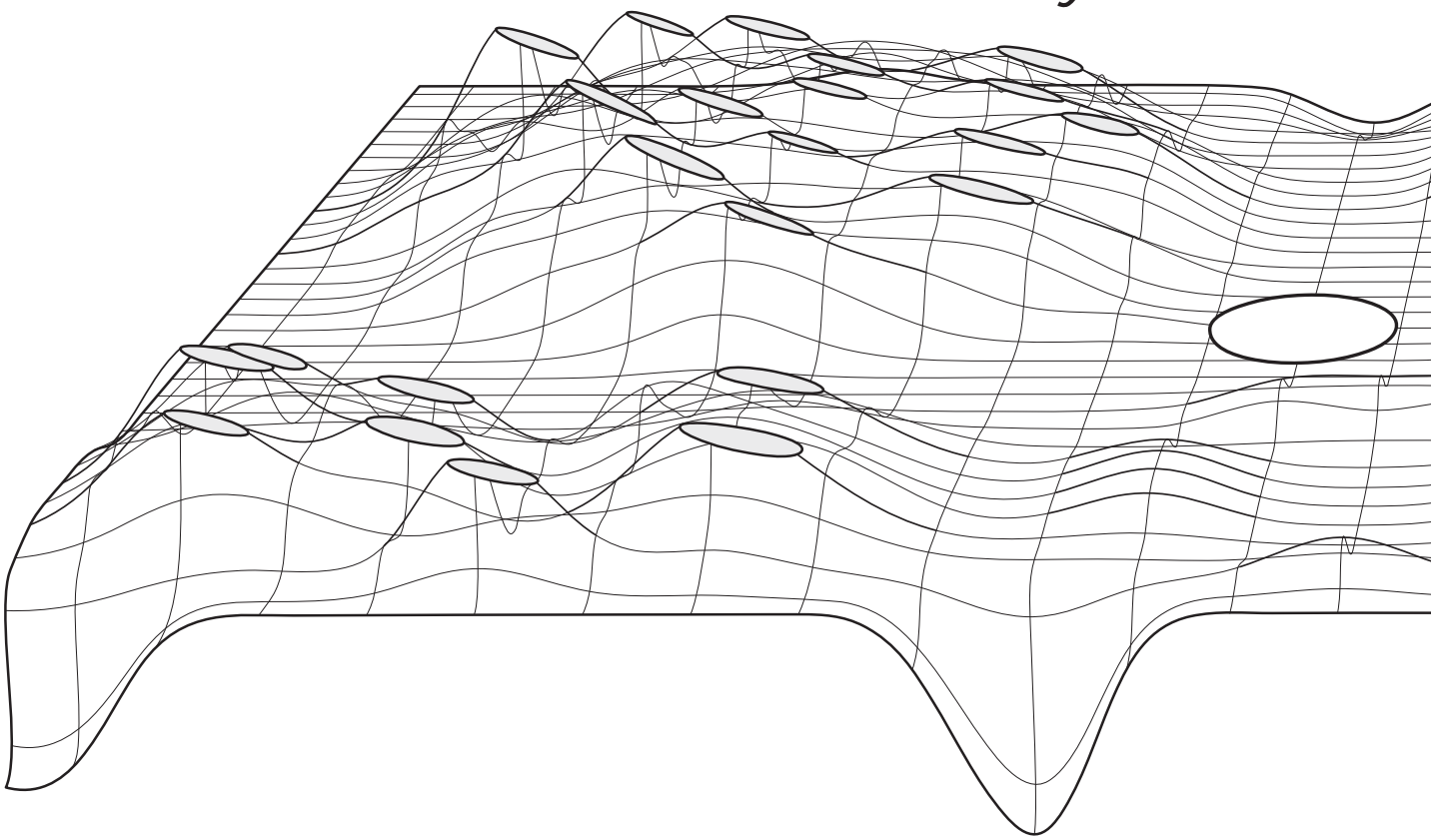
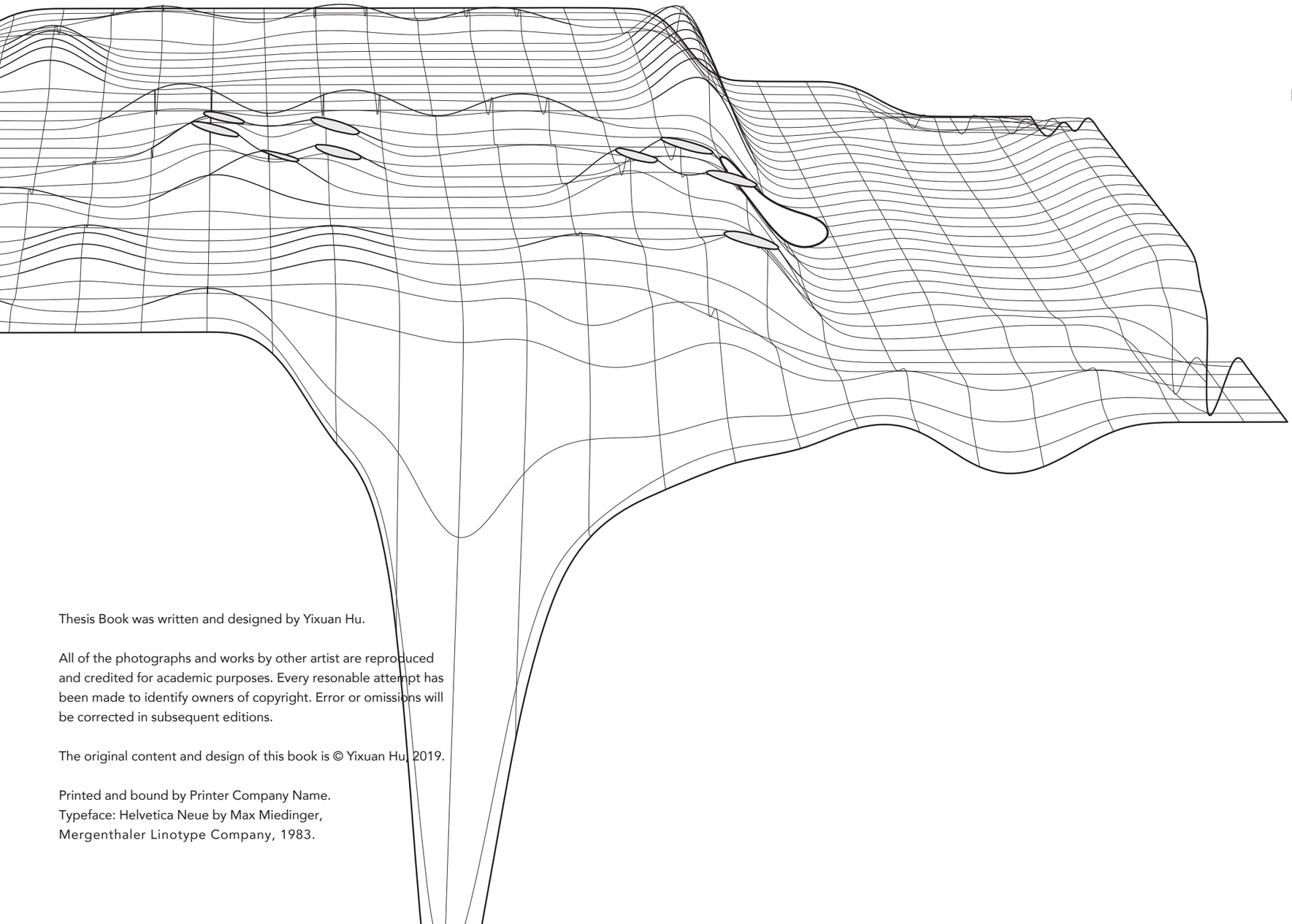
Mountainous City





Mountainous City

YIXUAN HU

MLA Landscape Architecture, RISD

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Providence, Rhode Island.

By Yixuan Hu
05/23/2020

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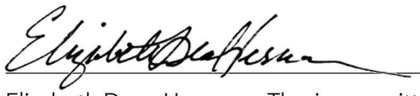


Elizabeth Dean Hermann, Thesis committee

CONTENTS

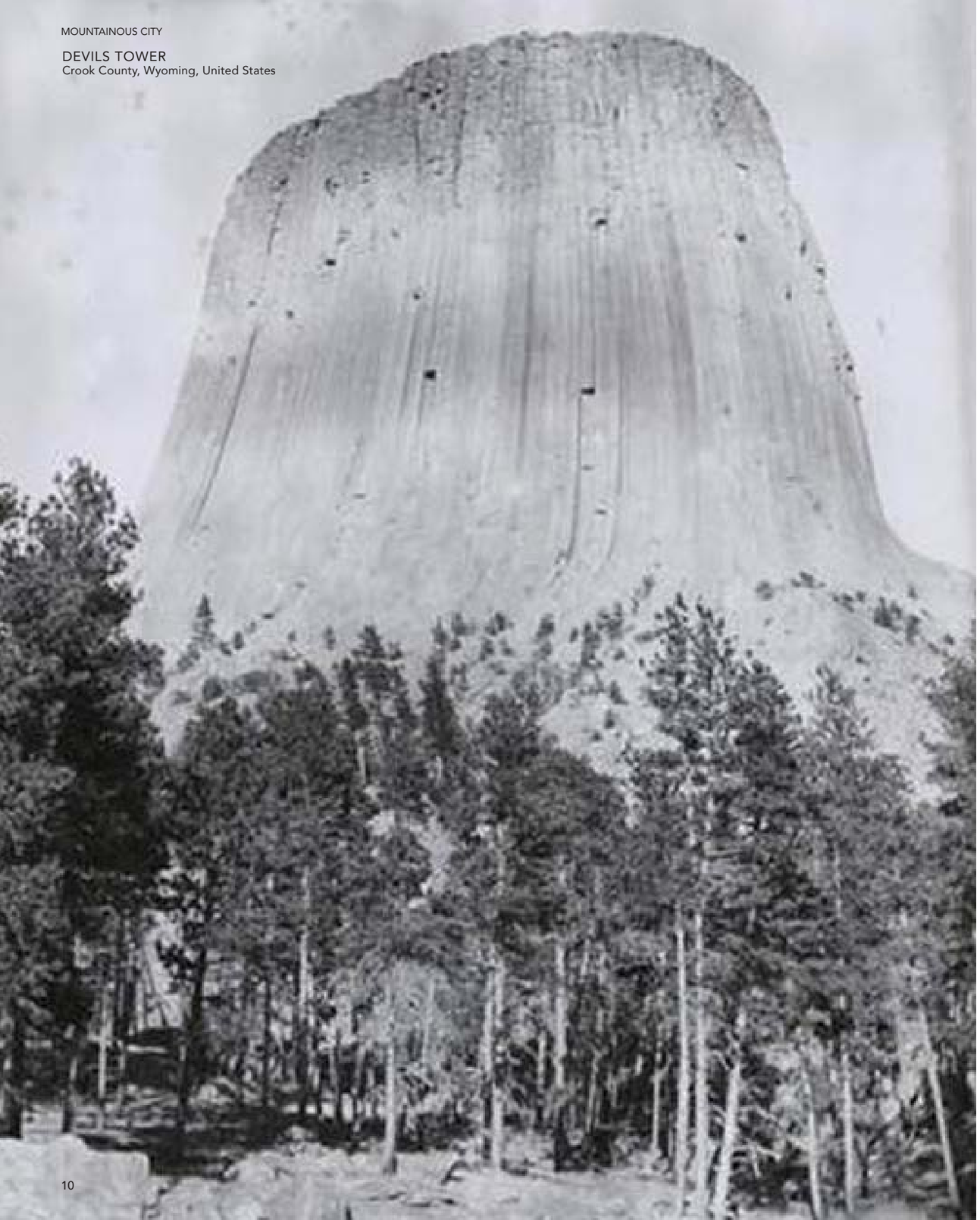
INTRODUCTION

I worship the beauty of *Nature* and am fascinated by the widsom of *Nature* as everything goes and connected by their smartest logic.

We all should be *Change-maker*, having responsibility to timely face the risk of global warming issues and take action to create a positive ecological and environmental impact.

I advocate *Urbanism* while insisting on ecological sustainability and diversity.

I want to propose a new form of *Urban System* basing on the smart way of *Moutain System*.



MOUNTAINOUS CITY

DEVILS TOWER
Crook County, Wyoming, United States

CHAPTER ONE

MOUNTAIN AS A SIGN

"The totemic nature of mountains creates a paradox: their overwhelming size makes them an unavoidable and seemingly understandable part of our image of the earth and yet this very grandness causes them to resist total visibility and, with that, any notion of comprehension."[1] These words reminded me the sense of mountains, the poetic perception of mountains. Why mountains are always so attractive to me? The longer people live away from mountains, the longer people eager to see a mountain. Why mountains are so appealing to people to reach the summit? To some adventurers, they even spend their own life to reach the most dangerous summit. Maybe that's a way of having a conversation to god the mother of nature, or a way to fulfill their belifs. Maybe it's their overwhelming scales compared to us giving a sense of majesty.

Of course, the uniqueness of a mountain is not only of the unreachable height but also the shape of ranges contouring the line to sky. According to different soil condition, precipitation and temperature among each vertical zonation, the eco-systems varied. It's an exceptionally enjoyable and healing mountain environment that the vertical ranges created with diversified fauna and flora.

Depending on different dynamics of mountains, each mountain has its own soul. As mountain settlement is as old as river settlement in human history, people who lived in mountains always can find the best location to build their villages or towns. It's interesting to notice that several cultural differences in one mountain according to their living patterns. People who not live in mountains would have more interests in reaching to the summit.

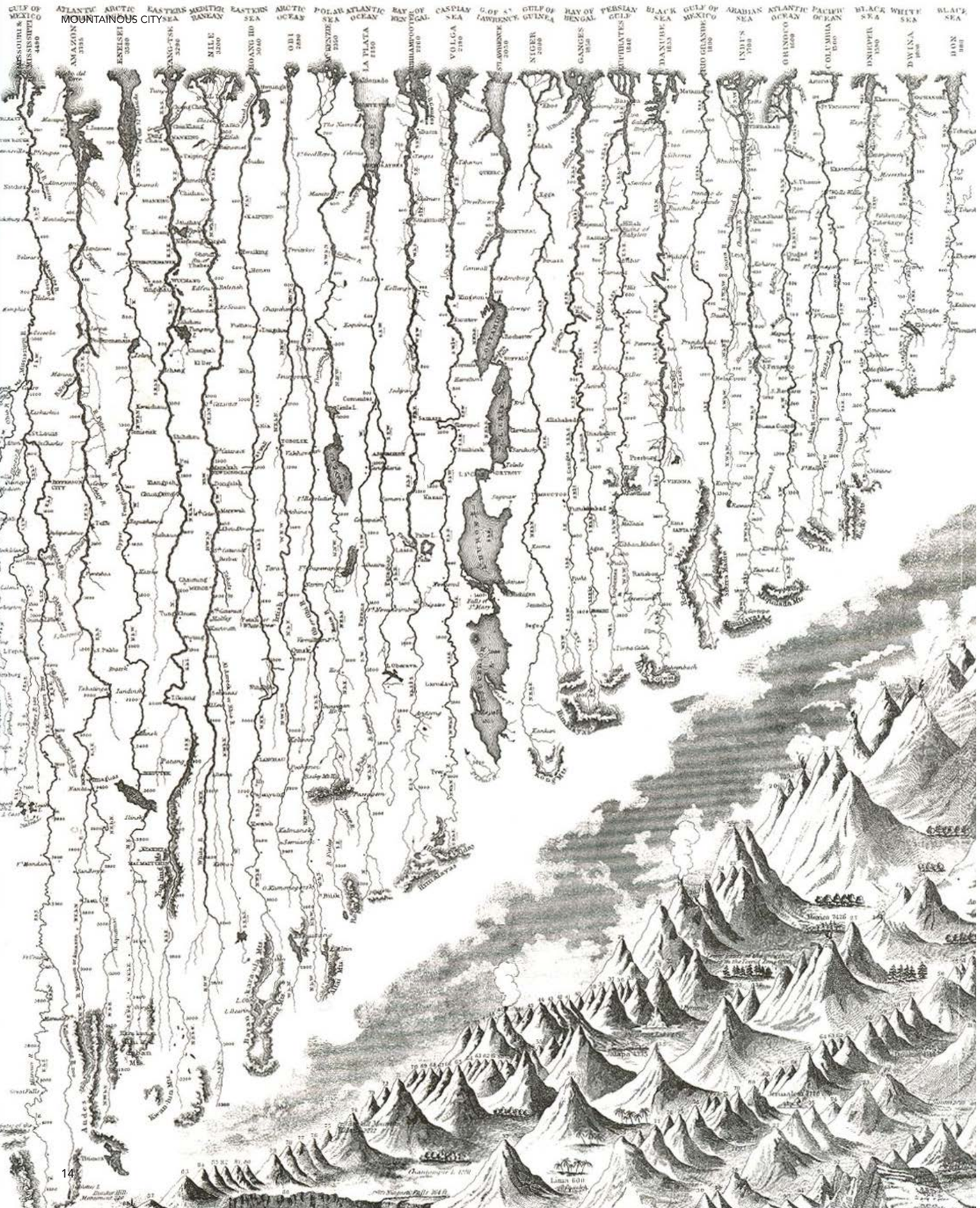
Devils Tower is located in the Bear Lodge Ranger District of the Black Hills, Wyoming, United States. It was the first national monument in US, composed of igneous rock, with typical column-like surface. "The igneous material that forms the Tower is a phonolite porphyry intruded about 40.5 million years ago, a light to dark-gray or greenish-gray igneous rock with conspicuous crystals of white feldspar. As the magma cooled, hexagonal (and sometimes 4-, 5-, and 7-sided) columns formed, each about six feet in diameter. As the rock continued to cool, the vertical columns shrank in width and cracks began to occur at 120-degree angles, generally forming compact 6-sided columns.[2]" The special column-like

1 "Harvard University Graduate School of Design." "On Mountains" Panel Discussion and Exhibition Opening Reception - Harvard Graduate School of Design, https://www.gsd.harvard.edu/event/on-mountains-panel-and-exhibition-opening/.

2 "Devils Tower." Wikipedia, Wikimedia Foundation, 4 Mar. 2020, en.wikipedia.org/wiki/Devils_Tower.

HIMALAYA RANGES
The Himalayas, or Himalaya, is a mountain range in Asia separating the plains of the Indian subcontinent from the Tibetan Plateau. The range has many of Earth's highest peaks, including the highest, Mount Everest.

landscape attracted hundreds of climbers to scale the sheer rock wall each summer.
Himalaya range are famous for its highest mountains in the world. Its continuously connected ranges cross more than 200 to 300 kilometer in north-south direction and more than 2400 kilometers in east-west direction. If you flight through the nearby airline, the long majestic mountain peaks are parallel to your sight view. There are 8 mountains more than 8000 meters high, and 38 mountains more than 7000 meters high. It's the mother of glaciers in this region where exists more than 17000 modern glaciers. It's the proof of plate tectonics and mother of multiple river systems like India river, Ganges river and Brahmaputra River. Among all the mountains in Himalaya range, mount Everest is the most famous one. Every year, mountain climbers plan in groups to challenge mount Everest. Nowadays, climbing the mount Everest has developed as a climbing culture------in one way, an icon of the bravest climber; in another way, an icon of rich which means many rich people can spend money to reach mount Everest for achieving such height majesty.



←

ALEXANDER VON HUMBOLDT

Humboldt's Naturgemälde, also known as the Chimborazo Map, is his depiction of the volcanoes Chimborazo and Cotopaxi in cross section, with detailed information about plant geography. The illustration was published in The Geography of Plants, 1807, in a large format (54 cm x 84 cm).

MEASURING A MOUNTAIN

Alexander von Humboldt was a Prussian polymath, geographer, naturalist, explorer, and proponent of Romantic philosophy and science. [1] He is the first person to map mountains in this vertical way–––vegetation zones in abstracted vertical way and river systems aligned to each mountain range. The way of measuring a mountain is vivid, innovative and understandable.

There are rare people intending to measure a mountain in a poetic way. To a landscape architect, the way of measuring a mountain is the same as site measurement and research–––site dimension, environmental condition, history, culture, etc. However, the scale and dimension of a mountain is far more complicated, having larger mass of volume, more complex shapes in topography change as well as vegetation distribution and micro-climate variance. Every mountain is unique. Interrelated factors influence and reshape mountain landscapes in different scales–––from inner substrate to outer climate influences. The motions of mountain geology influence the types of landforms while the glaciation process would reshape and change such landforms. The glaciation process would influence the river systems thus the conditions of soil moisture affects the diversity of vegetation.

1 "Alexander Von Humboldt." Wikipedia, Wikimedia Foundation, 3 Apr. 2020, en.wikipedia.org/wiki/Alexander_von_Humboldt.

How does glacier work and influence mountain landscapes?

What's the glaciation process?
What's the spatial relations in glaciated mountain?

What's the distribution of vegetation in Mount Gongga?

What's the vertical zonation of vegetation in Mount Gongga?
How does ecotone affect each zonation of vegetation?

How can the flow of urban system work in a different and innovative way by using mountain system?

What's the horizontal relation of zones in urban area?
What's the vertical relation of zones in urban area?

THESIS STATEMENT

My thesis studies how glaciation and vegetation systems define mountain landscapes, and asks how these and their modes of relation and zonation might provide a model for more sustainable and fully adaptable structures to support urbanism. I will propose a new urban matrix developed from the metaphor of a mountain system, focusing on efficient urban ecosystems and the dynamics of human activities.

MOUNT GONGGA
Luding county, Sichuan province, China

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CHAPTER TWO

MOUNT GONGGA

Mount Gongga is situated in eastern edge of Tibetan Plateau, Luding County, Sichuan province, China. Between Liqi River and Dadu River, it belongs to Daxue Shan mountain range, and is the middle section of Hengduan mountains. With the peak of 7556m, it enjoys the fame of “king of mountain” in Sichuan province and eastermost peak in the world.

In 1877-80, first western explorers find out Mount Gongga and miscalcualted it as the tallest mountain in the world. However, National Geographic Society quickly disproved such claim. It does stand head above every other peaks in that region, surrounded by gorges and its prominence from some of the deep, which is easily to understand why some might have mis-calculated its height.[1]

It is hard to catch a unhindered view of Mount Gongga which usually carries its own weather system. Gongga usually wears a shroud of clouds while the rest of sky is almost cloudless.

There are more than ten plateau lakes, including Mugecuo, Wuxuhai, Renzhonghai and Bawanghai. Some of them are at the foot of glaciers and some are surrounded by forests, still keeping their original natural features. There also have some hot springs, Hailuo valley Hot Spring and Kangding Erqiao Hot Spring are the most famous ones. Besides, several tibetan buddhism lamaseries are in these scenic area, such as Gongga Lamasery.[2]

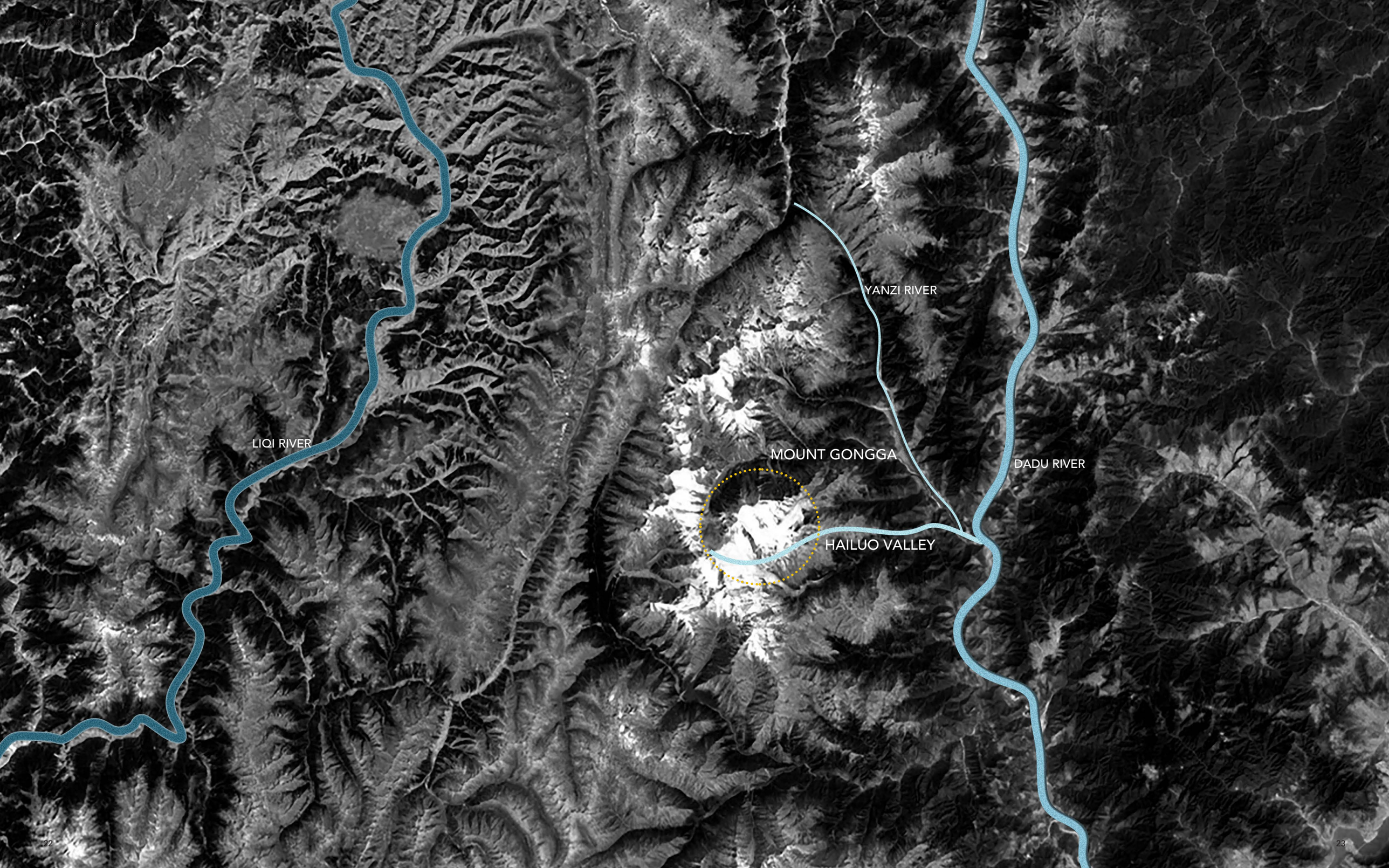
1 “Minya Konka (Mount Gongga).” Tibetpedia, 23 Feb. 2018, tibetpedia.com/kham-tibet/minya-konka/.
2 “Mount Gongga (Minya Konka).” Mount Gongga in Garze Sichuan, Minya Konka, www.travelchinaguide.com/cityguides/sichuan/garze/mount-gongga.htm.

MOUNTAINOUS CITY

CHINA

MOUNT GONGGA

HIMALAYA RANGES


YANZI RIVER
LIQI RIVER
MOUNT GONGGA
DADU RIVER
HAILUO VALLEY

I GLACIATED MOUNTAIN

ALPINE GLACIATION PROCESS

Alpine glaciers will form on mountainsides and move downward through valleys, creating or deepening valleys by pushing dirt, soil, or any other materials in their ways.

" Glacial ice is heavily loaded with accumulated rock and soil debris known as glacial drift. Glacial drift refers to all types of debris transported by glacial ice, without any sorting or stratification. Rocks and soil textures of all sizes are tranported. The crushing and grinding rock materials creates very fine, uniformm silt-sized particles (rock flour) which have angular, unweathered characteristics. As the ice advanced, then receded and melted, all of those materials were eventually dumped or scattered or sometimes stratified to create a variety of landforms.[1]"

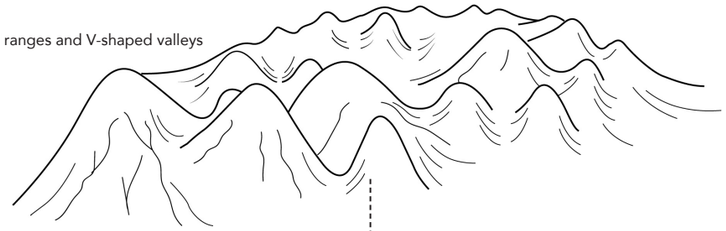
As one of the places where maritime glaciers originate, Mount Gongga is best well-known for its 159 glaciers, covering more than 151 square miles. Hailuo Valley Glacier No.1, Kunba Glacier, Bawang Glacier, Yanzigou Glacier and Mizigou Glacier are the most famous ones, with 492 to 984 feet thick ice. Hailuo Valley Glacier No.1 is the largest one, about 4 miles long and 0.25 to 0.43 miles wide, which is believed to have formed 1,600 years ago.

The glacier waterfall in Mount Gongga is active all year round, where ice calving and souring in different scales at all time. An avalanche of ice will cause millions of cubic meters of ice collapsing. This is a magnificent sight, when it happens, with ice cubes and snowflakes dancing in the air and the roaring sound filling whole valley.[2]

1 Way, Douglas S. Terrain Analysis: a Guide to Site Selection Using Aerial Photographic Interpretation. Dowden, Hutchinson & Ross, 1978.

2 "Mount Gongga (Minya Konka)." Mount Gongga in Garze Sichuan, Minya Konka, www.travelchinaguide.com/cityguides/sichuan/garze/mount-gongga.htm.

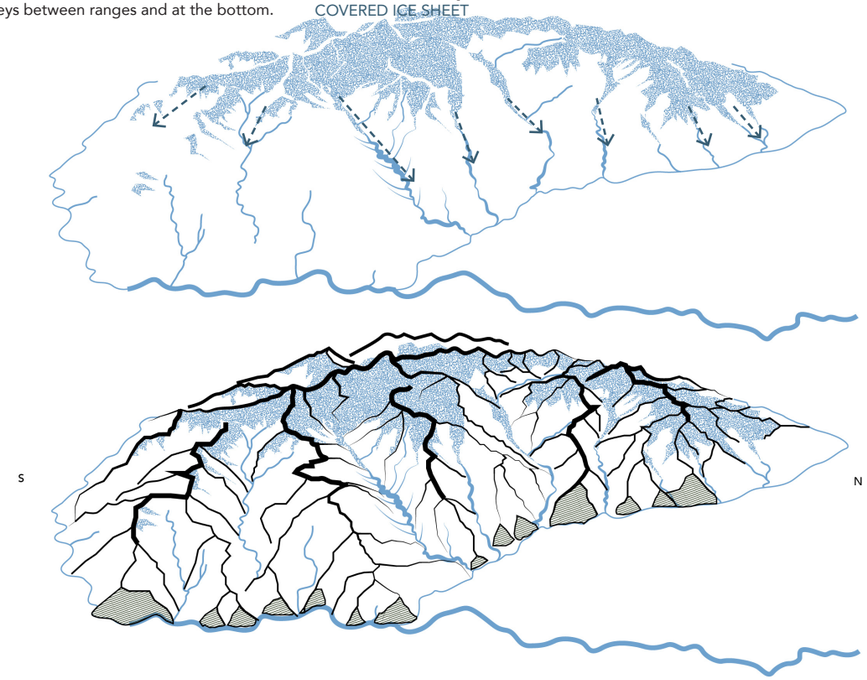
BEFORE GLACIATION
the mountain has rounded ranges and V-shaped valleys



AFTER GLACIATION
the glacier erosive process carves new shape of ranges, making it sharp, forming acretes, cirques, devides and u-shaped valleys between ranges and at the bottom.

GLACIAL EROSIVE PROCESS

COVERED ICE SHEET



GLACIER MOVEMENT

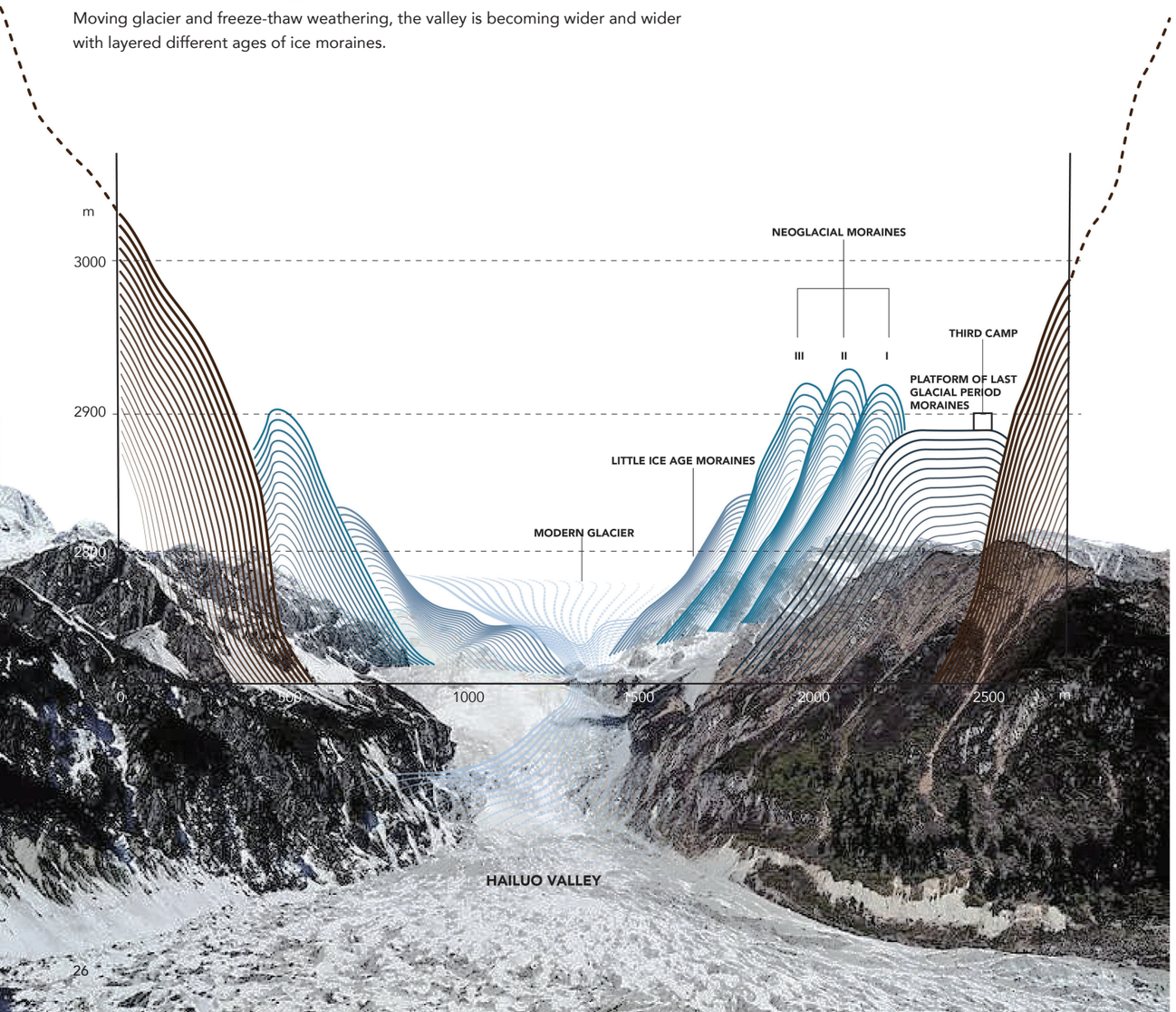
Mount Gongga is covered by large amount of glacier for thousands of centuries. According to geological study, the oldest glacier in Mount Gongga is from the quaternary ice age. The diagram below shows the original glacial erosion of Hailuo Valley at the top. It reveals the shape of layered glacier overlaying each other——forming the u-shaped valley deeper than its v-shaped period.

Most of world's mountain areas are associated with alpine glaciation. The valley glacier is similar to stream tributaries which flow towards down hills within its gravity——carving and scouring rocks, creating steep valleys and jagged ridgelines. The flow of glacier continue moving until reaches the speed of melting, known as ablation. When glacier ice melts, the glaciated topography is exposed and exhibits such features as cirques, aretes, u-shaped valleys. hanging valleys, and moraines.[1]

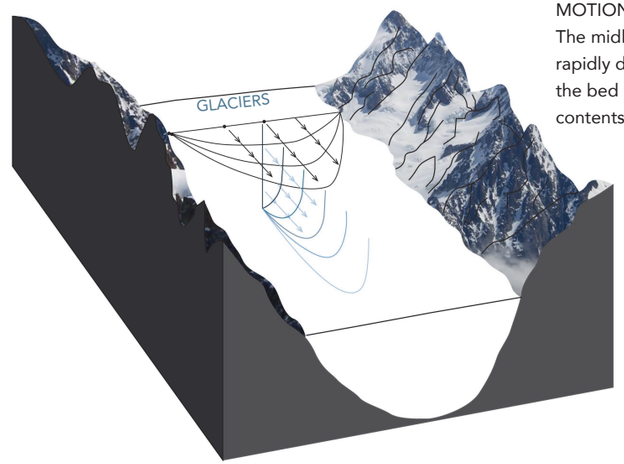
1 Way, Douglas S. Terrain Analysis: a Guide to Site Selection Using Aerial Photographic Interpretation. Dowden, Hutchinson & Ross, 1978.

BIRTH OF HAILUO VALLEY

Moving glacier and freeze-thaw weathering, the valley is becoming wider and wider with layered different ages of ice moraines.



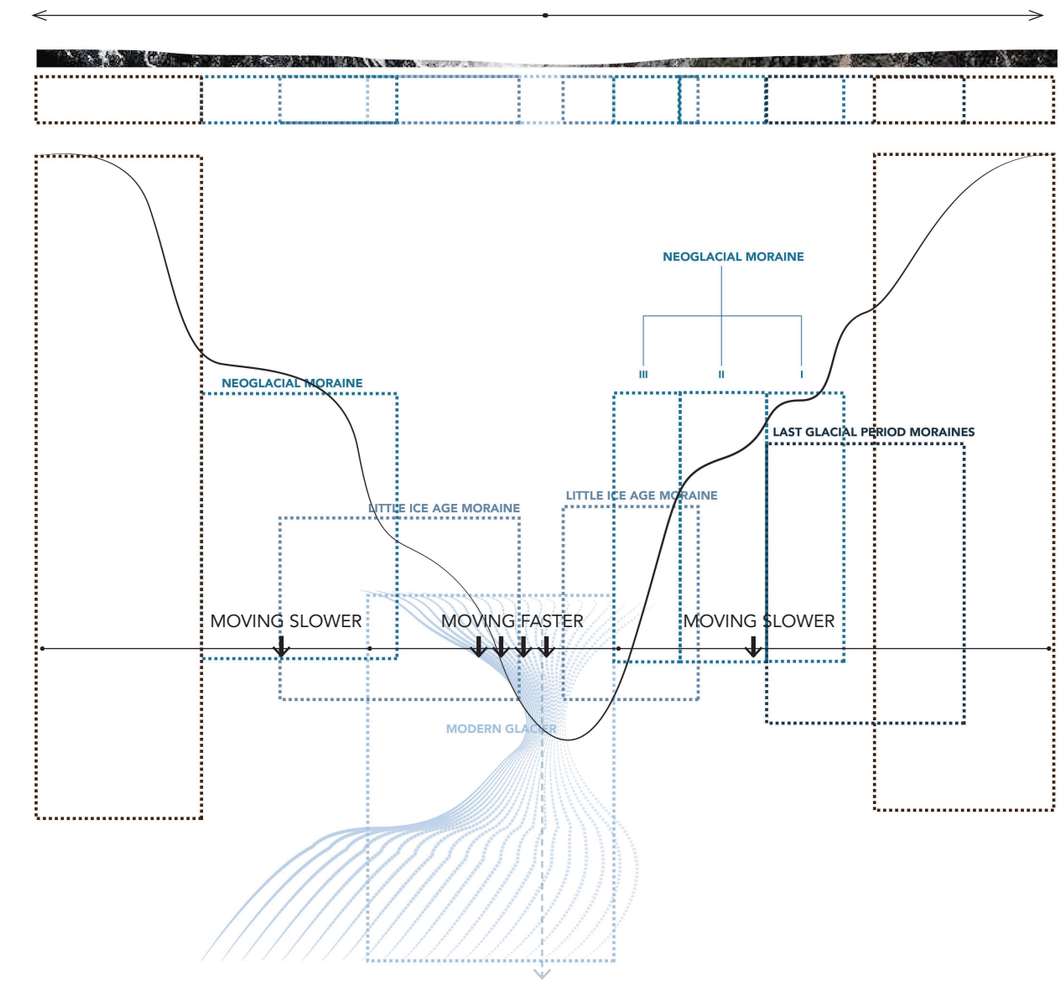
HORIZONTALLY LAYERED ZONE



MOTION OF GLACIER ICE

The midline of ice surface moves the most rapidly during glacier movement. Ice near the bed moves the slowest where the ice contents bedrocks and sediments.

TYPOLOGY OF HORIZONTAL LAYERES



Arêtes

Head wall

Cirques

TYPES OF ALPINE GLACIATION

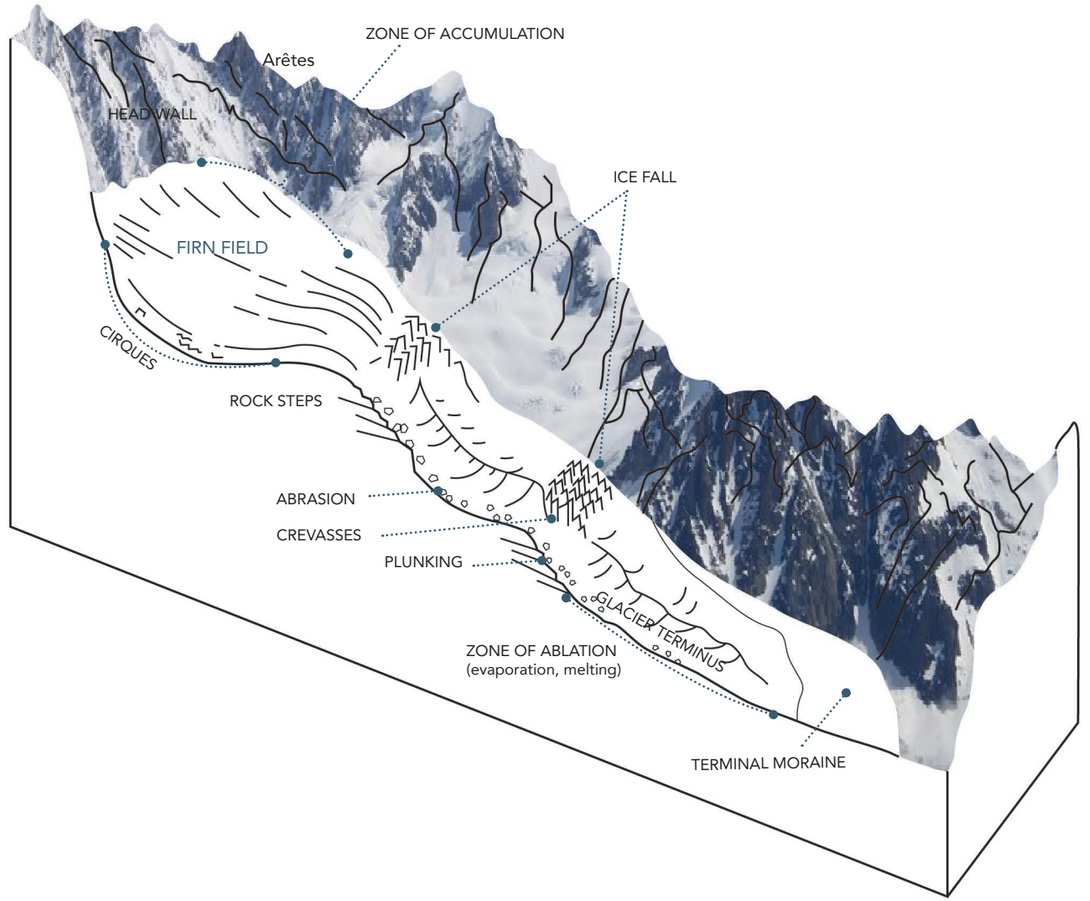
HOW DID GLACIERS CHANGE THE LANDSCAPE?

The glacier occupies a sloping valley between steep rock walls. Snow collects at the upper end in a bowl-shaped depression called ***Cirque.***

The upper end lies in a zone of accumulation. Layers of snow that are compacting and recrystallizing are called ***Firn***. Glacier ice flows downvalley out of the cirque, abrading and plunking the bedrock.

Arêtes are jagged, narrow ridges created where the back walls of two glaciers meet, eroding the ridge on both sides.

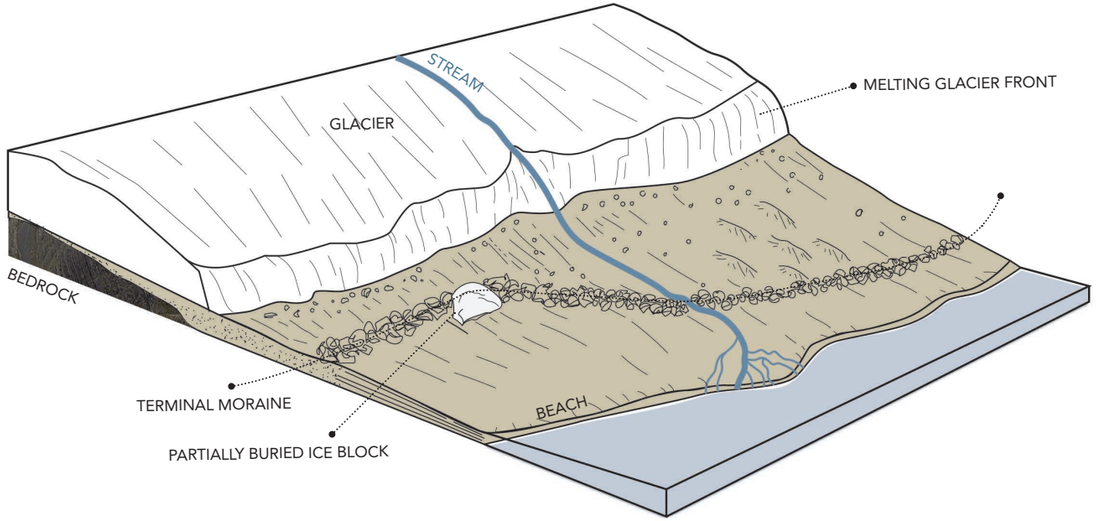
U-shaped valley was created by glaciers grinding down the rock on both the sides and bottom of the area where they are travelling. The result is making it large and wide.



TYPES OF GLACIAL DEPOSITS

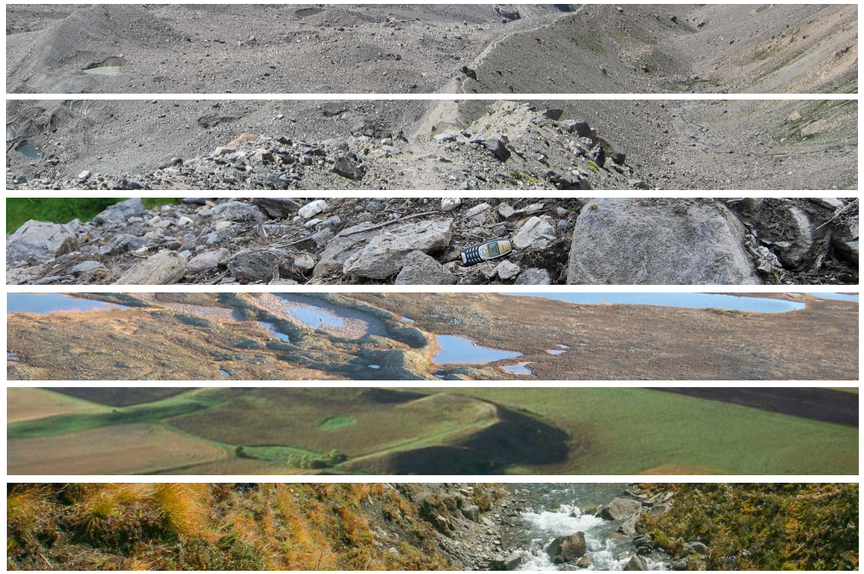
IN THE ZONE OF ABLATION
The lower part of glacier lies in the Zone of ablation. Here, the ice thins as it evaporates and melts, losing its plasticity. It may develop deeper crevasses. The glacier deposits rock debris in the terminus as it melts.

When glaciers move, they tend to push large piles of unsorted sediment out in front of them, just like a bulldozer pushing a pile of dirt. When the glaciers melt, they leave huge piles of sediment (moraines) behind. The terminal moraine marks the farthest that a glacier traveled before melting.



GLACIAL TILL DEPOSITS

TILL PLAIN / GROUND MORAINE / MORAINE / DRUMLIN
When glaciers retreat, they often deposit large mounds of till: gravel, small rocks, sand, and mud. It is made from the rock and soil that was ground up beneath the glacier as it moved.



GLACIOFLUVIAL DEPOSITS

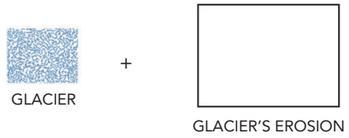
ESKERS / KAME / KAME TERRACE / OUTWASH / VALLEY TRAIN

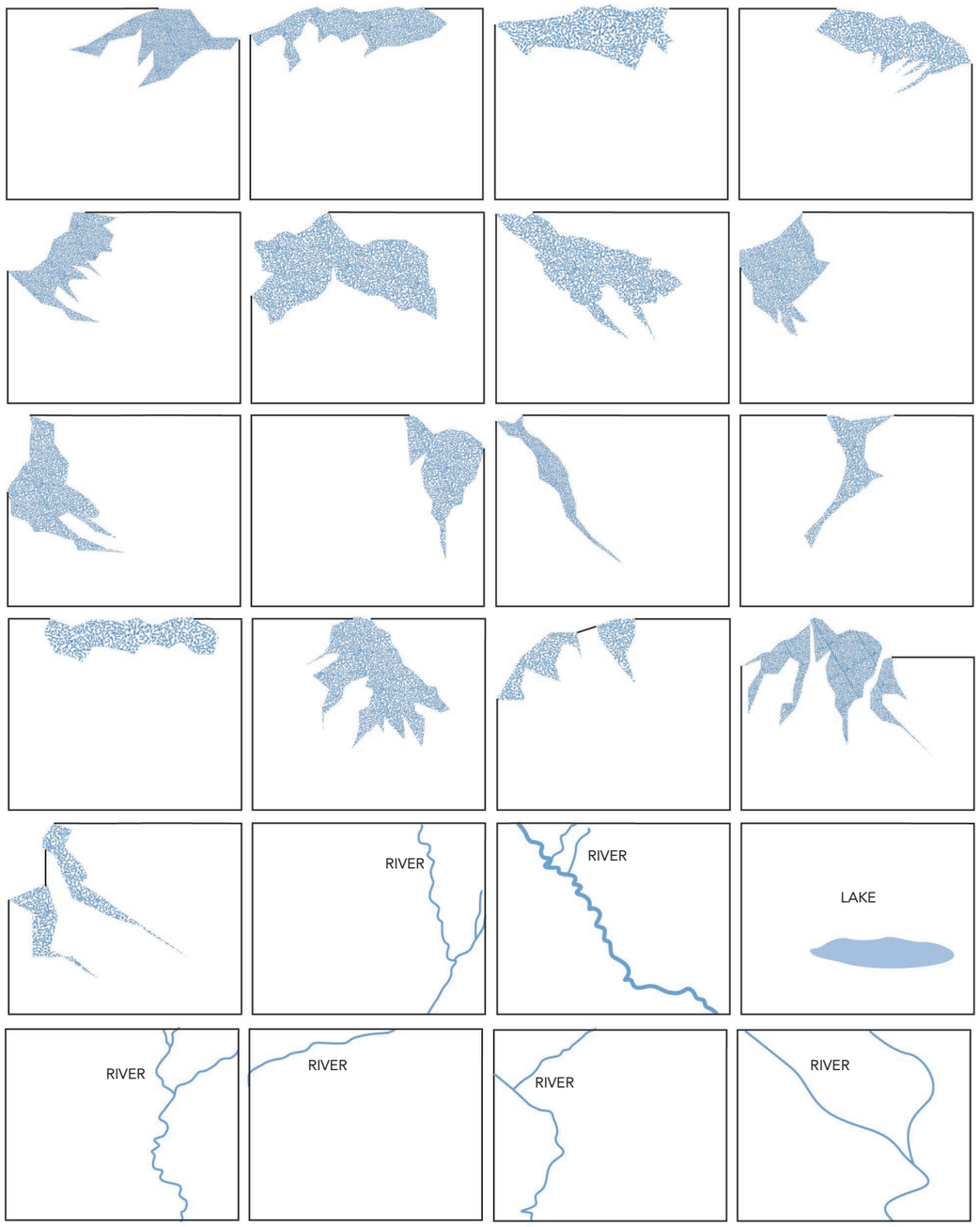
GLACIOLACUSTRINE DEPOSITS

LAKE BED
(the lake is often a temporary formation, formed by ice dams in valley or between ice front and moraines or high ground.)
BEACH RIDGE
(formed on shorelines of lake by the wave actions)

GLACIAL PATCHES FROM MOUNT GONGGA

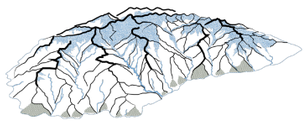
Patches are the basic unit of the landscape that changes and fluctuates, a process called patch dynamics. Patches of glacier parts represent the carving and scouring area of glacier's deposits.

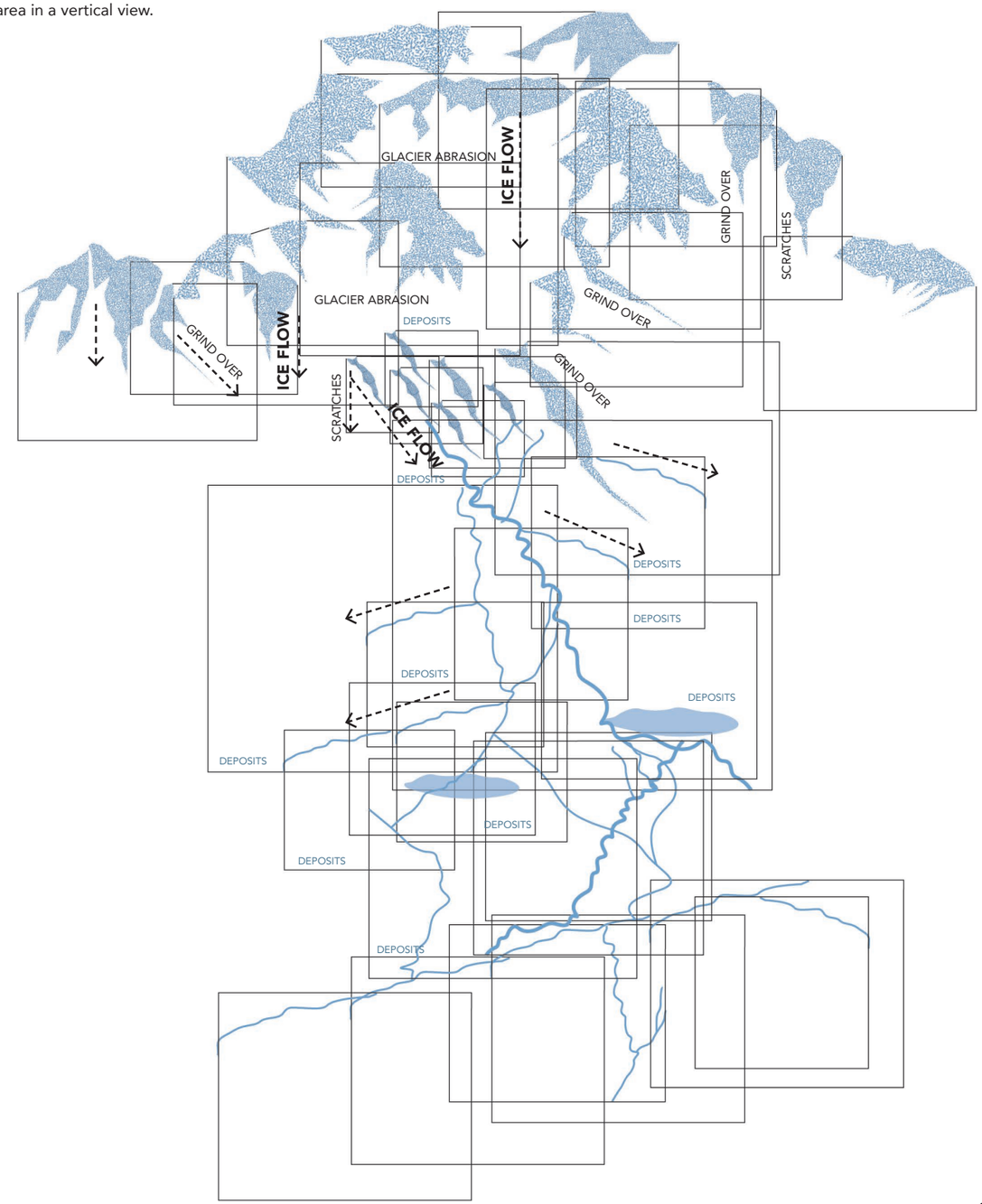




VERTICAL GLACIATION SYSTEM OF MOUNT GONGGA

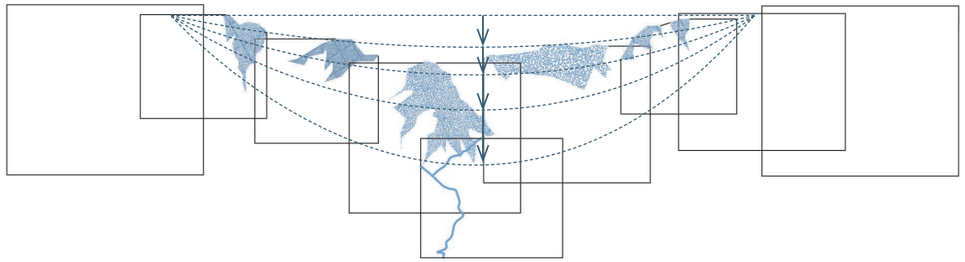
Using the isolated fragments of glaciers, I create a conceptual vertical pattern that follows the rules of glacier states in Mount Gongga. The rectangular shape represents the glacier's deposits whose visible and invisible erosive influence, where glacier might change in the mountain, outlining a conceptual area in a vertical view.



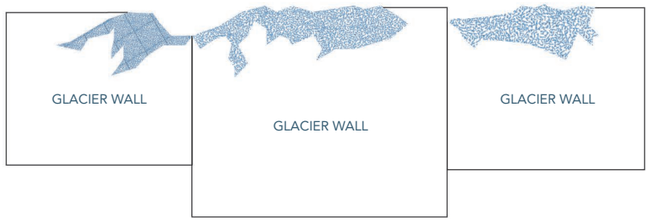


DIAGRAMS OF GLACIAL PATCHES

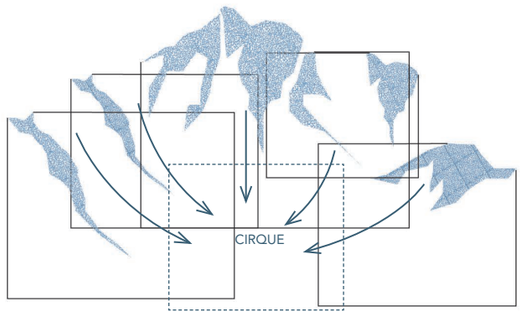
MOTION OF GLACIERS



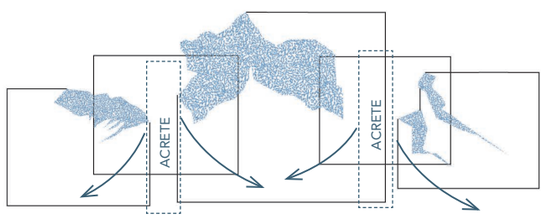
GLACIER WALL



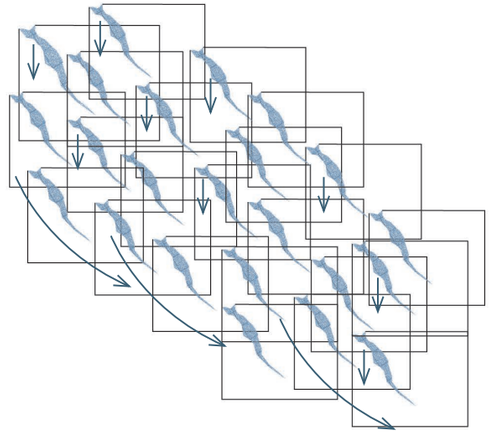
CIRQUE



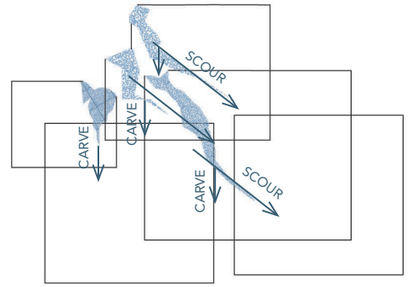
ACRETE



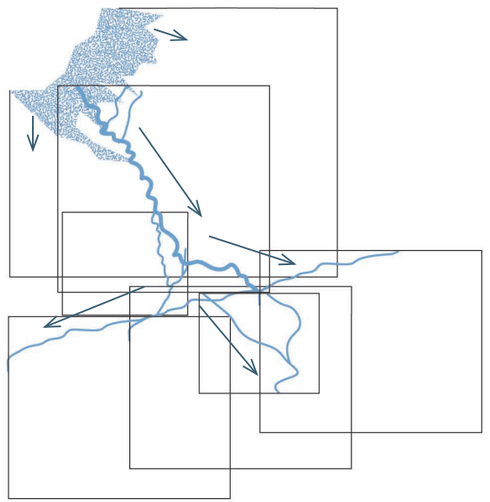
GLACIER FALL



GLACIER ABRASION

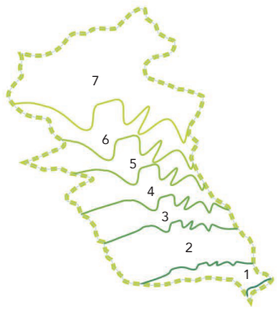


GLACIER ABLATION



EASTSIDE OF MOUNT GONGGA

VERTICAL VEGETATION ZONES



7 FREE OF VEGETATION
6 ALPINE GRASSES
5 ALPINE MEADOWS
4 SUBALPINE SHRUBS
3 CONIFEROUS FORESTS
2 CONIFEROUS AND BROAD-LEAVED FORESTS
1(3) EVERGREEN AND DECIDUOUS BROAD-LEAVED FORESTS
1(2) EVERGREEN BROAD-LEAVED FORESTS
1(1) ARID SHRUBS AND MEADOWS

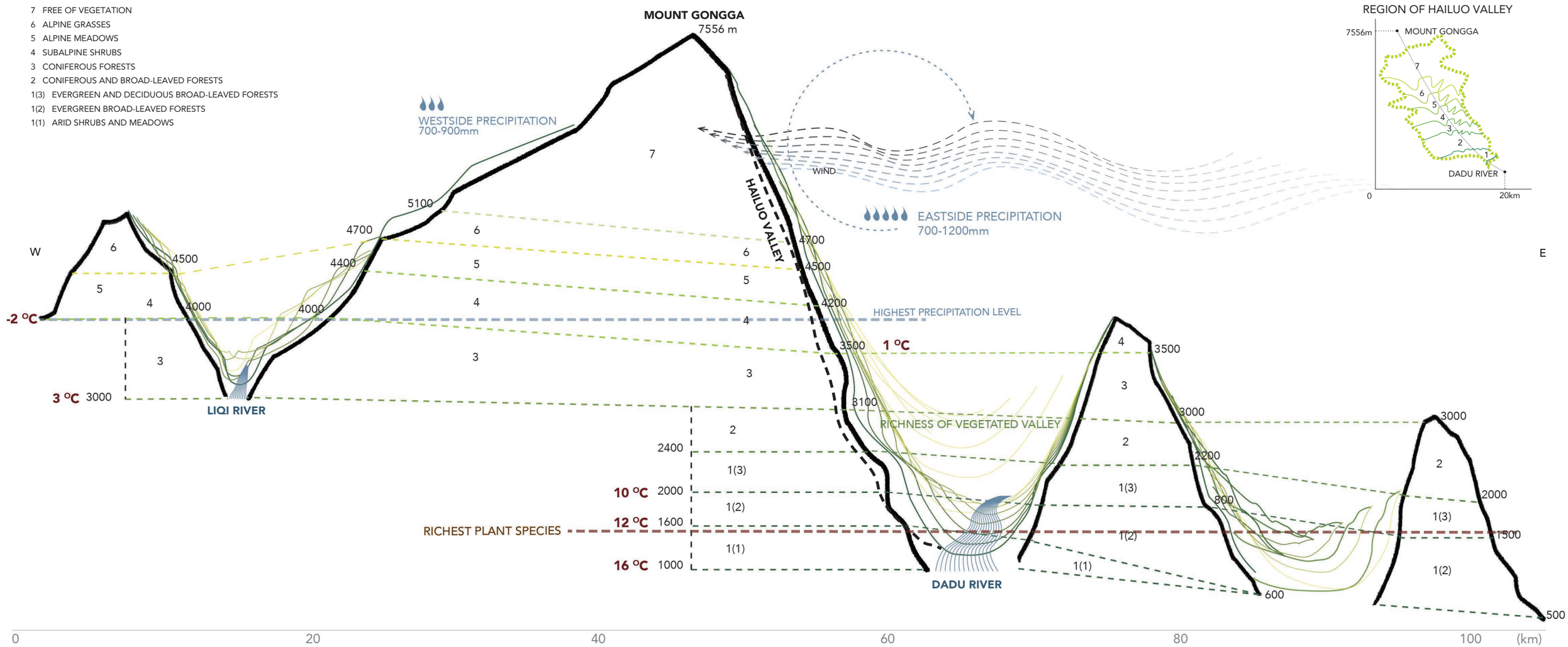
MOUNTAIN RANGE
RIVER / STREAM
U-SHAPED VALLEY
GLACIER

MOUNT GONGGA
YANZI VALLEY
HAILUO VALLEY
MOZI VALLEY
DA VALLEY
LIQI RIVER
MOXI RIVER
MOXI RIVER
EASTSIDE PRECIPITATION
Z00-1200mm
EAST-WIND
DADU RIVER

II VEGETATED MOUNTAIN

Mount Gongga is famous for its richness of vegetation zonation. There are 7 vertical vegetation zones. Prevailing wind makes more precitipation from east side enriching the diversity of vegetation.

7 FREE OF VEGETATION
6 ALPINE GRASSES
5 ALPINE MEADOWS
4 SUBALPINE SHRUBS
3 CONIFEROUS FORESTS
2 CONIFEROUS AND BROAD-LEAVED FORESTS
1(3) EVERGREEN AND DECIDUOUS BROAD-LEAVED FORESTS
1(2) EVERGREEN BROAD-LEAVED FORESTS
1(1) ARID SHRUBS AND MEADOWS



7 >4700m

7. FREE OF VEGETATION

6 4500-4700m

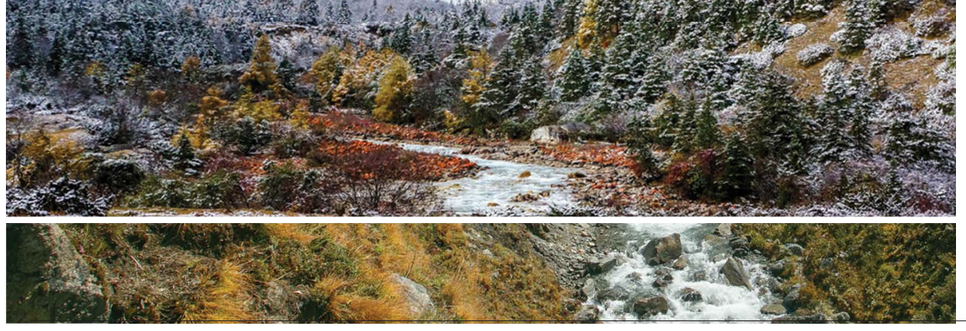
6. ALPINE GRASSES

HERB: Saussurea medusa, Saussurea laniceps, Saussurea quercifolia W. W. Smith, Eriophyton wallichii

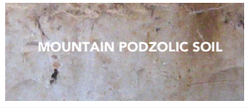
5 4200-4500m

5. ALPINE MEADOWS

SHRUB: Azalea, Alpine spirea, Dasiphora fruticosa, P.Glabra Lodd.
HERB: Poa Annua, Potentilla griffithii, Kobresia myosuroides, Anaphalis sinica Hance, Polygonum macrophyllum, Meconopsis Vig., Anemone coronaria, Garden Nasturtium, Allium atrosanguineum, Primula malacoides, Lamiophlomis rotata, Sedum



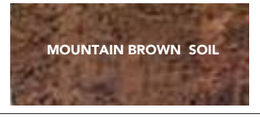
4 3500-4200m



4. SUBALPINE SHRUBS

TREE: Fir (only)
SHRUB
HERB
MOSS: Abietinella abietina, Actinothuidium hookeri, Polytichum commune Hedw.

3 3100-3500m



3. CONIFEROUS FORESTS

TREE: Hemlock, Dumosa, Spruce, Picea brachytyla, Redwood, Betula utilis, Aceraceae,
SHRUB: Mountain ash, Azalea, Lonicera japonica,
HERB: Abietinella abietina, Polytrichum commune, Usnea longissima Ach
MOSS

2 2400-3100m

2. CONIFEROUS AND BROAD-LEAVED FORESTS

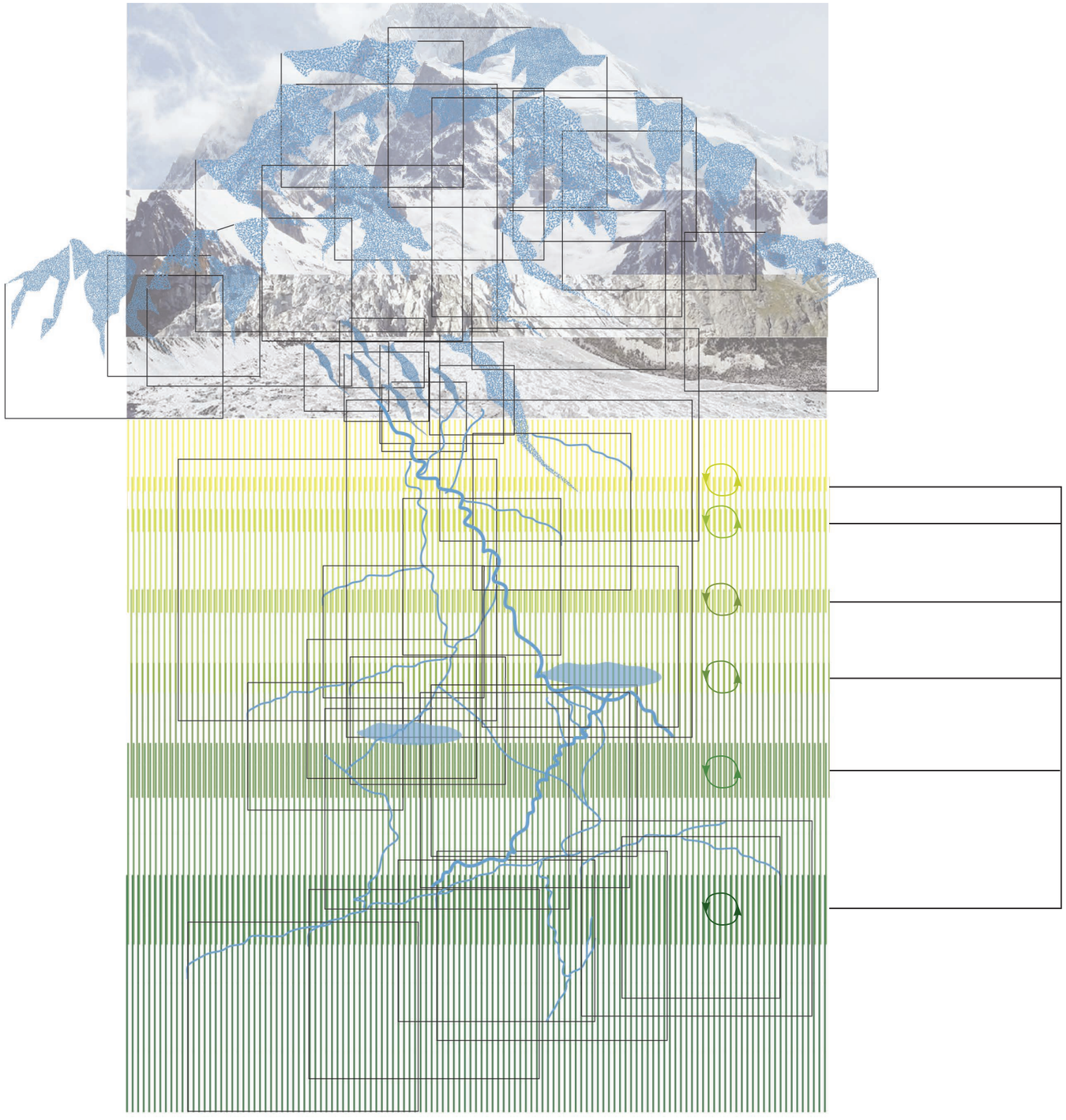
TREE: Stone oak, Cercidiphyllum japonicum, Euptelea pleiospermum, Diptero-nia sinensis, Betula utilis, Populus lasiocarpa
SHRUB: Sinarundinaria chungii, Mountain ash, Toxicodendron succedaneum, Azalea,
HERB: Debregeasia edulis, Cyrtomium fortunei, Gastrodia elata
MOSS

1 <2400m

1. EVERGREEN AND DECIDUOUS BROAD-LEAVED FORESTS

TREE: Machilus nanmu II, Phoebe faberi, Pinus yunnanensis forest, Oriental white oak, Litsea
SHRUB: Azalea, Rosaceae, Lespedeza cuneata, Pistacia weinmannifolia, mottled bamboo, Sinarundinaria chungii
HERB: Debregeasia edulis, Hispid arthraxon, Remote lemongrass herb, Green bristlegrass, Heteropogon contortus, Imperata cylindrica,
MOSS, LICHEN

ZONATION OF VEGETATION IN MOUNTAIN



ECOTONES

ENERGY / SOURCE TRADE

We use the definition of ecotone as proposed by Hollandet al. (1991), i.e., “ecotones are zones of transition between adjacent ecological systems, having a set of characteristics uniquely defined by space and time scale and by the strength of interactions between adjacent ecological systems”, from Ecotones in Vegetation Ecology: methodologies and definitions revisited.

The border of two layers.

It creates and provides corridors for interaction and intervention between two layers.

It is represented as the most dynamic and reordered space between two layers.

It is like a public gathering space between two layers.

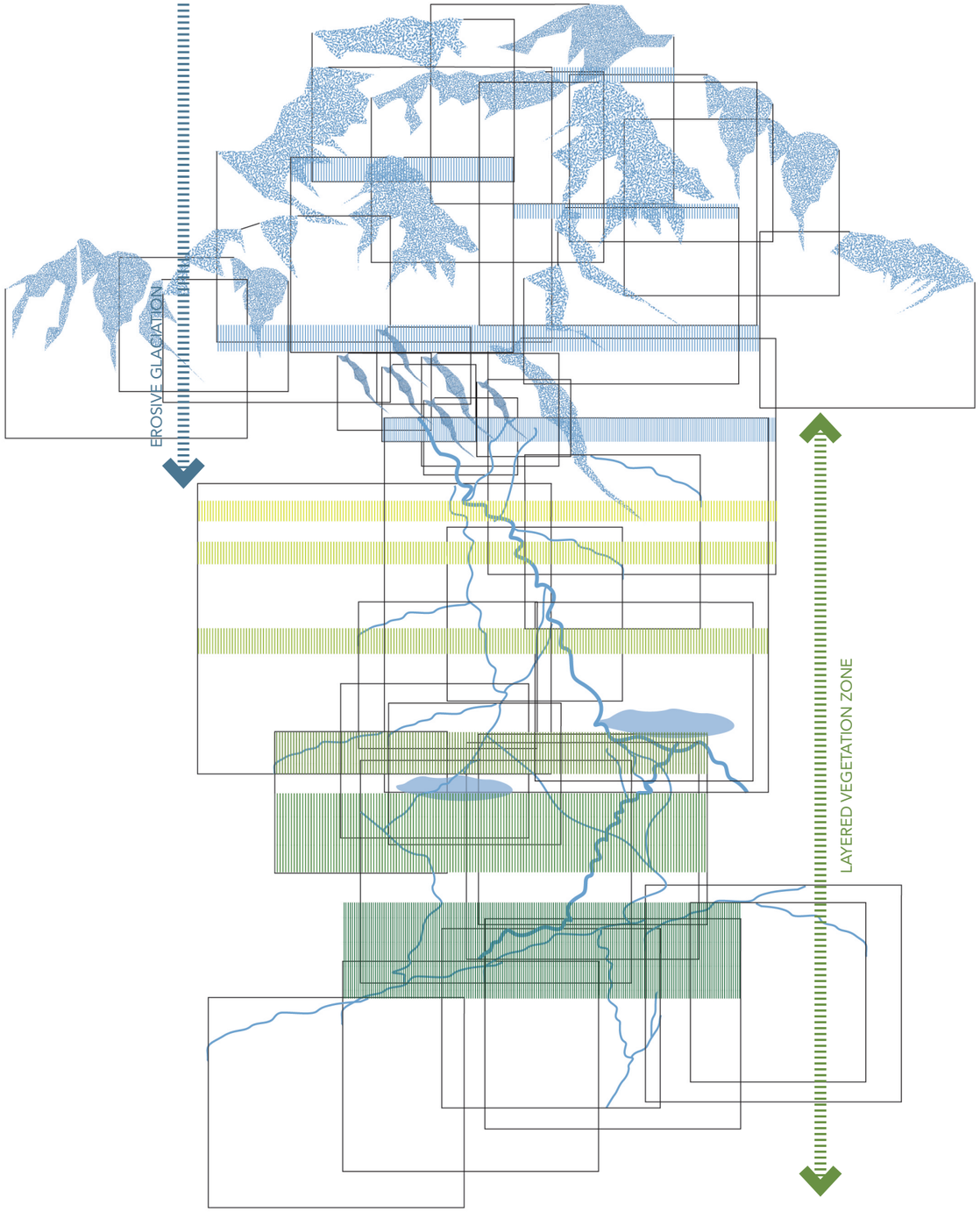
STRUCTURE OF ZONATION

Vertical zonation of mountains varied by their physical environment conditions, including the height of zones, the temperature, precipitation, sunlight, types of soil, they provide and limit sorts of vegetation in one certain zonation.

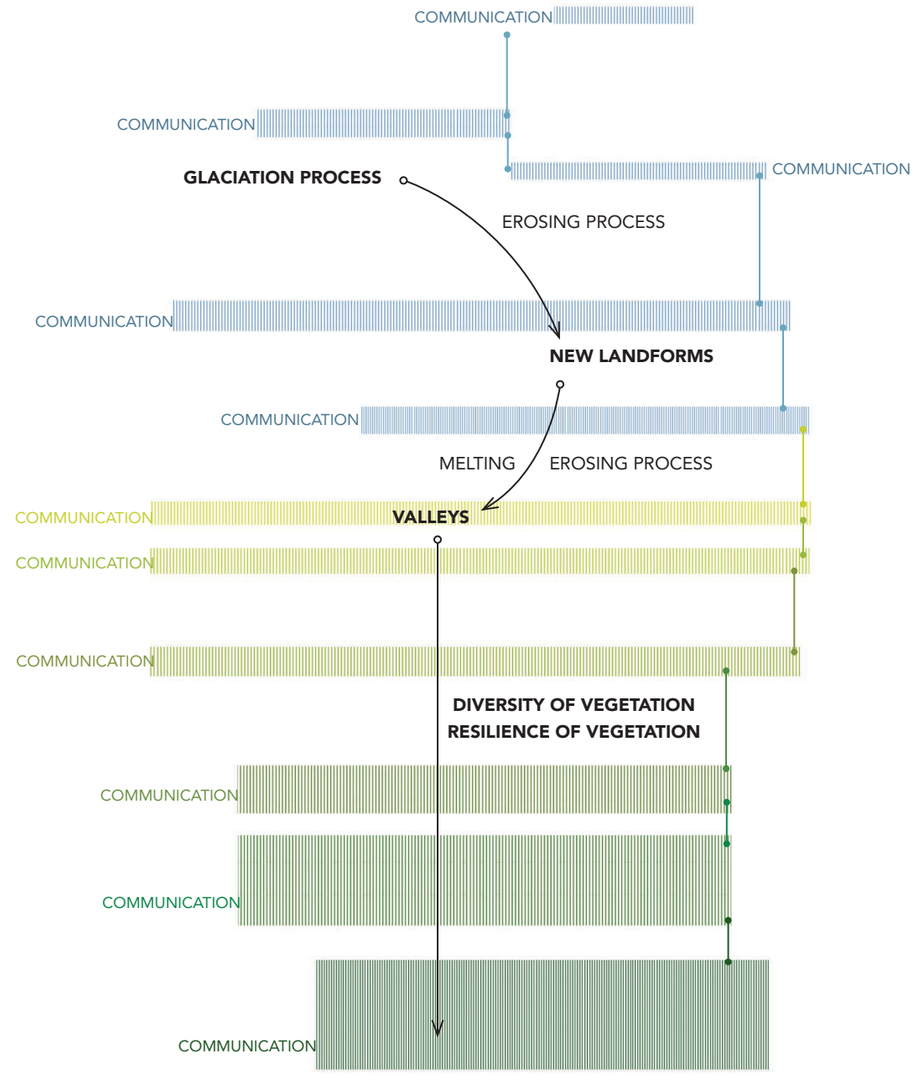
Zoom in each vegetation zonation, four sub-zones developed: mosses, herbs, shrubs, and trees. In the first three layers, it has the wealthiest categories. However, when it comes to a higher level, the changing weather condition makes the structure of vegetation sparse and monotonous.

When it comes to urban region, the urbanism process is similar like glacier did in the mountains——occupy, change and create something new. We built houses, bridges, roads and streets, change the lands, cultivate plants we want, create artificial structures for transportation, discover new energy for power, and so on.

DIAGRAM OF VERTICAL MOUNTAIN SYSTEM



SIMPLIFIED INTERRATIONS OF VERTICAL MOUNTAIN SYSTEM



PRINCIPLES

MOUNTIAN

MOTION OF GLACIERS

GLACIAL LANDFORMS

VERTICAL ZONATION OF VEGETATION

The midline of moving glaciers is the fastest part of its movement, carving and reshaping grounds and landscapes. This glaciation process creates a set of different state of glacier flow.

By using glacier patches, they represent different types of glacial landforms and state of the glaciation process. Within the gravity effect, connected patches illustrate an abstract way of glacial movement from top to bottom.

Each zonation has its resilience of living patterns. The height of vegetation (achievability of sources) determines the structure of sublayers. Ecotones provide the place to exchange energy and trigger bio-diversities.

Transfer glacier flow in mountain to human flow in urban, it builds up a new form of vertical urban relations.

URBAN

VERTICAL FLOWING IN URBAN

NEW-FORM OF URBAN ZONES

VERTICALLY LAYERED ZONES

Translate glacial landforms into a new form of urban zones by using mimetic models, learning their characters, and applied to detailed design.

Different height of vertical zones divided by specific functions. Ecotones in urban strengthen the connection points between two layers.

CHAPTER THREE ——MOUNTAINOUS CITY

DYNAMICS OF MOUNTAINOUS URABN FLOW

Based on the mountain system, I transferred the flow of glaciation process to the flow of human activities in urban areas, which belongs to the dynamics of mountainous urban flow. According to its changing state of glaciation process from top to bottom, I divided urban zones into slow zones and active zones.

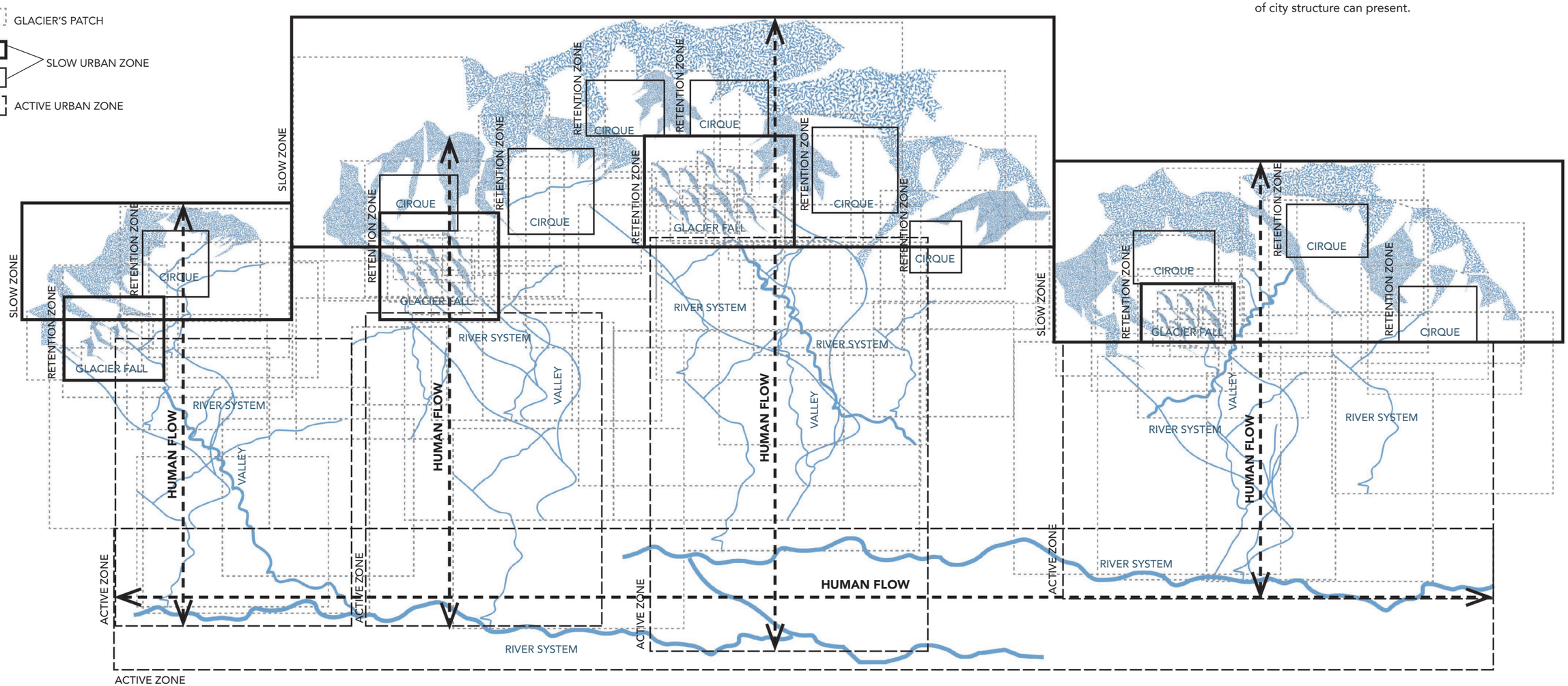
GLACIER

RIVER

GLACIER'S PATCH

SLOW URBAN ZONE

ACTIVE URBAN ZONE



TRANSFORMING FLOW OF GLACIATION TO FLOW OF HUMAN ACTIVITY IN URBAN SPACES

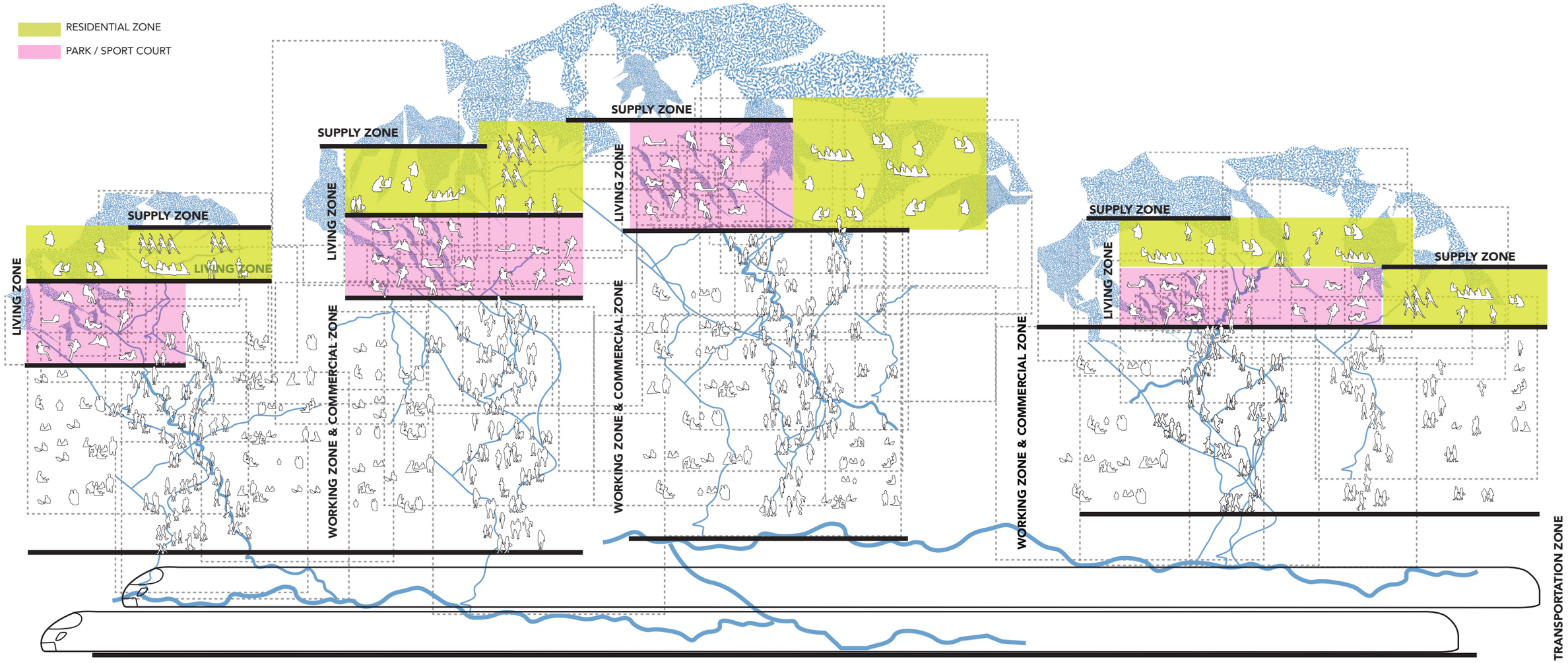
Q1: Would this be a better way of city structure?
Q2: Would this vertical way of structure provide a better resilience for different city zones?

In a city, human flow is defined by the function of city spaces——the place of work, the place of living, the place of public communicating, etc. Thus, types of spaces and ways of integrated spaces determined ways of community interactions. Glaciation is moving from top to bottom by its gravity effect. Moreover, through each state of glaciation process, it deposited and reshaped different landscape zonation by time.

As glacier flow is a metaphor in the city, human flow acted the same way determined by different scales of functional zones vertically. Following the moving pattern of glaciers, a new version of city structure can present.

FOUR VERTICAL ZONATION OF MOUNTAINOUS CITY

Based on the dynamics of urban flow, I defined the functions of four specific urban zones in vertical layers. Each layer would have its resilience while interrelated and overlapped with other zones. The supply zone is the place where glacier cirque forms and intend to flow downhills. The living zone is the place where glacier fall remains and accumulates. The Working zone and commercial zone are the places of streams and river systems. The transportation zone is the place where essential rivers are passing by mountains.



HORIZONTAL ZONATION OF MOUNTAINOUS CITY

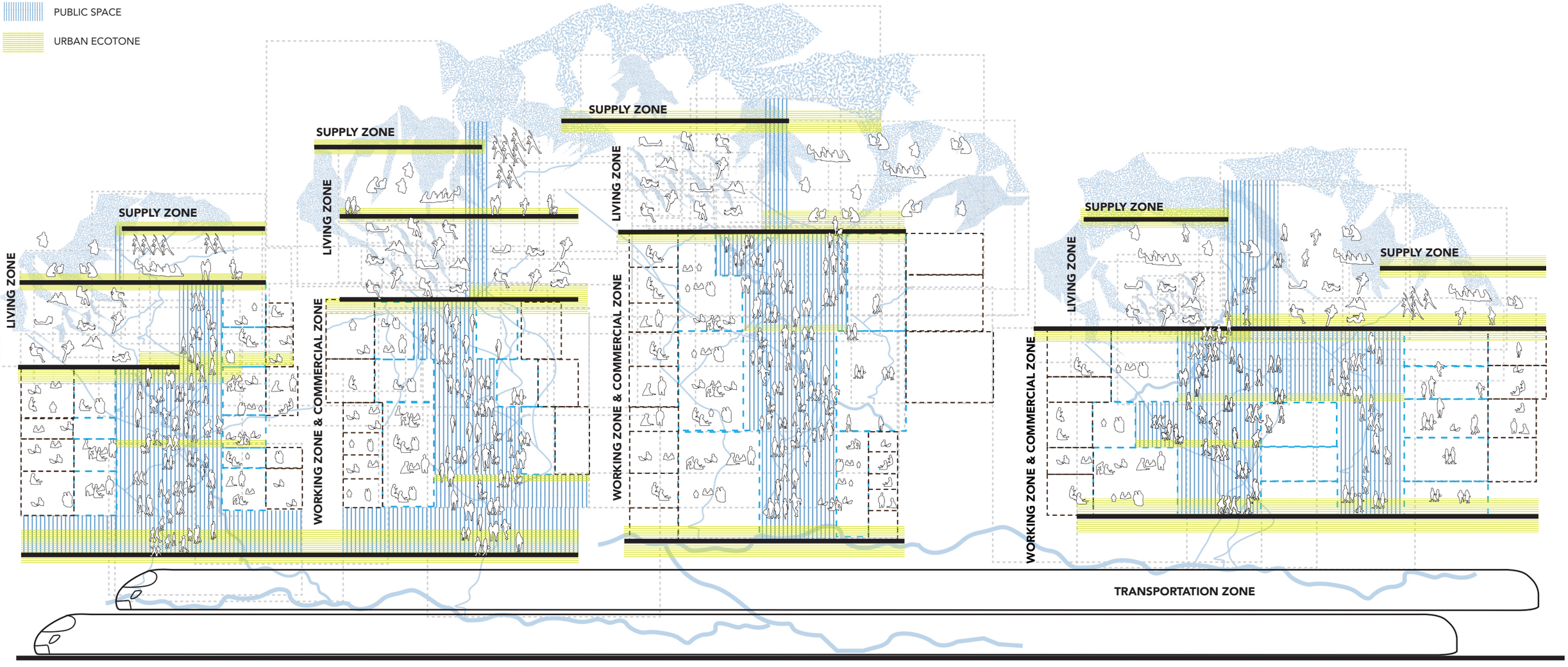
SEMI-PRIVATE SPACE

PRIVATE SPACE

PUBLIC SPACE

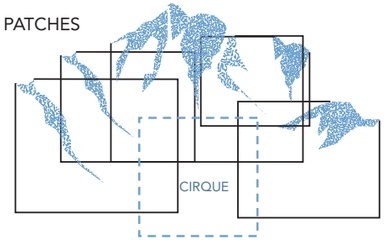
URBAN ECOTONE

Based on the spatial characters of u-shaped valley, valleys in Mountainous City lead the main flow and manage the distributions of energy and resources vertically. The middle line of each block is the fastest part of flow where the public engagement happens as well as vertical transport. Furthermore, it also plays a connector role working vertically and combines the whole city structures. In the form of horizontal zonation, it strengthened the conjunction of juxtaposed public and private spaces.



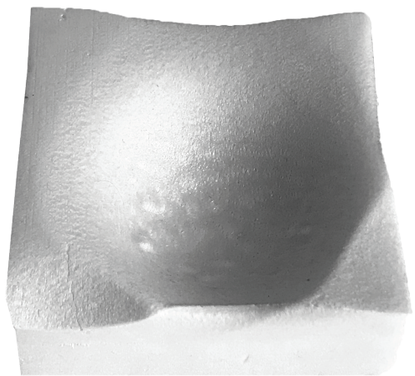
ROOFTOP IN MOUNTAINOUS CITY —— CONCEPT DEVELOPMENT

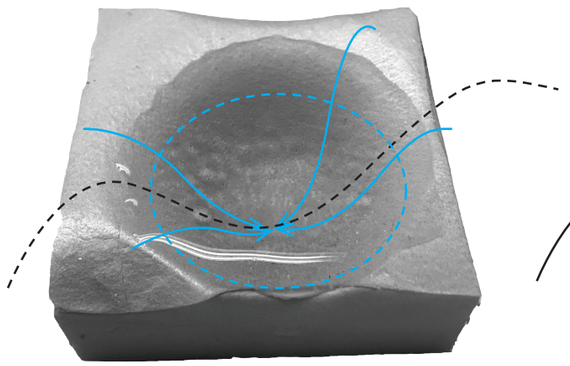
MIMETIC PATCHES

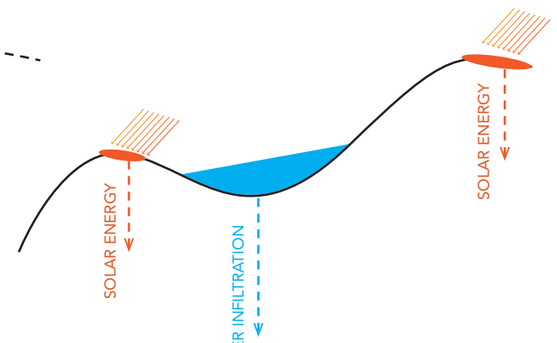


Cirque, as the first gathering space in the glaciated mountain, provides the concept of rooftop construction in mountainous city. With the methodology of mimicry, I made several mimetic models to illustrate and represent cirques by foams. Within assuming functions of solar energy, stormwater management and open green spaces, the shape of the roof provides an efficient form to be utilized.

MIMETIC MODELS 1



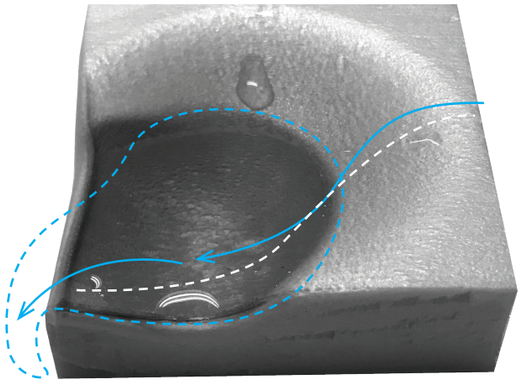


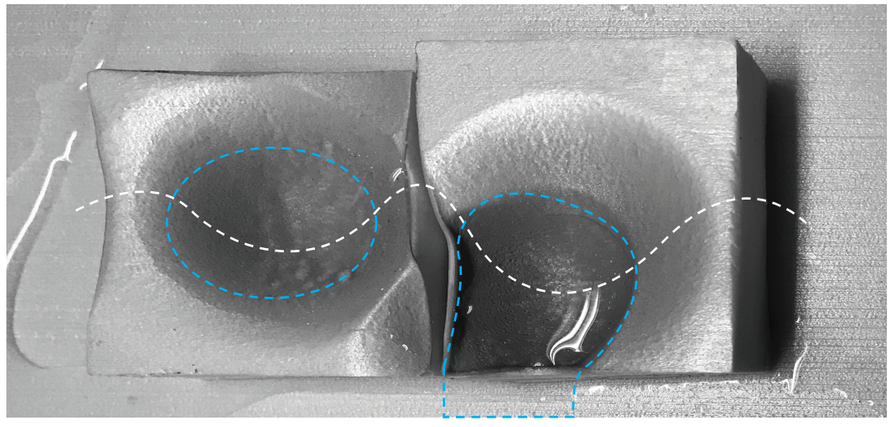


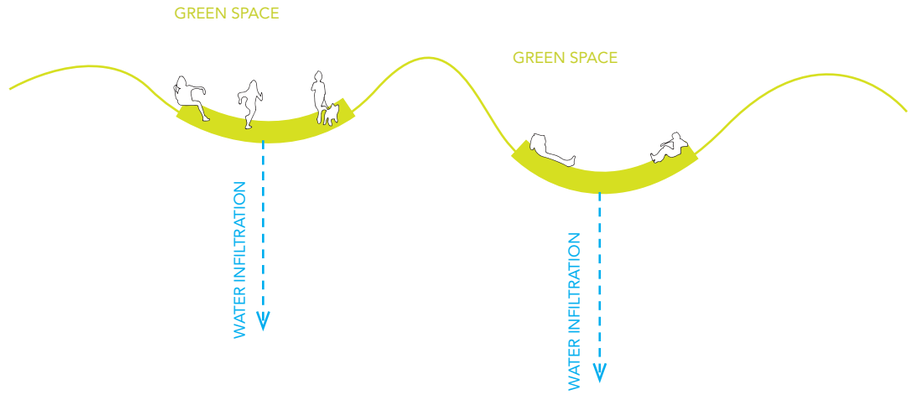
←
Solar energy set on peaks of the shape and rainwater collected by the lowest point.

↓
The curved form covered by permeable surface used for rainwater management and makes it more consistent to integrate with other functions.

MIMETIC MODELS 2





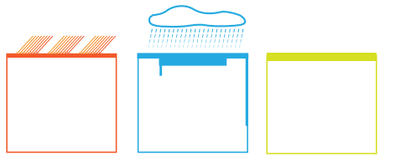


CONCEPT OF ROOFTOP IN MOUNTAINOUS CITY

LANDFORM
WATER
CONTAINER
SOLAR PANEL

PIPES

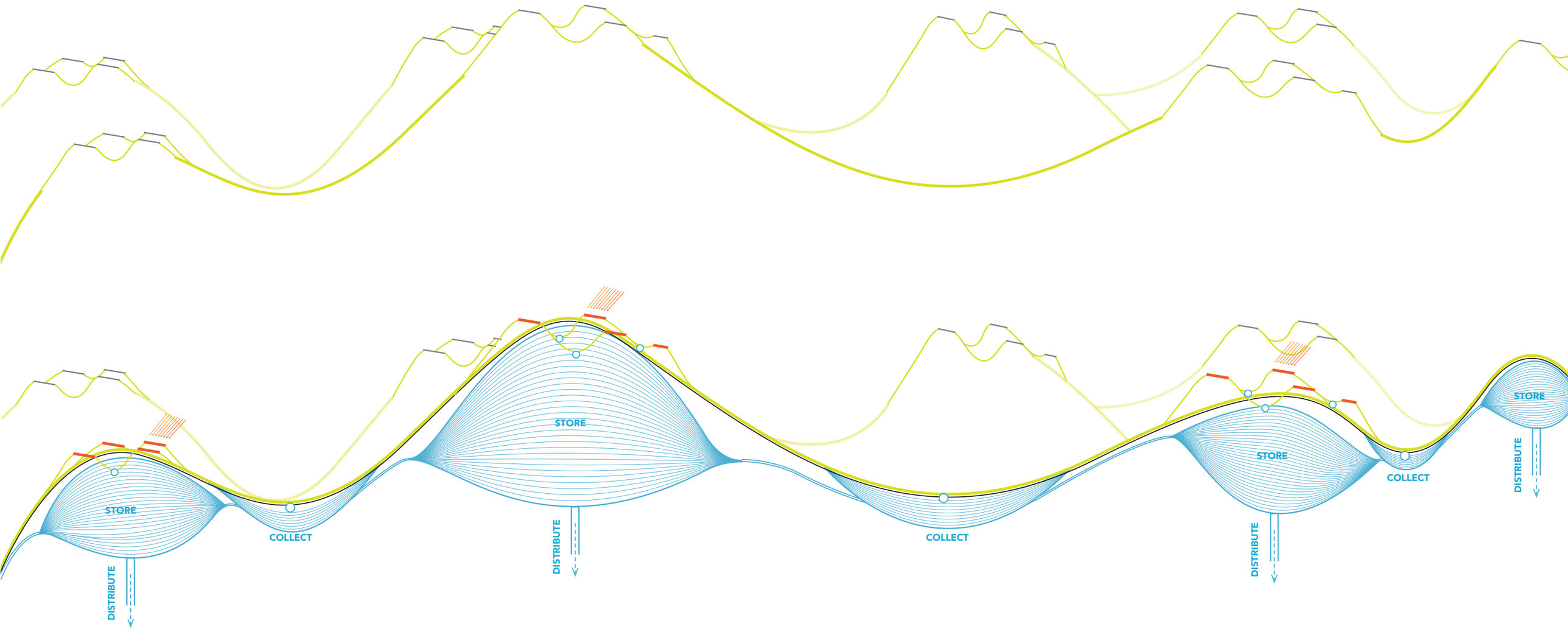
FUNCTIONS



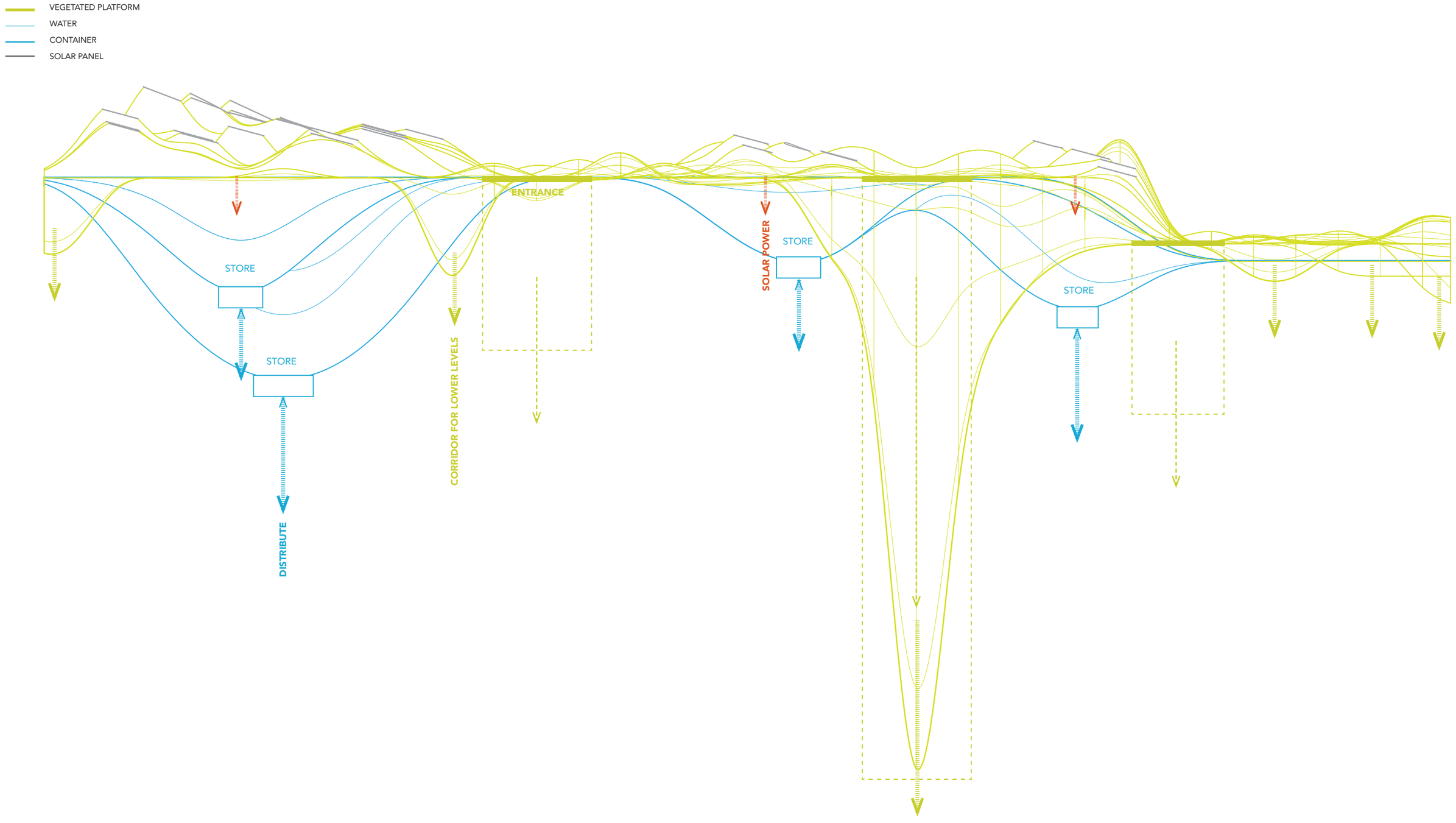
SOLAR ENERGY

STORMWATER COLLECTION

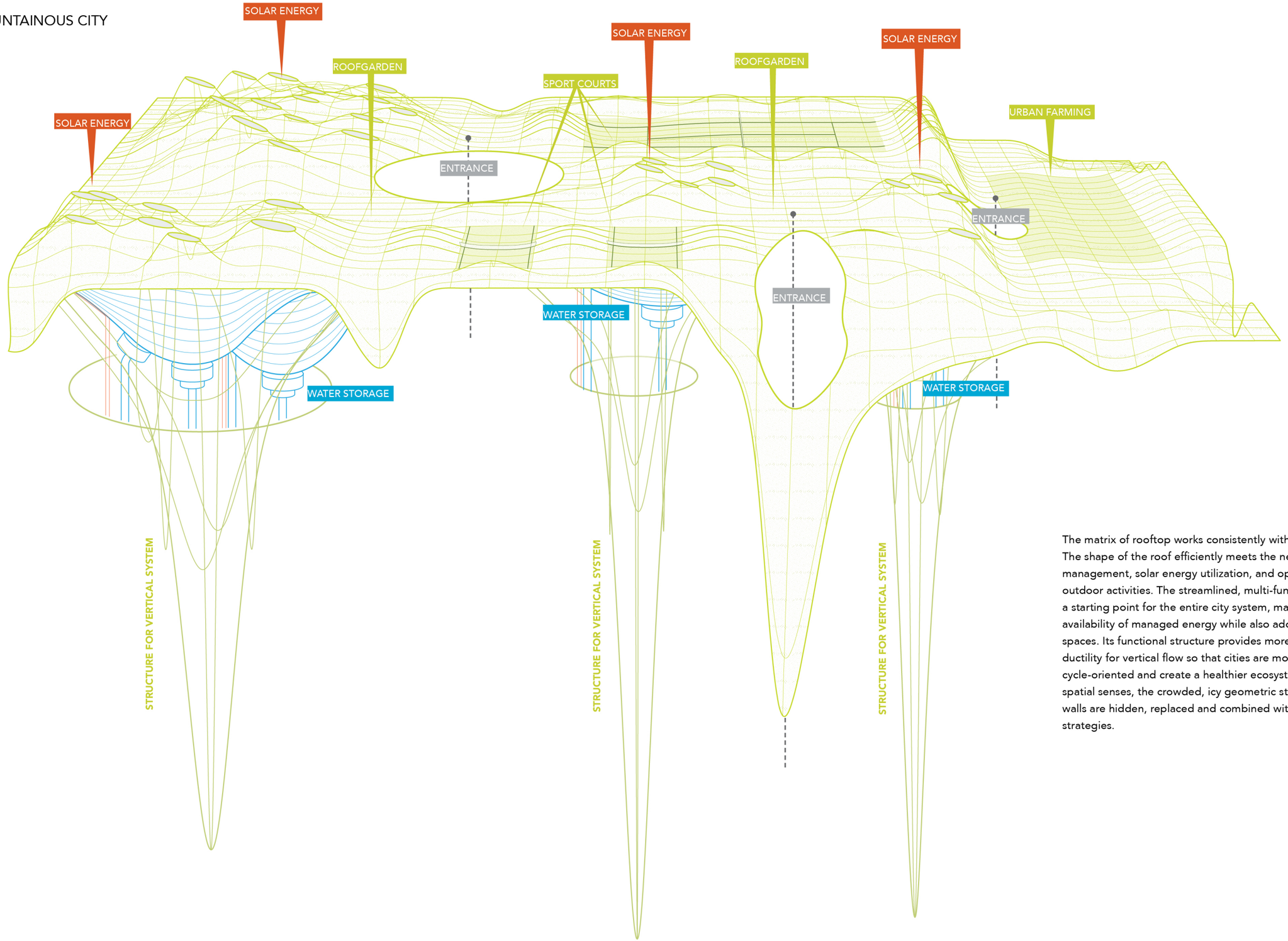
PARK / PLAYGROUND



SECTION OF ROOFTOP IN ONE BLOCK OF MOUNTAINOUS CITY



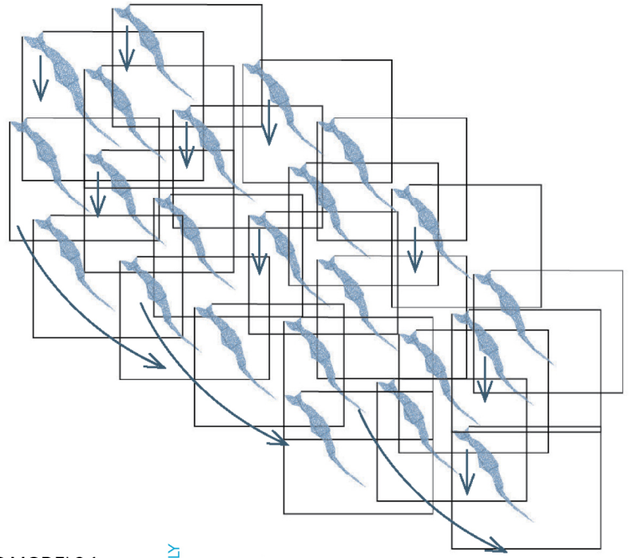
ROOFTOP IN MOUNTAINOUS CITY



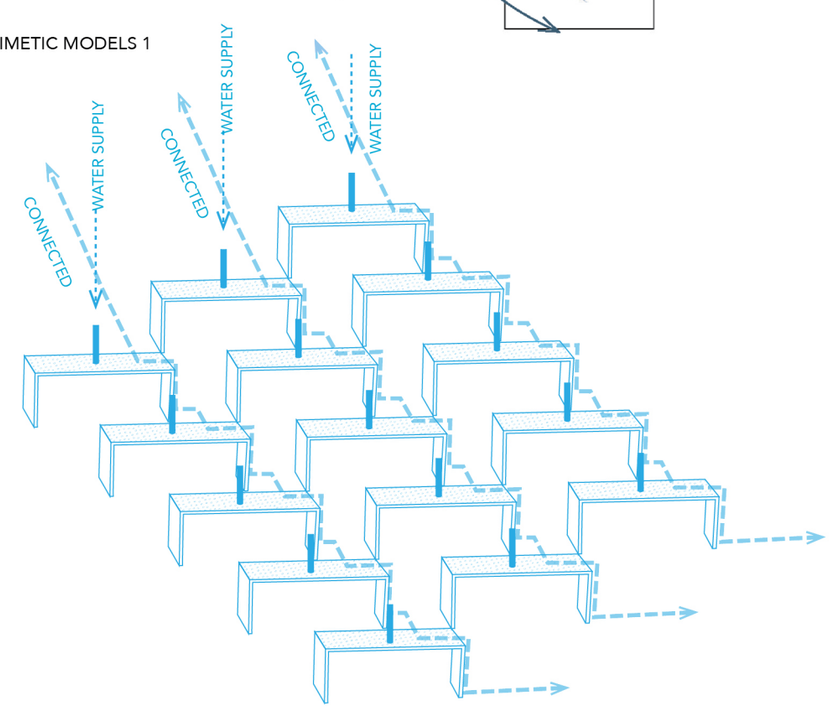
The matrix of rooftop works consistently with multiple functions. The shape of the roof efficiently meets the needs of water management, solar energy utilization, and open view space for outdoor activities. The streamlined, multi-functional roof serves as a starting point for the entire city system, maximizing the availability of managed energy while also adding more green spaces. Its functional structure provides more continuity and ductility for vertical flow so that cities are more ecological cycle-oriented and create a healthier ecosystem. In the city's spatial senses, the crowded, icy geometric steel bars and concrete walls are hidden, replaced and combined with ecological strategies.

LIVING ZONE IN MOUNTAINOUS CITY —— CONCEPT DEVELOPMENT

MIMETIC PATCHES

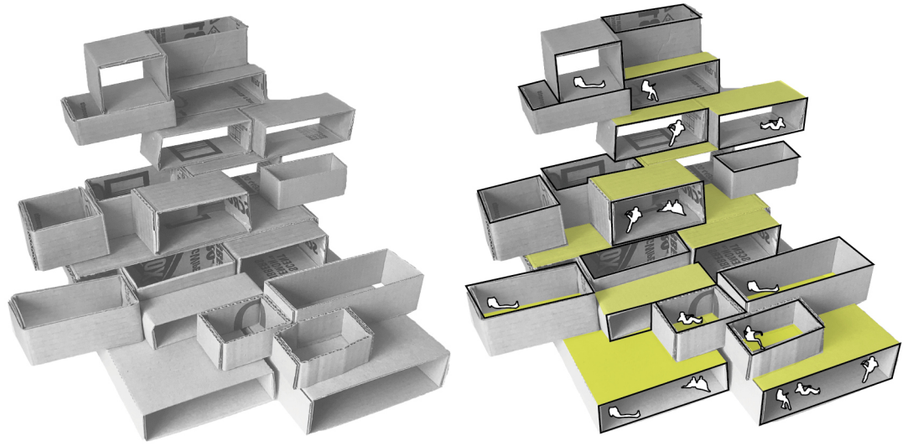


MIMETIC MODELS 1

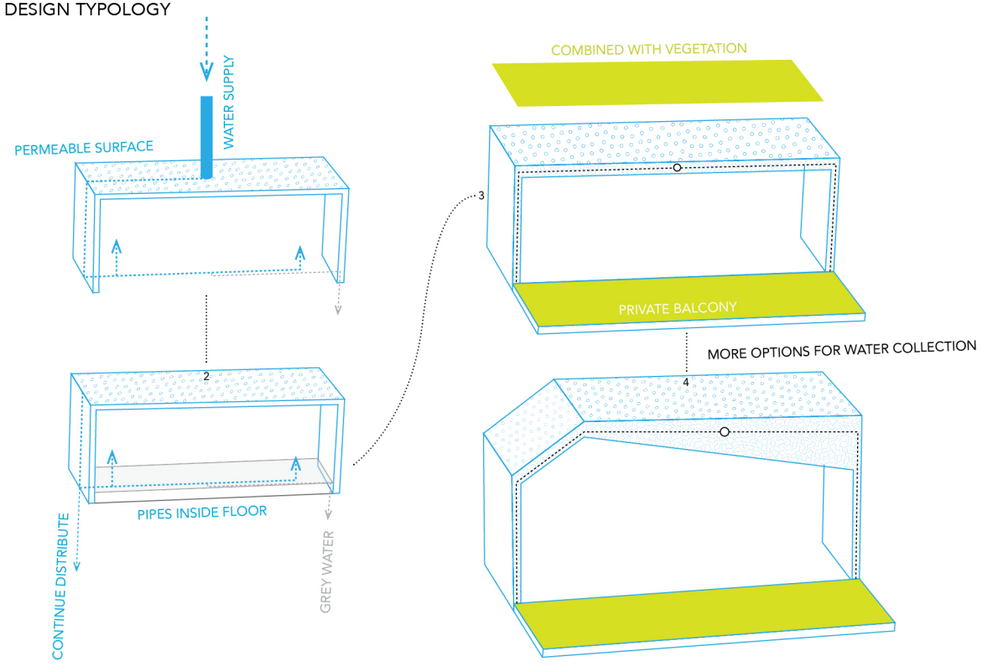


MIMETIC MODELS 2

JUXTAPOSITIONAL LIVING MODULES



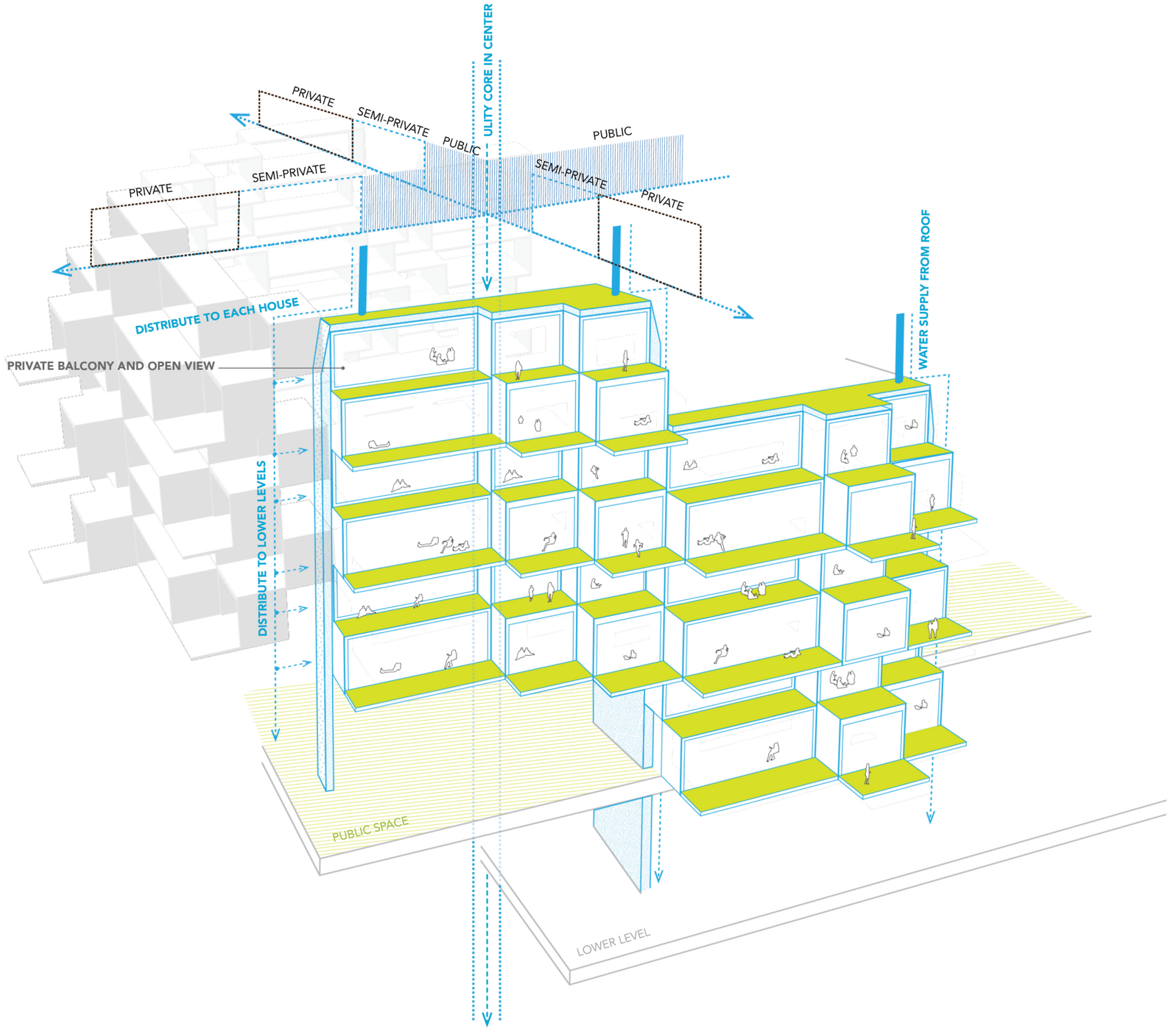
DESIGN TYPOLOGY



LIVING ZONE IN MOUNTAINOUS CITY

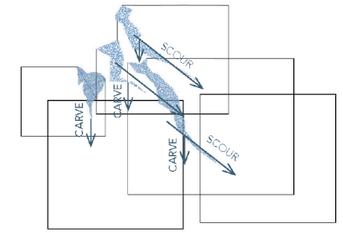
Living zone plays the same role in the city as array-based glacier fall plays in a glacial mountain——a remaining place and the warmest harbor in urban life. By a series of mimetic models translated from glacier fall, what I got was a juxtaposition of multiple independent spaces. Each living module shares a unified and efficient water supply system, while at the high levels away from the noise of public places and enjoy an open view. Each house has its ecosystem through a private greenfield garden link.

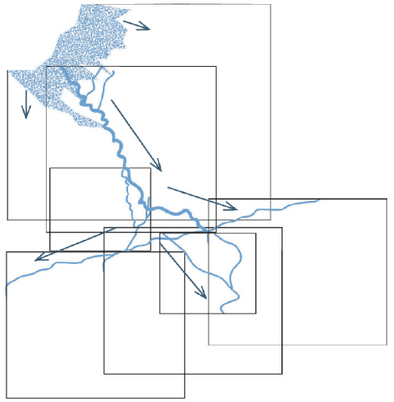
The central axis of urban structure provides the primary energy for the juxtaposed living space, and the direction of the source connects the whole urban structure to flow downwards, the same process of glacier erosion, flowing to every part of the city. The central axis of energy supply is like the valley in a city, the horizontally layered zonation abstracted from the structure of mountain system——inner spatial part is public space, continuously to the surrounding private space. The transition of zonation makes urban flow systematically organized throughout the system.



VALLEYS IN MOUNTAINOUS CITY —— CONCEPT DEVELOPMENT

MIMETIC PATCHES

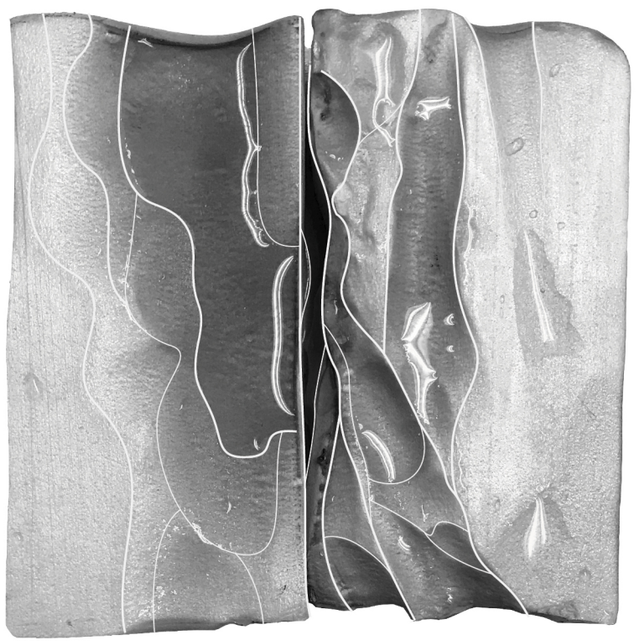




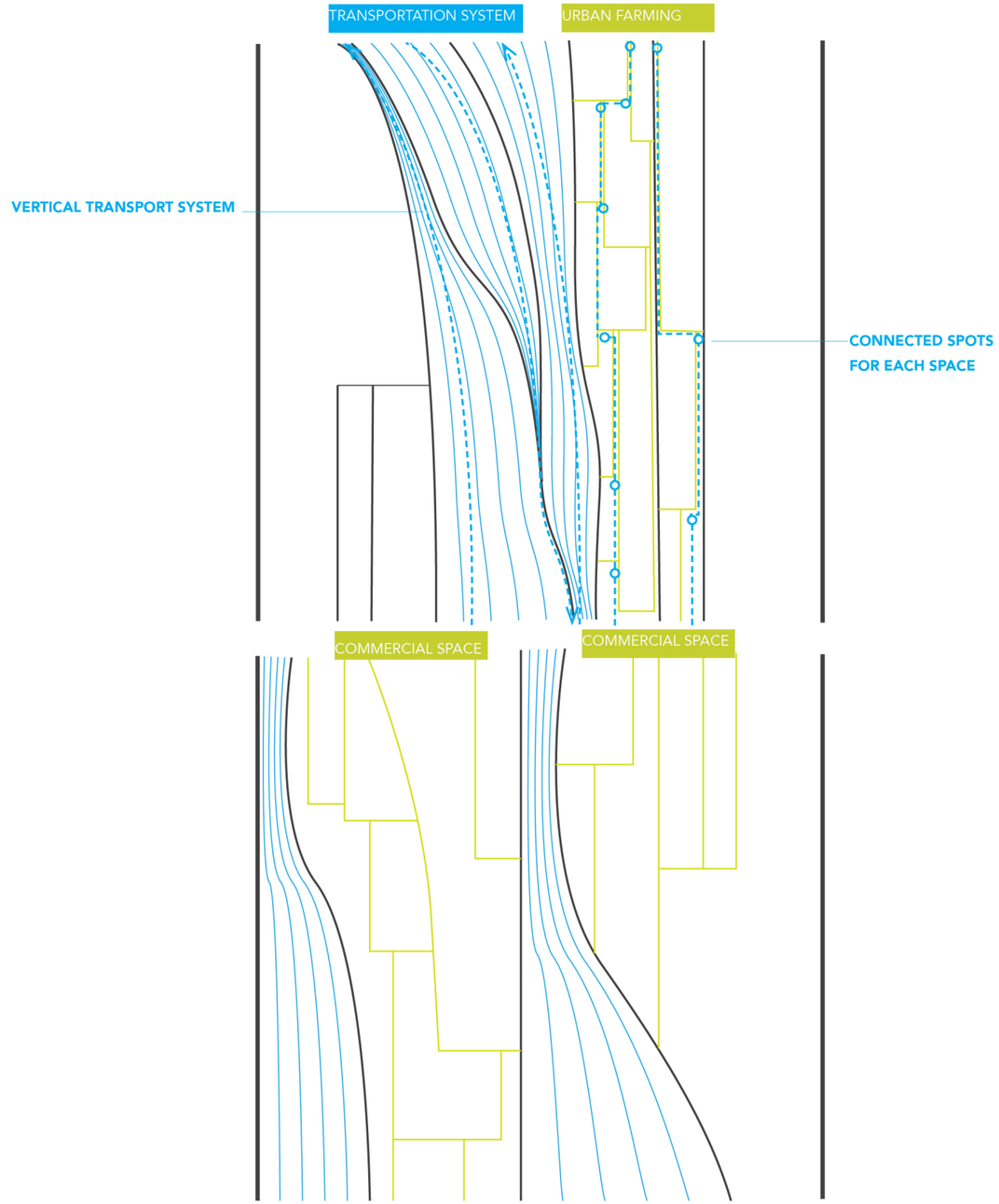
Valley as a vital factor in mountain promoting the formation of vertical zonation of vegetation. Erosion in valleys is continuously changing to reshape the landscape of mountains by glaciers and rivers. The essential part of the entire erosion process is their deposition process, like migration, some keeping walking while some are finding out a place for themselves to settle down.

After translating the mimetic models from valley patches, valley depths can be divided into different spatial layers while interrelated to each other. Valley is the metaphor for public interactions, which consists of public space and utility core set in parallel, from top to bottom through the vertical chain of the whole city.

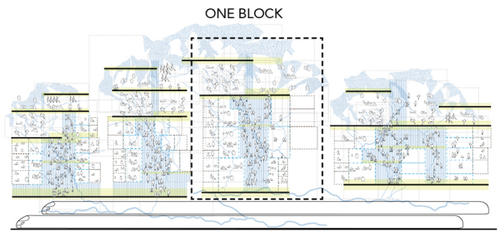
MIMETIC MODELS 1



DESIGN TYPOLOGY



ONE BLOCK OF MOUNTAINOUS CITY



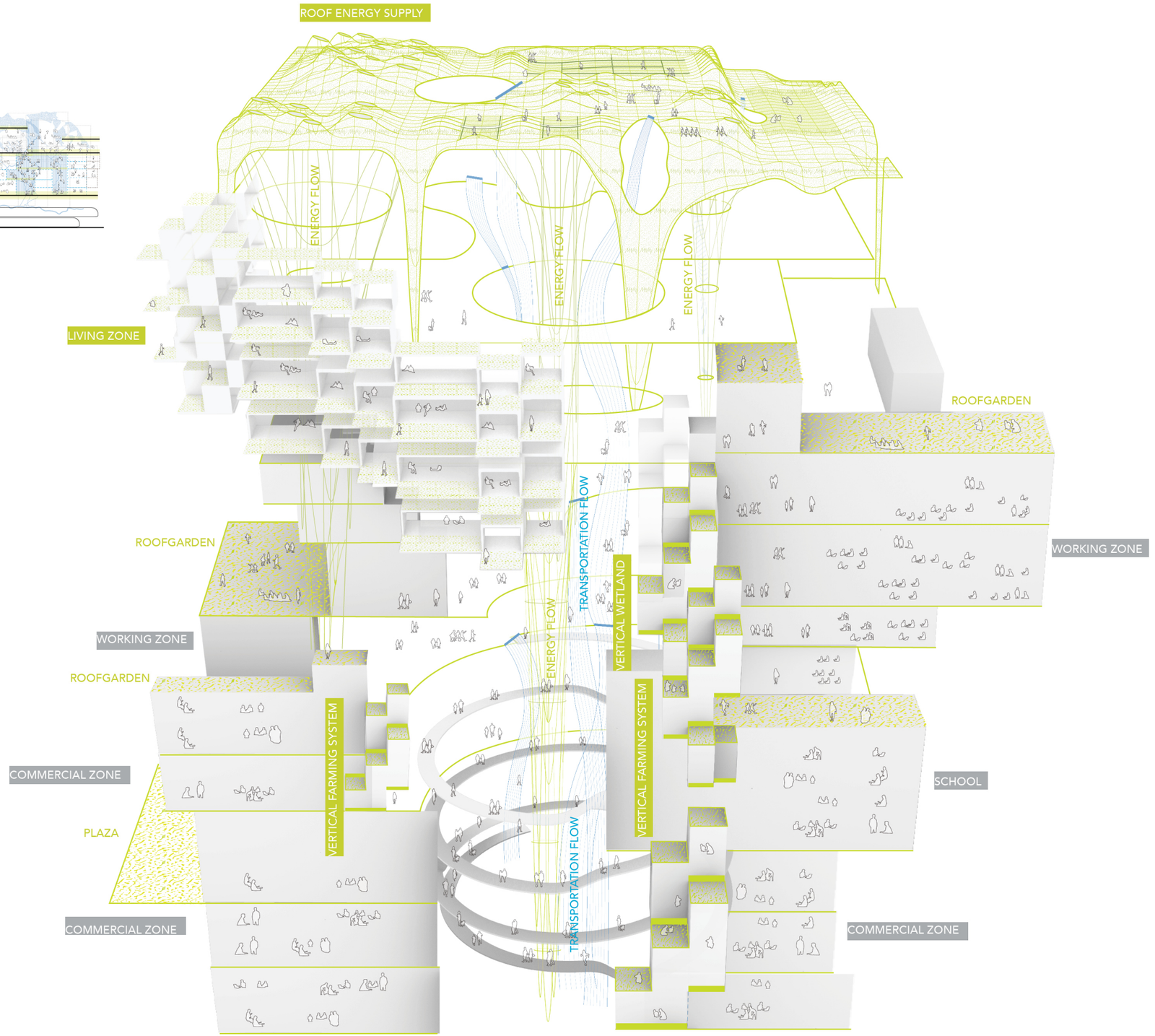
OPEN SPACE

GREENHOUSE (URBAN FARMING)

BALCONY

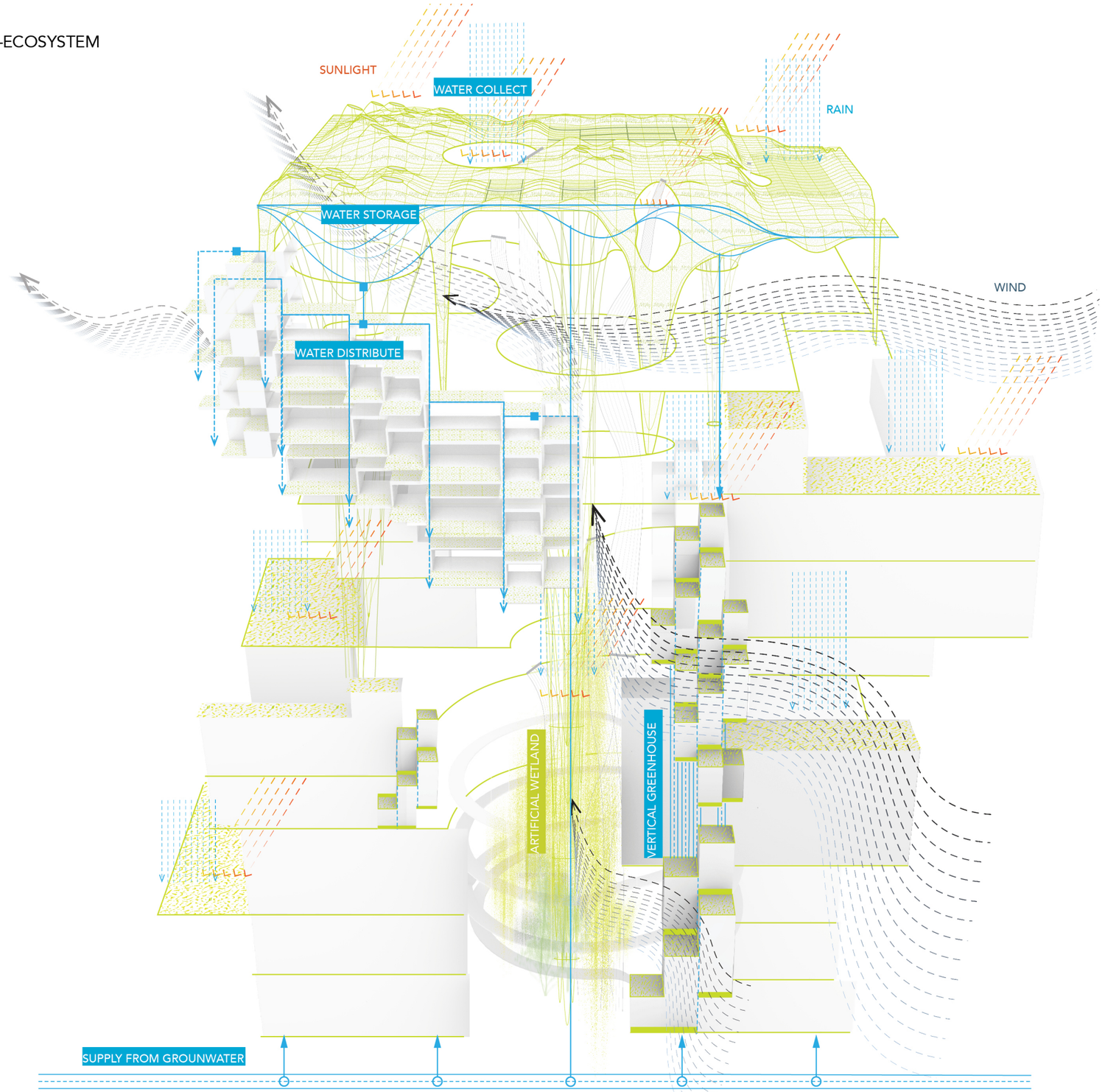
VERTICAL TRANSPORTATION SYSTEM

FLOORS AND STRUCTURE



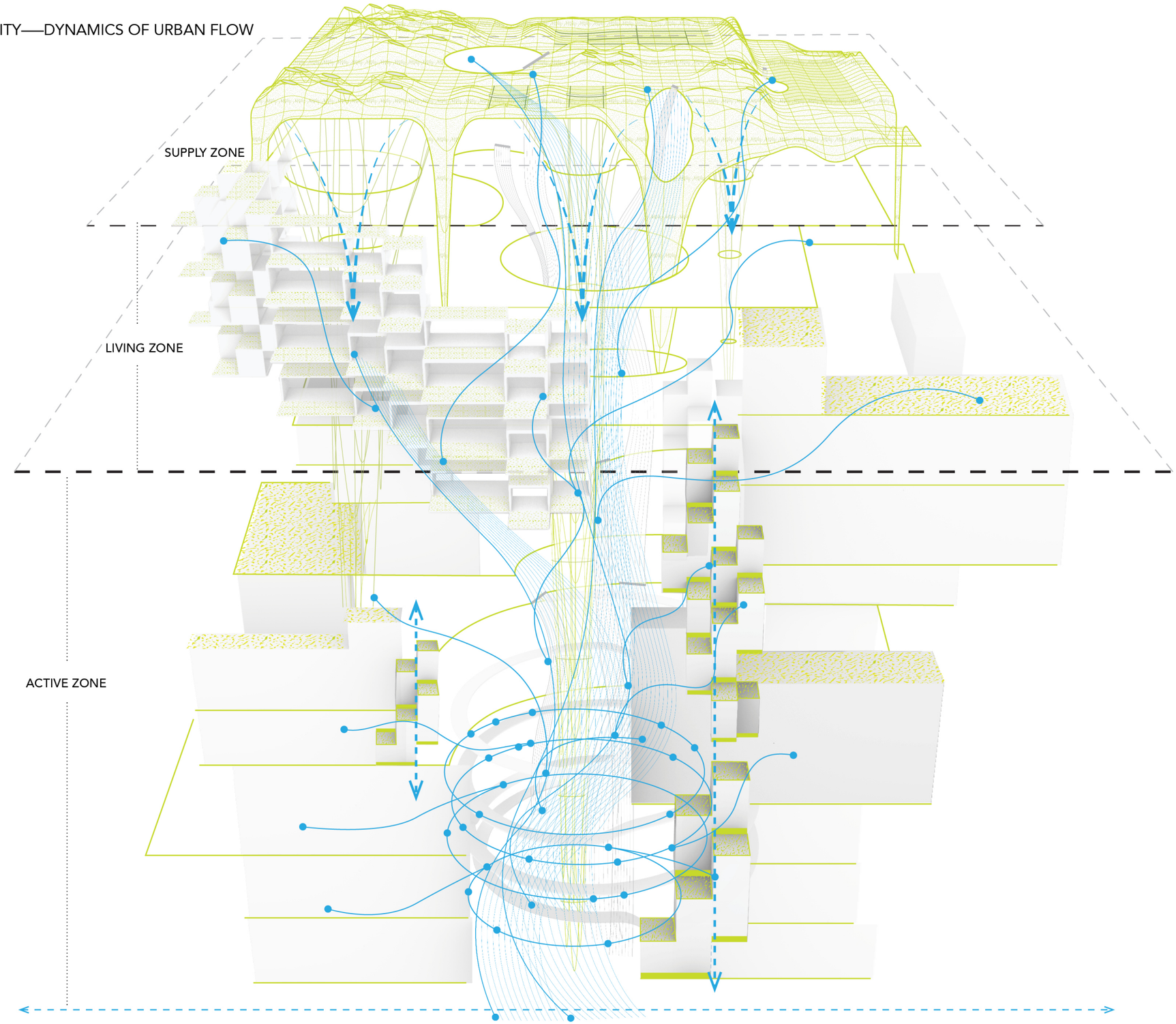
ONE BLOCK OF MOUNTAINOUS CITY ——ECOSYSTEM

The overall vertical formation of hydrological and ecological systems, depicting the interactions with wind, rain and sunlight.



ONE BLOCK OF MOUNTAINOUS CITY——DYNAMICS OF URBAN FLOW

Referred to the starting structure on page50, this is how Mountainous City act finally. The comparison of active and quiet dynamics consists of three primary zones.



EPILOGUE

Developed from the model of mountain system, I proposed a mountainous urban matrix focusing on efficient urban ecosystems and the dynamics of human activities. A series of rethinking came up through the metaphor of a mountain system about formation and relations in urban spaces. The mountainous city divided into layered zonation is integrated with hydrological and ecological systems and efficient spatial structures.

This would be a non-stop thinking about urban design. The Mountainous City provides me an incredible opportunity to keep producing deeper development upon such basic patterns of a city. The whole process, for me, is extraordinarily valuable. Every result and step I came up with is hard and deliberate. The methodology I experimented is unprecedented and trained my ways of thinking. Desperately diving into a metaphor and translating it into a design is a challenging and experimental experience, as built on such gigantic topics.

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Mountainous City