phase 4

After the fabric is degraded, the artificial moraine will
[1] become a permanent archive
[2] mark the land to remember the disappearing glacier.
PERSPECTIVE
Mountain Hut
The architectural documentation here is an intricate system, which is composed of many elements that are related to four categories in the future scenario. The form and function of this architectural documentation will change to adapt to the environmental change. This thesis propose an occupiable documentation; therefore, in this thesis, architecture is both a medium to document and a space to archive. Finally, this thesis will propose a new relationship between architecture and the environment by becoming a **storehouse of the earth**.
MODEL

Mountain Hat
Mountain Hat with Site Model

30 x 30 x 25 inch
Wood, 3d Printing
Mountain Hat with Site Model

30 x 30 x 25 inch
Wood, 3d Printing
Mountain Hat with Site Model

30 x 30 x 25 inch
Wood, 3d Printing
Glacier Blanket with Site Model

8 x 28 x 12 inch
Wood, 3d Printing, Resin
Glacier Blanket with Site Model

8 x 28 x 12 inch
Wood, 3d Printing, Resin
DETAIL

Glacier Research Center
Appendix

THESIS FINAL REVIEW

Media Lab

December 17th, 2015
Final Presentation

Media Lab
December 17th, 2015
Final Presentation

Media Lab
December 17th, 2015
Appendix

PROJECTION MODEL

Site Model

8 x 8 x 4 inch
1: 60,000
Projection on the Site Model

Mid Review
Final Review
Rendering Images in the Future
Scenario
Rendering Images in the Future
Scenario
Appendix

DESIGN PROCESS

PLAN TEST
Mountain Hat
Glacier Blanket
Artificial Moraine

Phase 1: Ice sheet melting process.
Phase 2: Artificial moraine becomes more prominent.
Phase 3: Artificial moraine degrades over time.
Phase 4: Artificial moraine eventually disappears.

SCENARIO TEST

Appendix
Appendix

DRAWING

Present and Future

Diagram
October, 2015
Radical Architect

Idea Sketch
September, 2015
Conservative Government

Idea Sketch
September, 2015
Marking the Land

Idea Sketch
September, 2015
Hotel

Idea Sketch
September, 2015
Dam Hotel

Idea Sketch
October, 2015
Data adapted from swisstopo reproduced by Namjoo Kim
Appendix

MAP COLOR TEST

![Map Color Test Image]

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Appendix

THESIS PREPARATION

Spring semester, 2015
BOOK


PAPER & ONLINE


Finger, David, Georg Heinrich, Andreas Gobiet, and Andreas Bauder. “Projections of Future Water Resources and Their Uncertainty in a Glacierized Catchment in the Swiss Alps and the Subsequent Effects on Hydro-


