

What we can learn about urban ground floors from images?

Rez de Ville / Urban Ground Floors 2023

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Understanding Spaces based on Visual Data

Greener

Sky View

Buildings

Pavement

Traffic

Pedestrians

Cyclists

GF Façade

Utilities

Open Space

Lamps

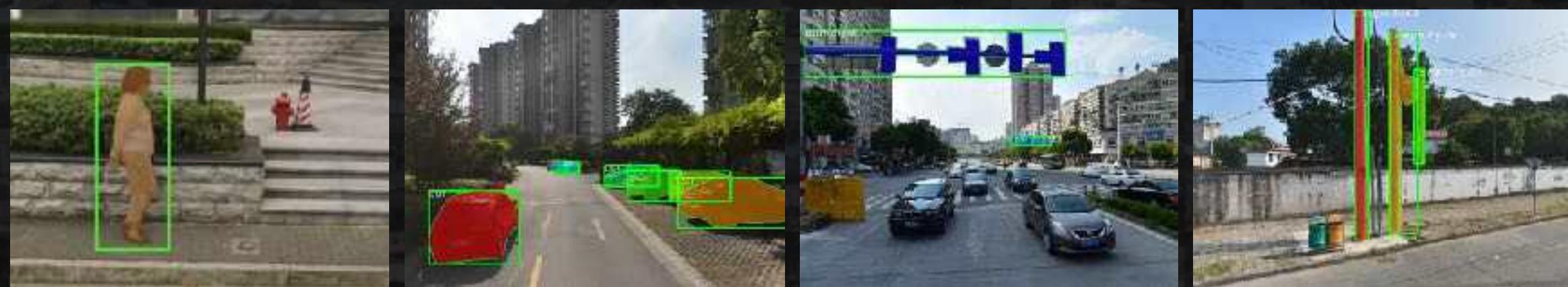
Benches

Posts



Understanding Spaces

based on Visual Data



Qiantang River, Zhejiang

Historical Landscape Preservation



Dwelling in the Fuchun Mountains
1348-1350 A.D. Yuan Dynasty China



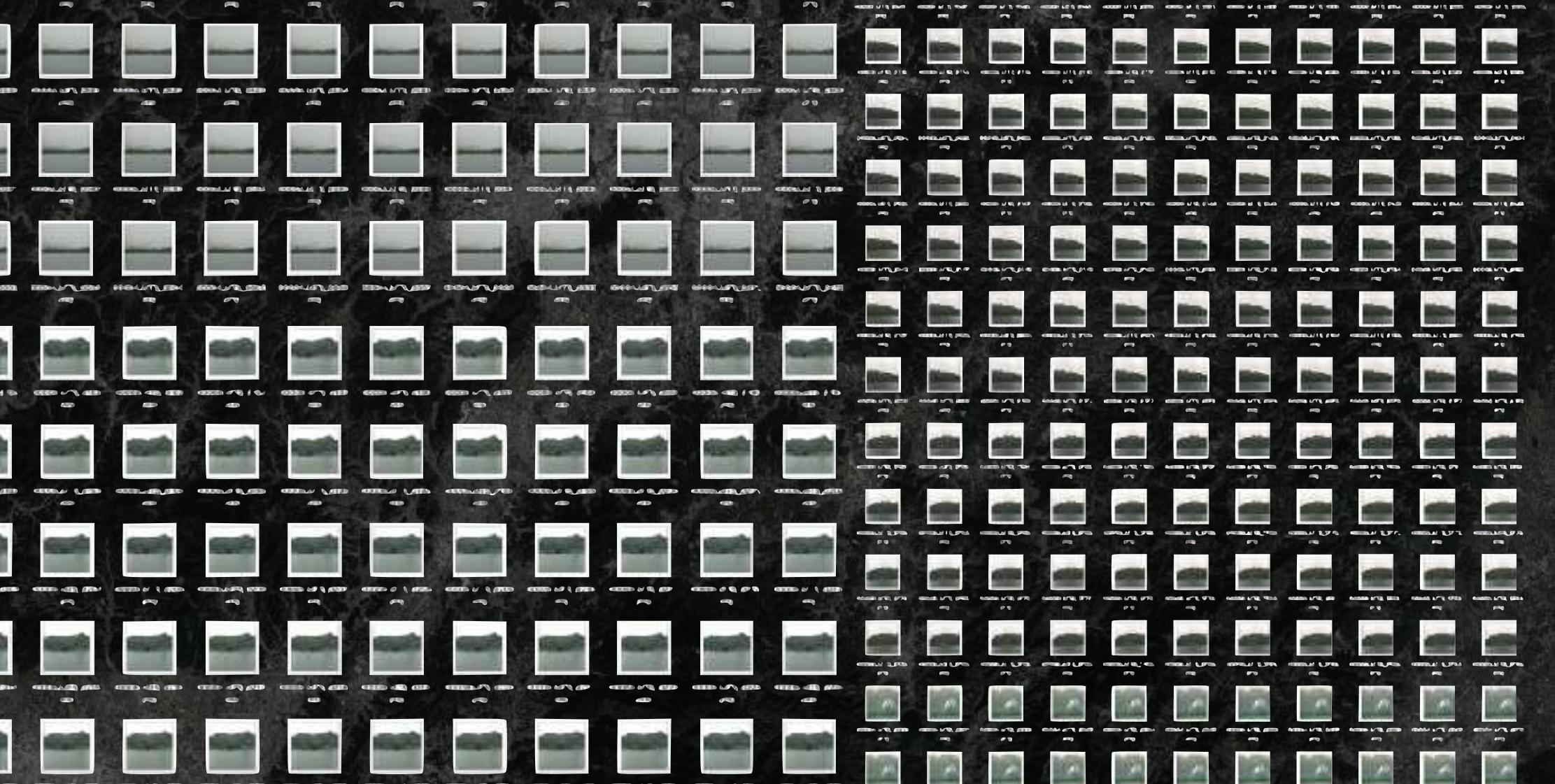
North Bank15 Videos, 345mins, 21711 images (1 frames/per second)



↑
Broken



South Bank14 Videos, 374mins, 22421 images (1 frames/per second)



Hangzhou

Qiantang River [30.6km]

Fuchun River East [74.3km]

Fuchun River West [28.6km]

Xinan River [34.9km]

North AM
000021min46s

South
0000021min40s

North AM
000419min32s

North AM
000227min53s

South
0000214min00s

North AM
000704min22s

South
0000318min05s

North AM
000727min22s

South
0000521min35s

North AM
000804min19s

South
0000626min50s

North PM
000001min23s

South
0000726min30s

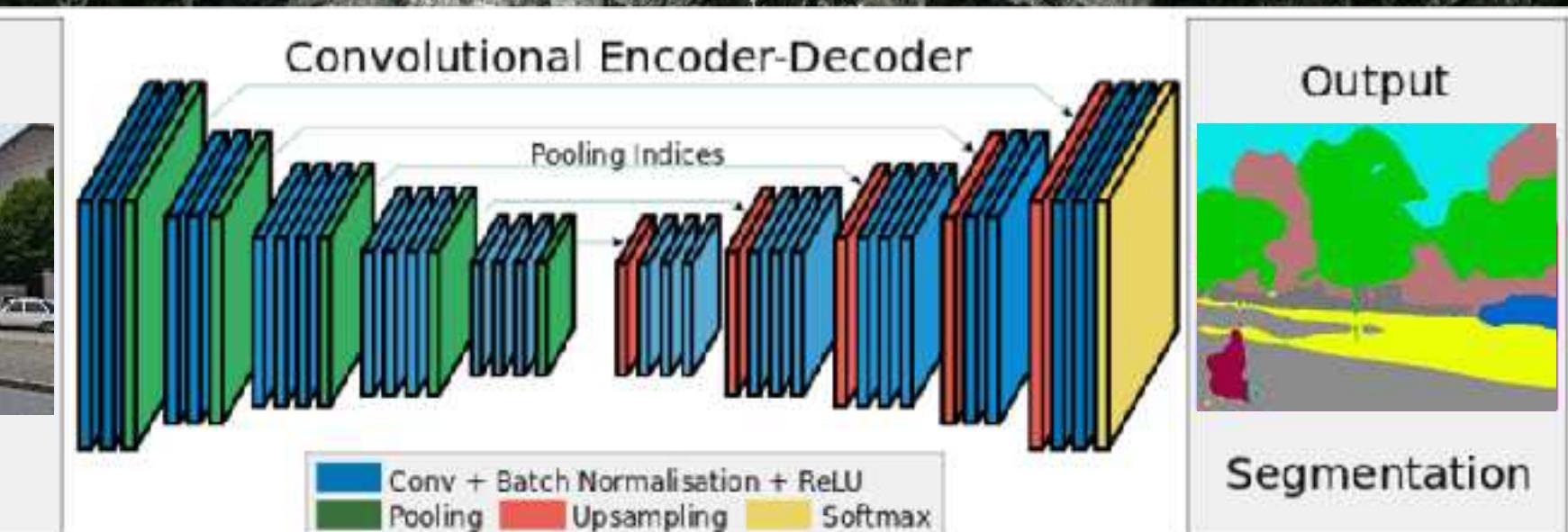
South
0000803min04s

North PM
000323min38s

South
0001006min18s

North PM
000501min47s

South
0001302min30s



Geo-Locating Manually
based on Key Views

airplane

animal

apparel

arcade
machine

armchair

ashcan

awning

bag

ball

bannister

bar

barrel

base

basket

bathtub

bed

bench

bicycle

blanket

blind

boat

book

bookcase

booth

bottle

box

bridge

buffet

building

bulletin
board

bus

cabinet

canopy

car

case

ceiling

chair

chandelier

chest of
drawers

clock

coffee
table

column

computer

conveyer
belt

counter

countertop

cradle

crt
screen

curtain

cushion

desk

dirt track

dishwasher

door

Earth

escalator

fan

fence

field

fireplace

flag

floor

flower

food

fountain

glass

grandstand

grass

hill

hood

house

hovel

kitchen
island

lake

lamp

Image Segmentation

land

light

microwave

minibike

mirror

monitor

mountain

ottoman

oven

painting

palm

path

person

bar

base

pier

pillow

plant

plate

plaything

pole

pool table

poster

pot

radiator

railing

refrigerator

river

road

rock

rug

runway

sand

sconce

screen

screen
door

sculpture

sea

seat

shelf

ship

shower

sidewalk

signboard

sink

sky

skyscraper

sofa

stage

stairway

step

stool

stove

streetlight

swimming pool

swivel
chair

table

tank

television

tent

toilet

tower

trade
name

traffic
light

tray

tree

truck

van

vase

wall

wardrobe

washer

water

waterfall

windowpane

airplane	animal	apparel	arcade machine	armchair	ashcan	awning	bag	ball	bannister	bar	barrel
base	basket	bathtub	bed	bench	bicycle	blanket	blind	boat	book	bookcase	booth
bottle	box	bridge	buffet	building	bulletin board	bus	cabinet	canopy	car	case	ceiling
chair	chandelier	chest of drawers	clock	coffee table	column	computer	conveyer belt	counter	countertop	cradle	crt screen
curtain	cushion	desk	dirt track	dishwasher	door	Earth	escalator	fan	fence	field	fireplace
flag	floor	flower	food	fountain	glass	grandstand	grass	hill	hood	house	hovel
kitchen island	lake	lamp							land	light	microwave
minibike	mirror	monitor	mountain	ottoman	oven	painting	palm	path	person	bar	base
pier	pillow	plant	plate	plaything	pole	pool table	poster	pot	radiator	railing	refrigerator
river	road	rock	rug	runway	sand	sconce	screen	screen door	sculpture	sea	seat
shelf	ship	shower	sidewalk	signboard	sink	sky	skyscraper	sofa	stage	stairway	step
stool	stove	streetlight	swimming pool	swivel chair	table	tank	television	tent	toilet	tower	trade name
traffic light	tray	tree	truck	van	vase	wall	wardrobe	washer	water	waterfall	windowpane

Image Segmentation

airplane	animal	apparel	arcade machine	armchair	ashcan	awning	bag	ball	bannister	bar	barrel
base	basket	bathtub	bed	bench	bicycle	blanket	blind	boat	book	bookcase	booth
bottle	box	bridge	buffet	building	bulletin board	bus	cabinet	canopy	car	case	ceiling
chair	chandelier	chest of drawers	clock	coffee table	column	computer	conveyer belt	counter	countertop	cradle	crt screen
curtain	cushion	desk	dirt track	dishwasher	door	Earth	escalator	fan	fence	field	fireplace
flag	floor	flower	food	fountain	glass	grandstand	grass	hill	hood	house	hovel
kitchen island	lake	lamp							land	light	microwave
minibike	mirror	monitor	mountain	ottoman	oven	painting	palm	path	person	bar	base
pier	pillow	plant	plate	plaything	pole	pool table	poster	pot	radiator	railing	refrigerator
river	road	rock	rug	runway	sand	sconce	screen	screen door	sculpture	sea	seat
shelf	ship	shower	sidewalk	signboard	sink	sky	skyscraper	sofa	stage	stairway	step
stool	stove	streetlight	swimming pool	swivel chair	table	tank	television	tent	toilet	tower	trade name
traffic light	tray	tree	truck	van	vase	wall	wardrobe	washer	water	waterfall	windowpane

Image Segmentation



Reclassify into 7 Categories

sky

water

building

plant

mountain

boat

wall

Sky

Water

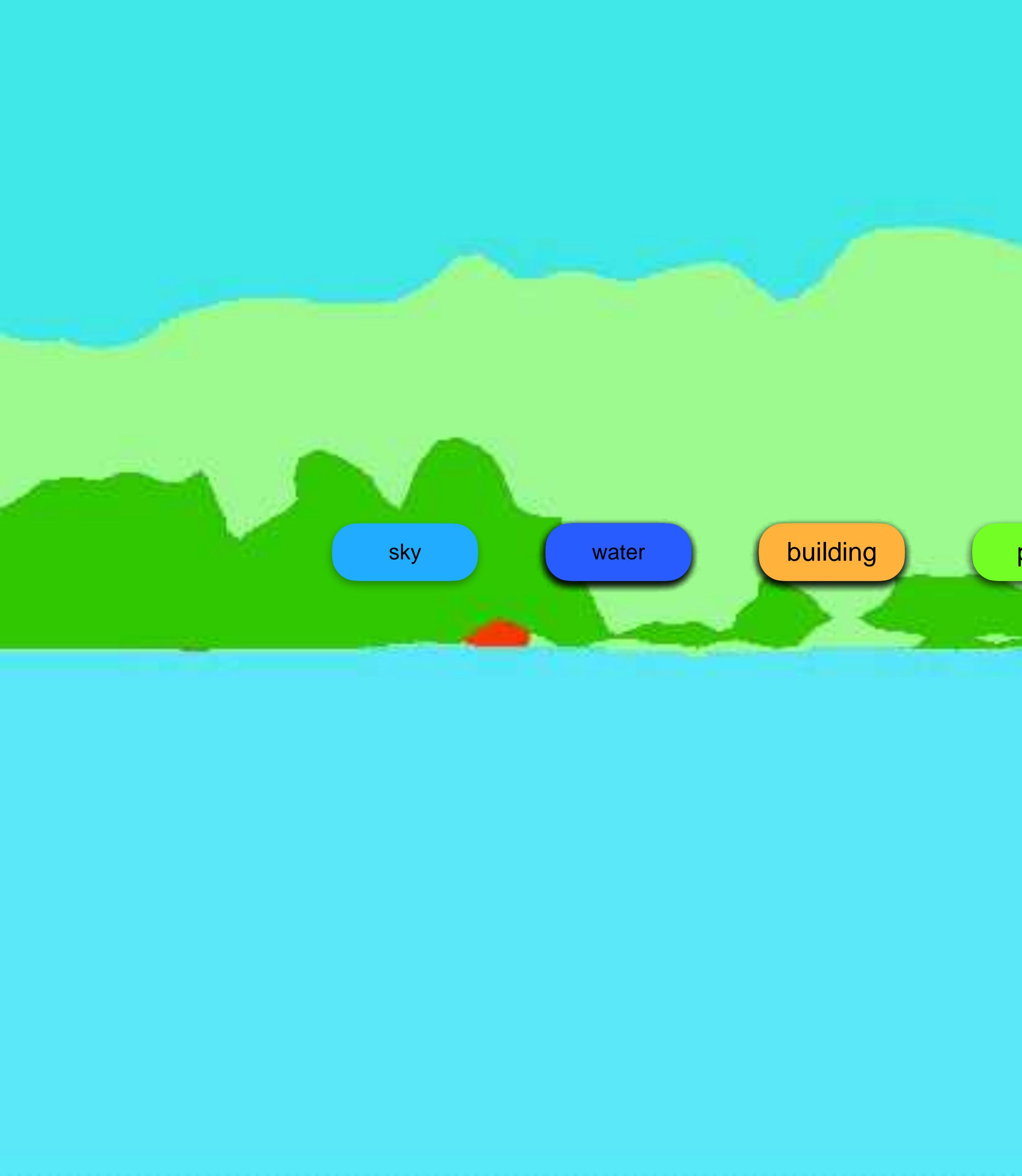
Building

Plant

Mountain

Boat

Wall

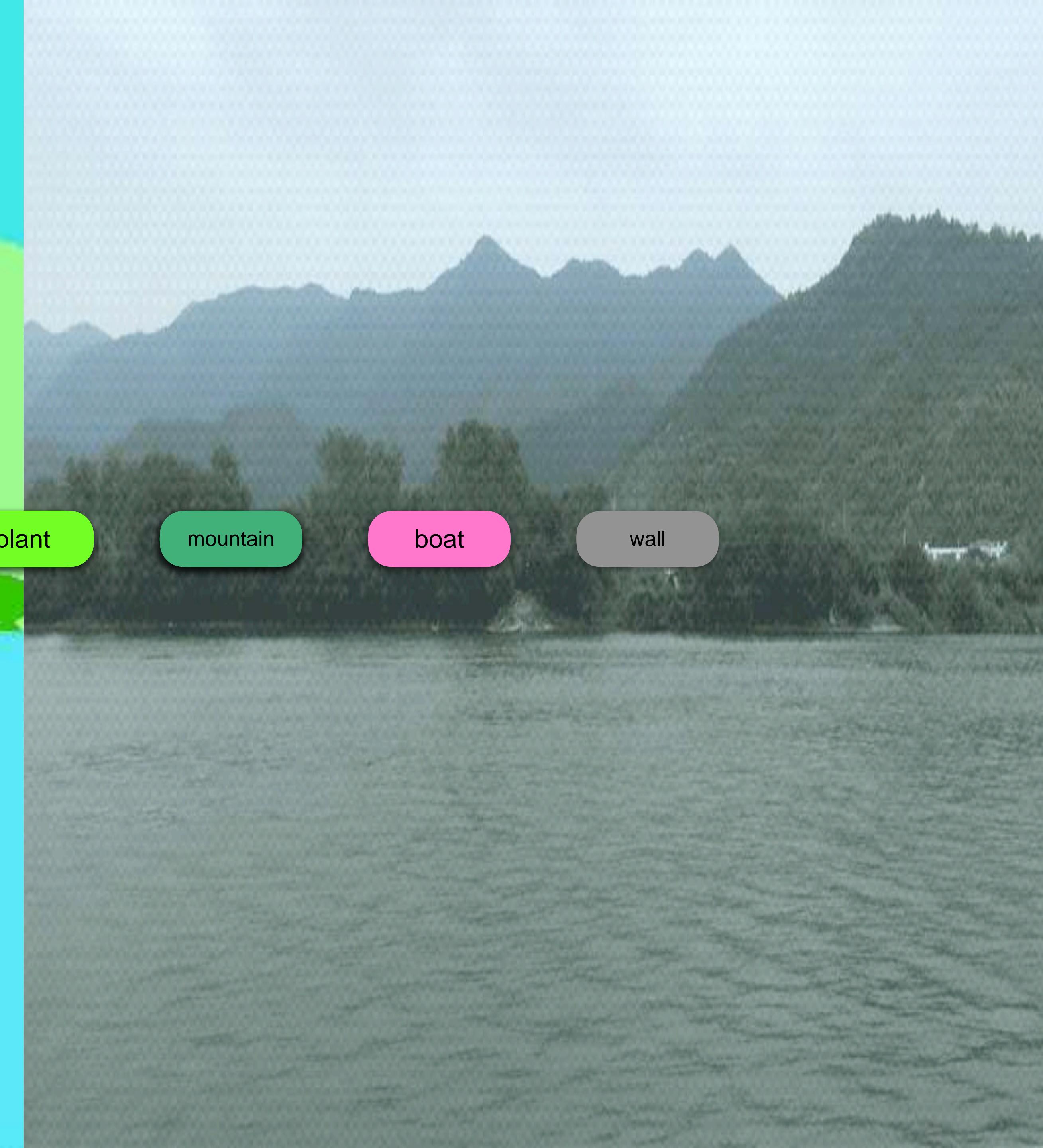


sky

water

building

plant



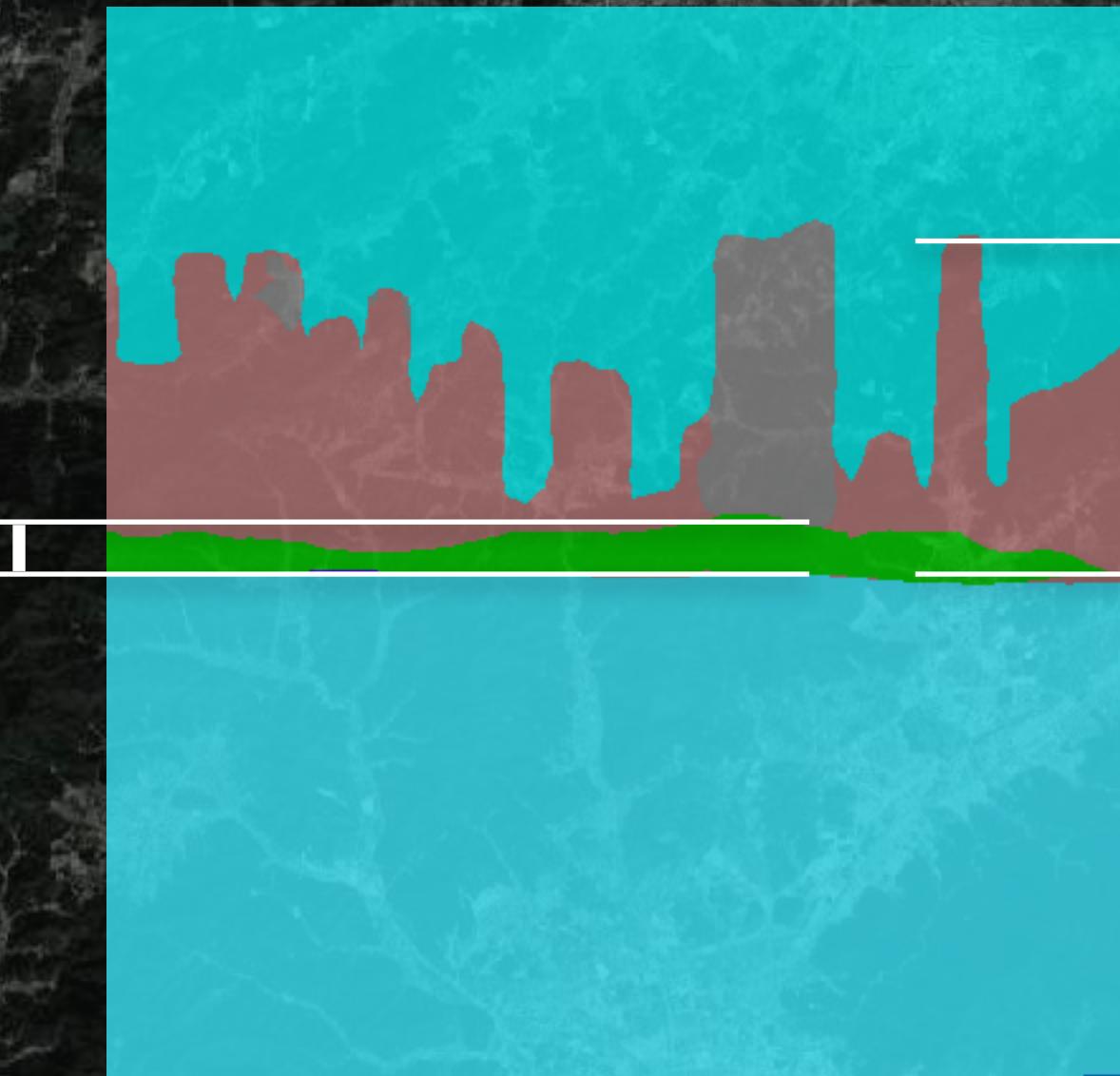
mountain

boat

wall

Ratio of Building Height / Plant Height

North Bank of Qiantang River

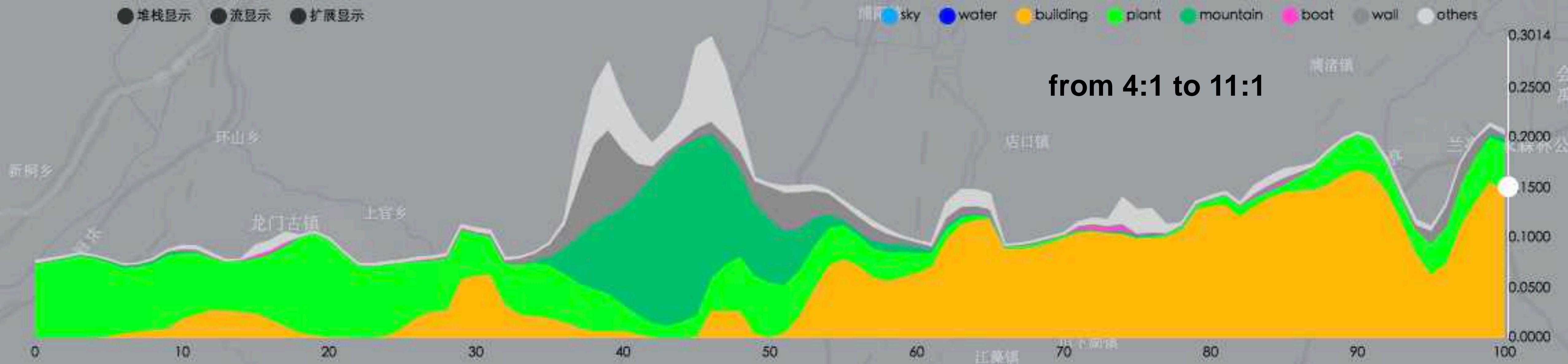


10:1

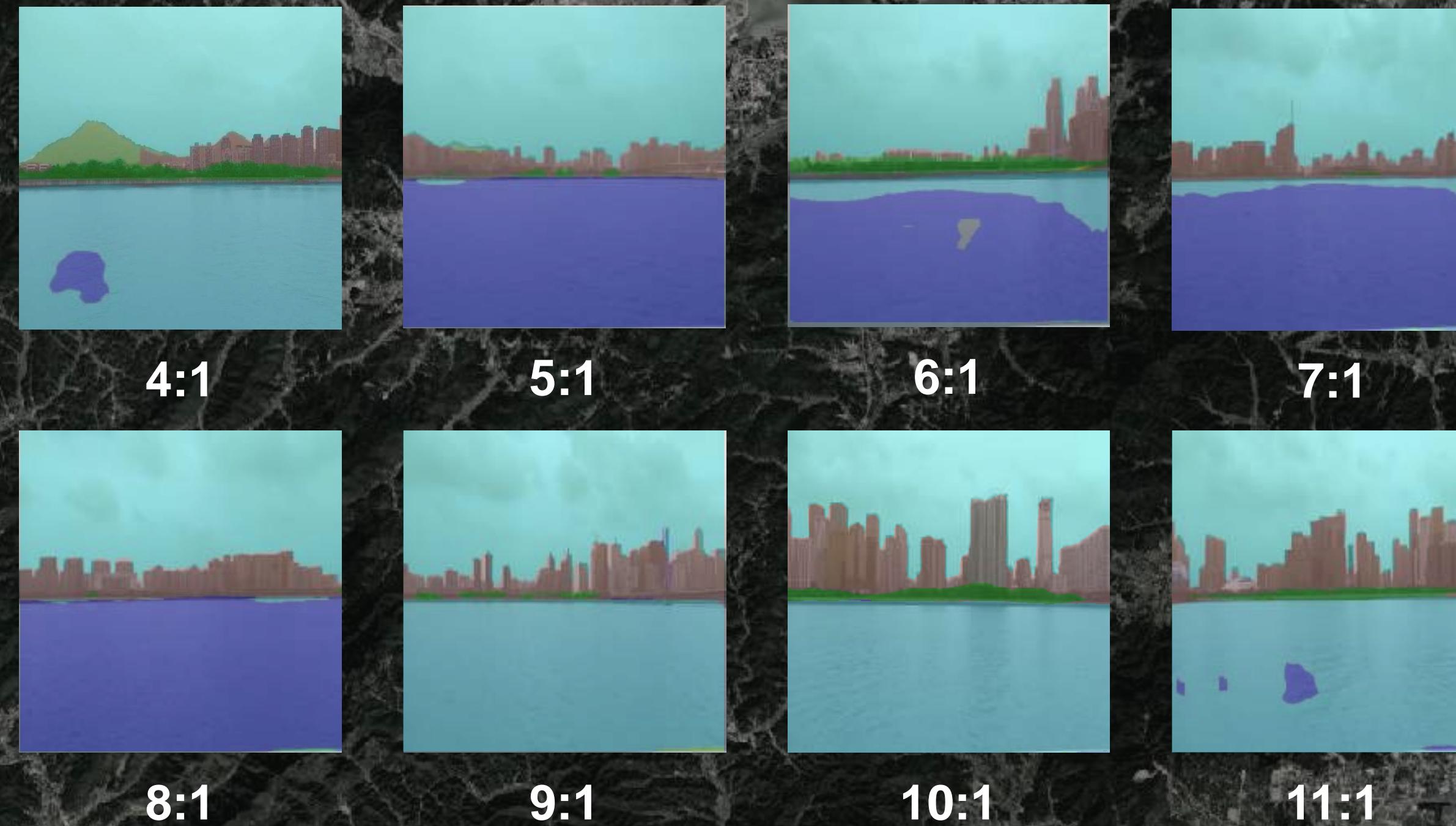
● 堆栈显示 ● 流显示 ● 扩展显示

● sky ● water ● building ● plant ● mountain ● boat ● wall ● others

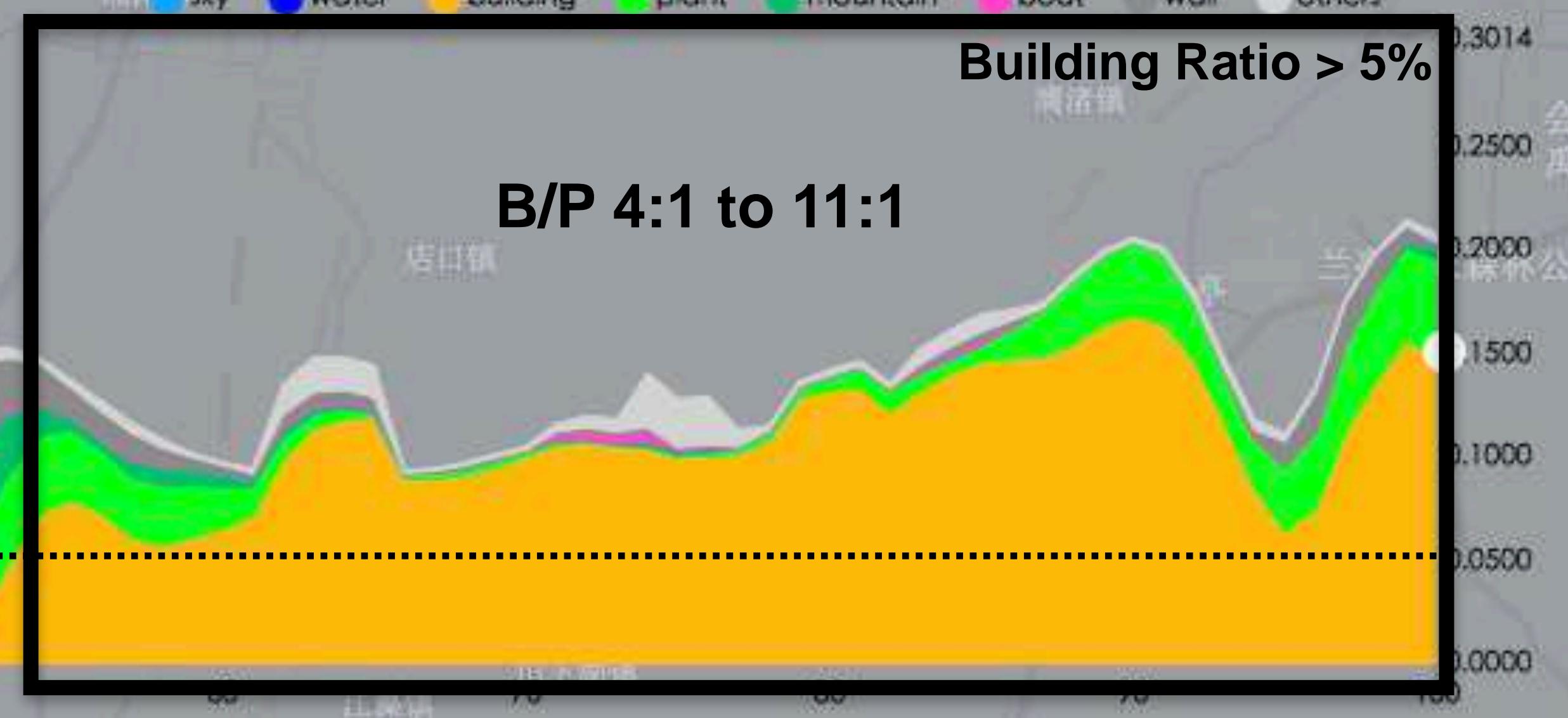
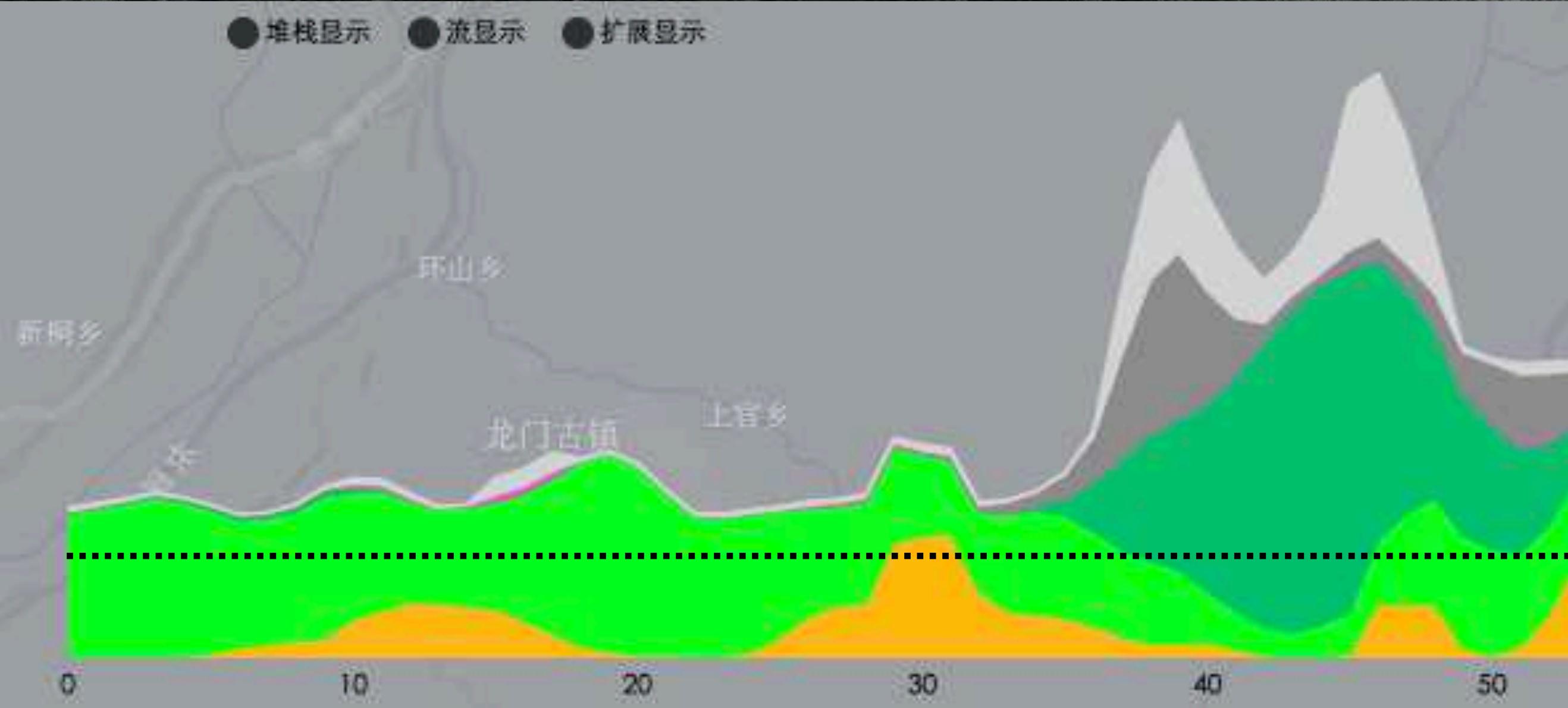
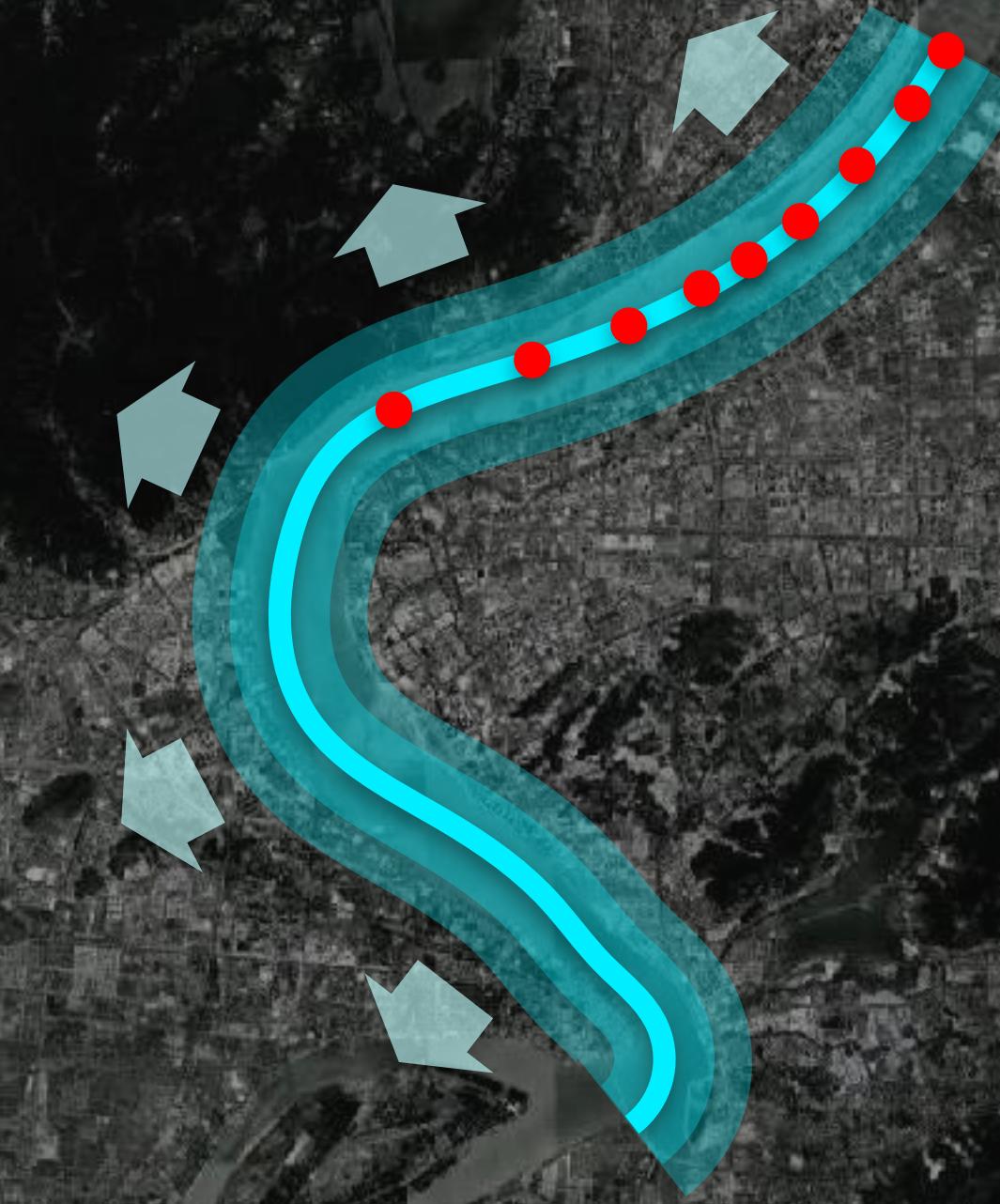
from 4:1 to 11:1



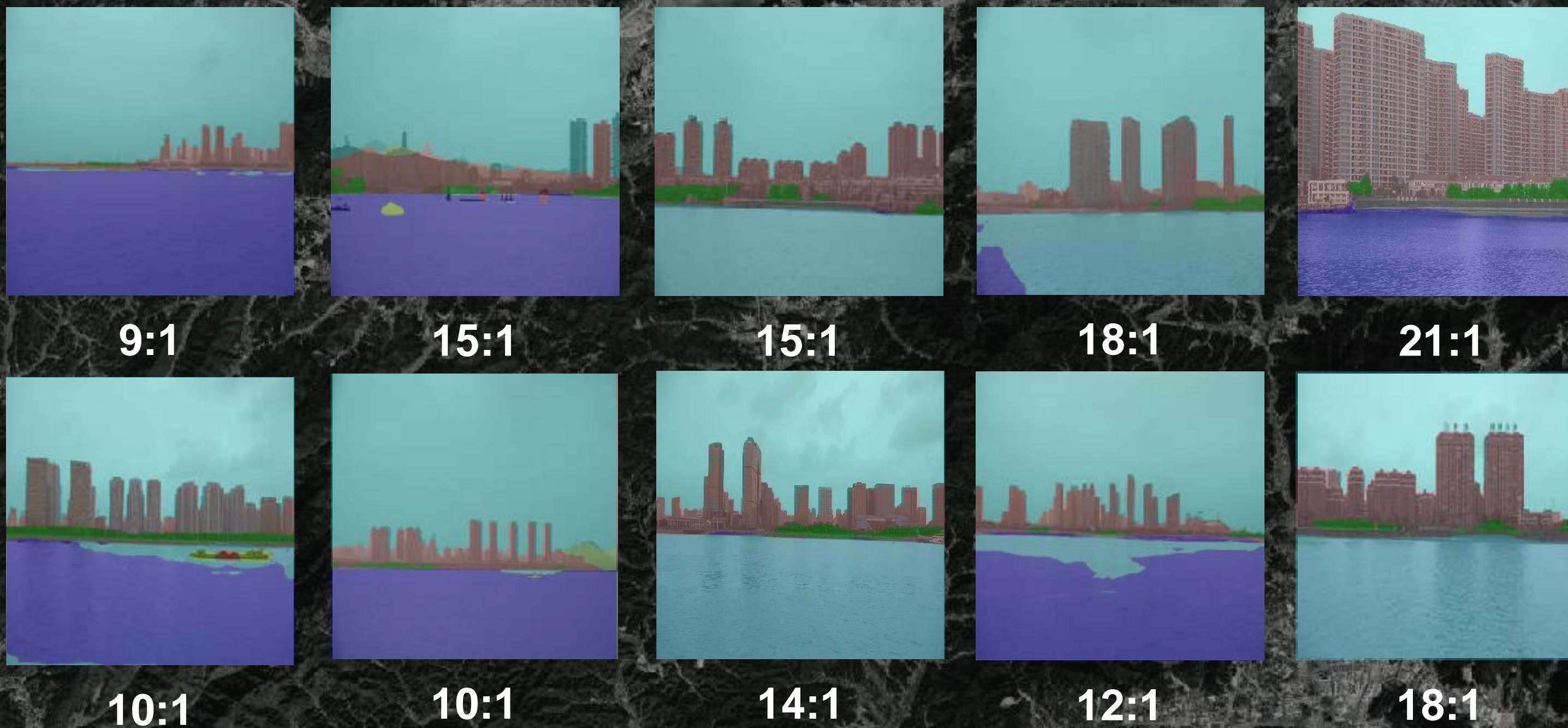
Ratio of Building Height / Plant Height



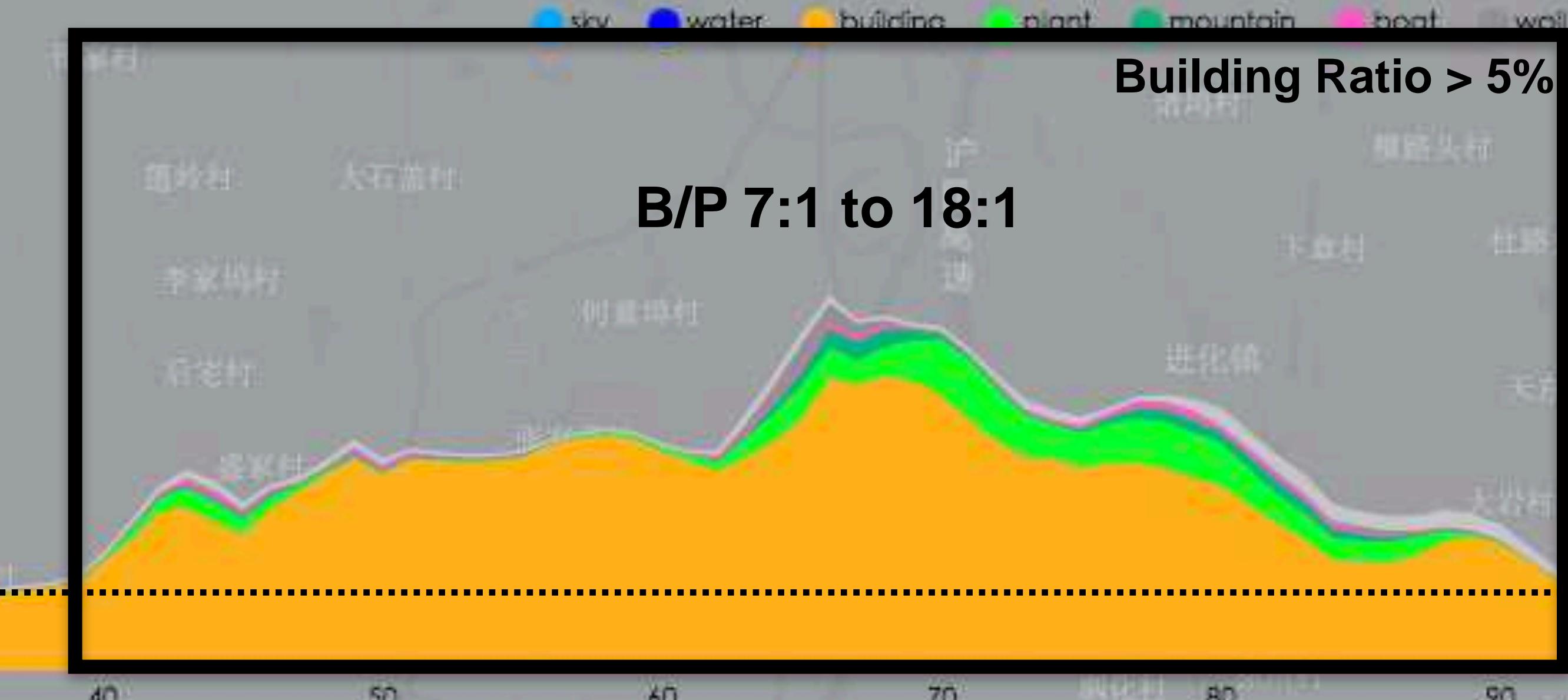
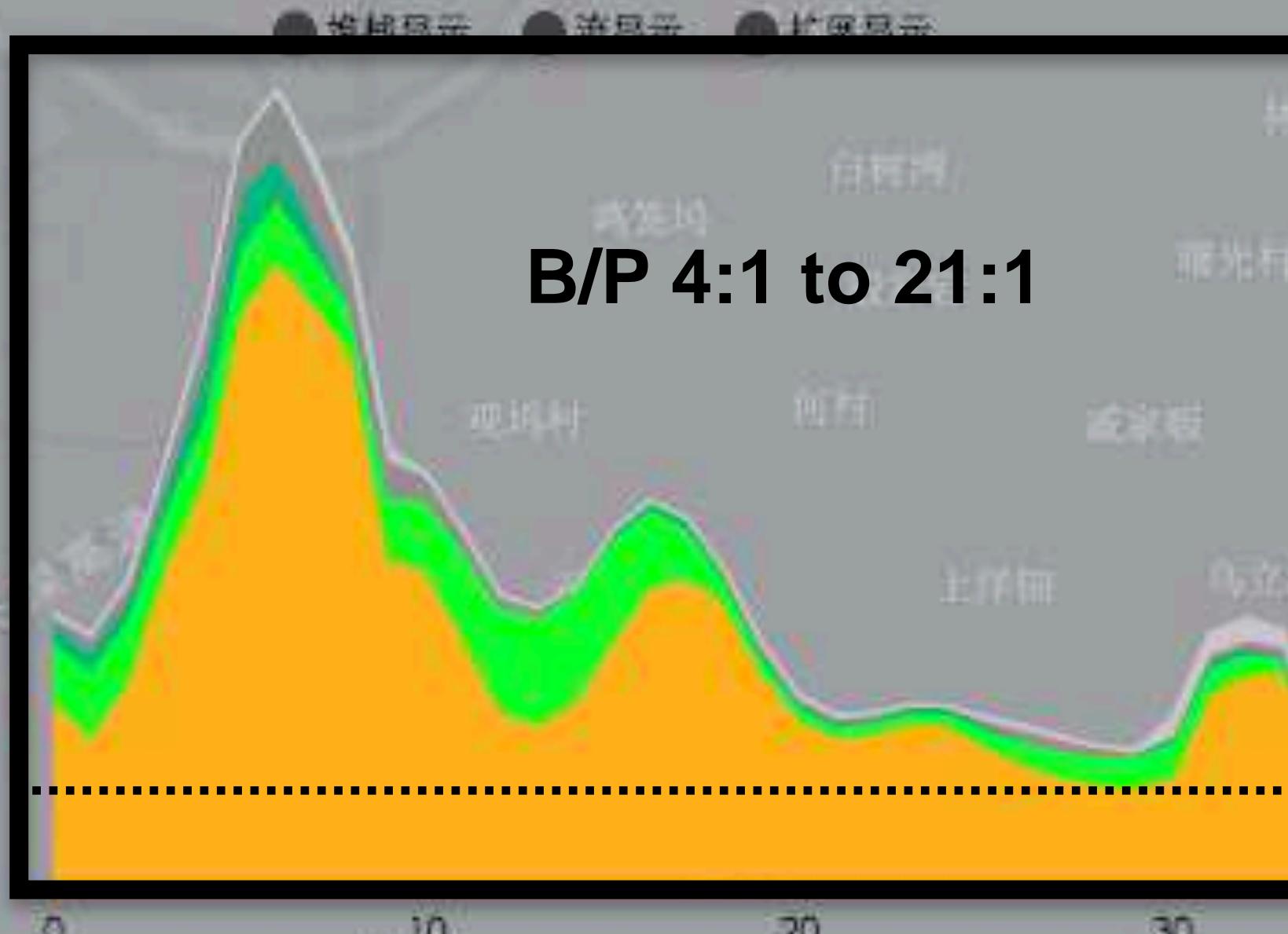
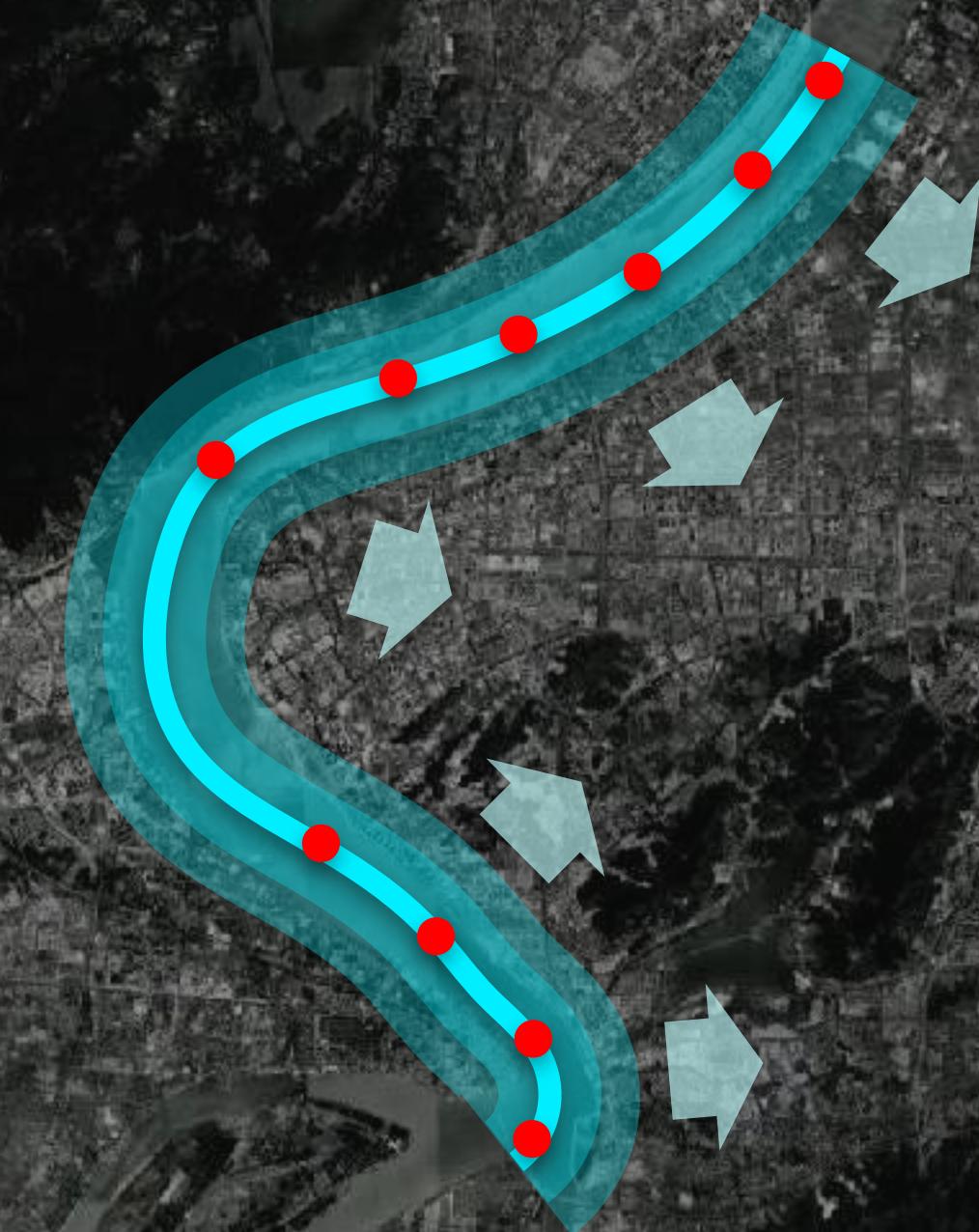
North Bank of Qiantang River



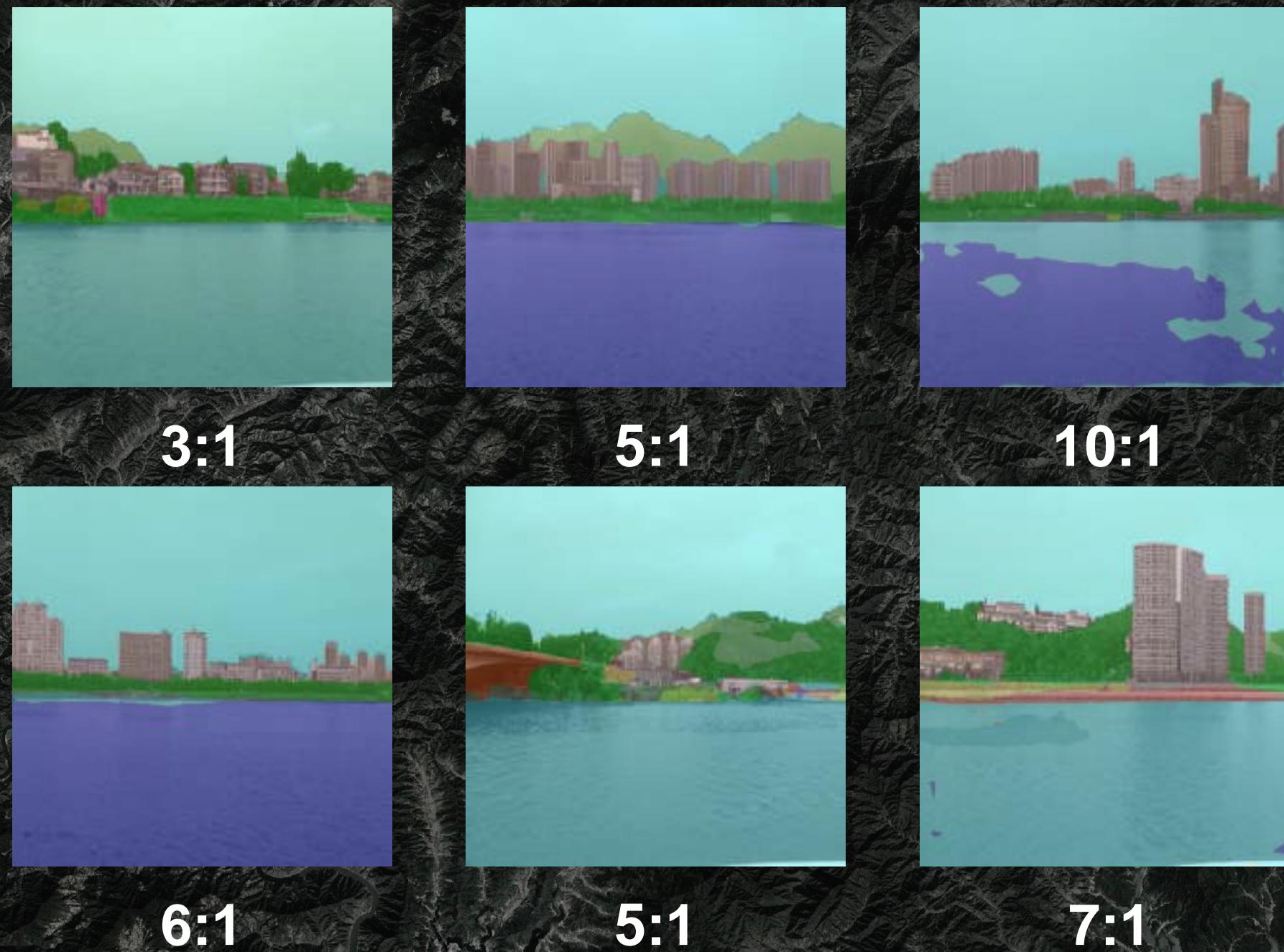
Ratio of Building Height / Plant Height



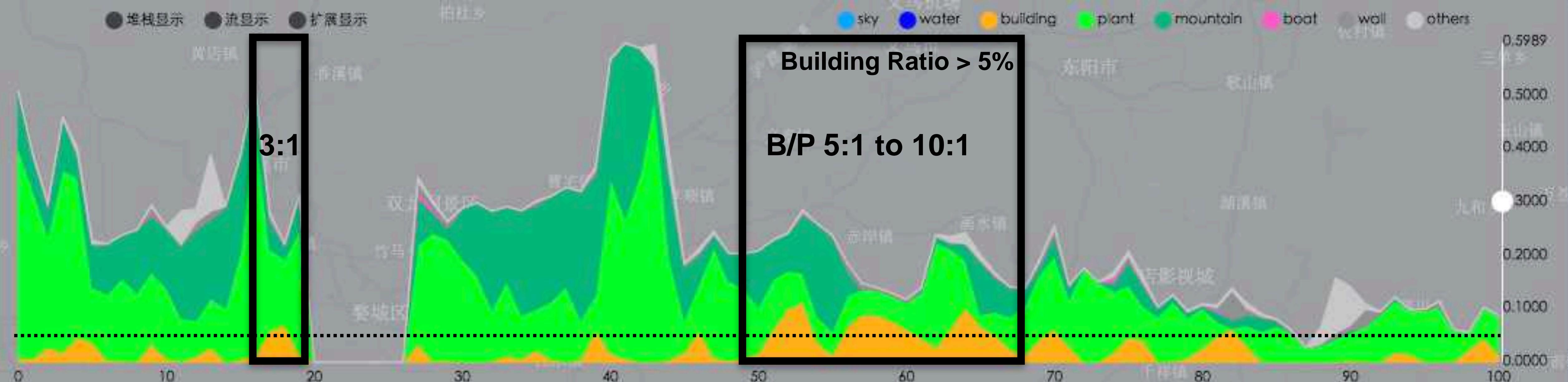
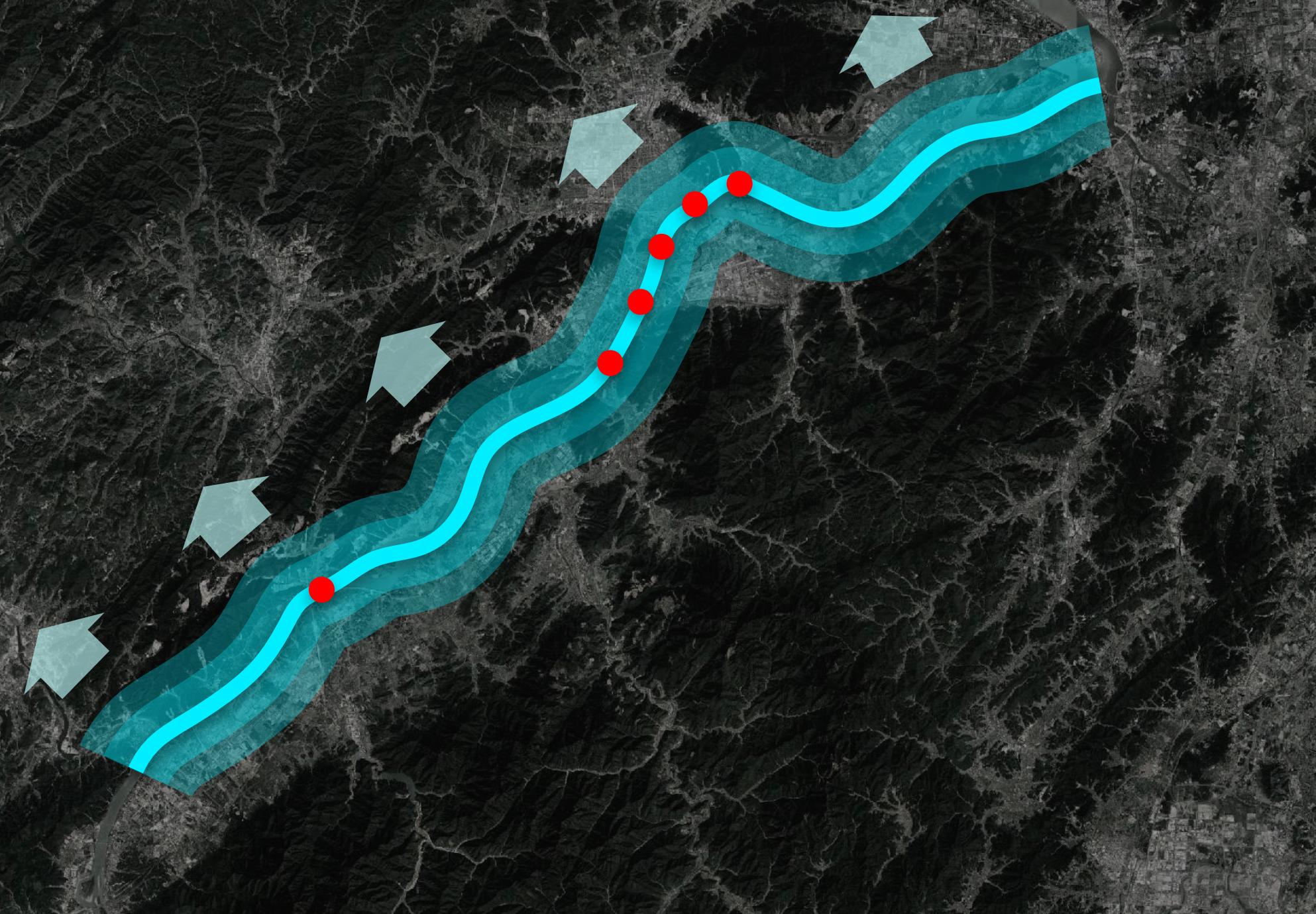
South Bank of Qiantang River



Ratio of Building Height / Plant Height



North Bank of Fuchun River



Ratio of Building Height / Plant Height

South Bank of Fuchun River



10:1



7:1



4:1



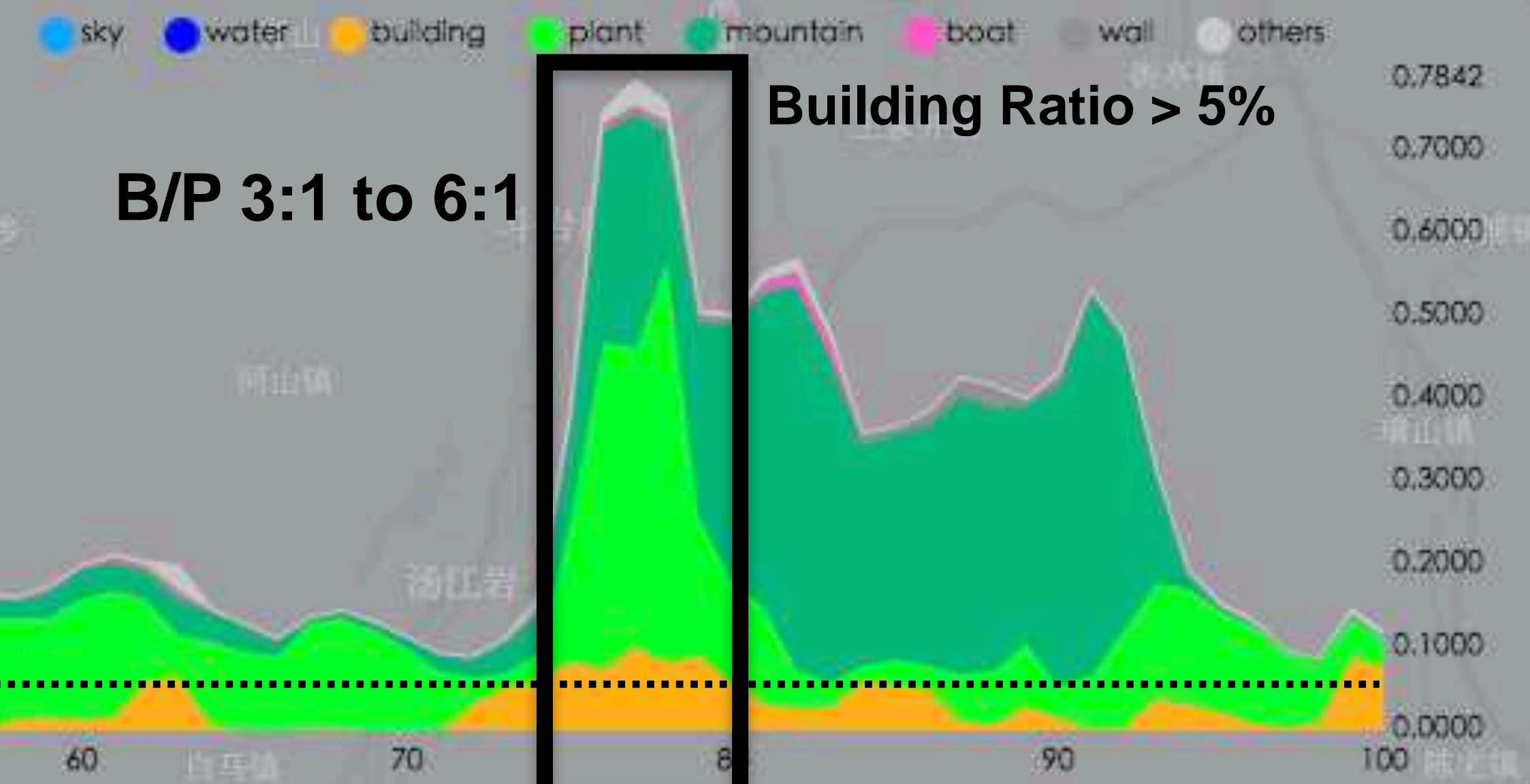
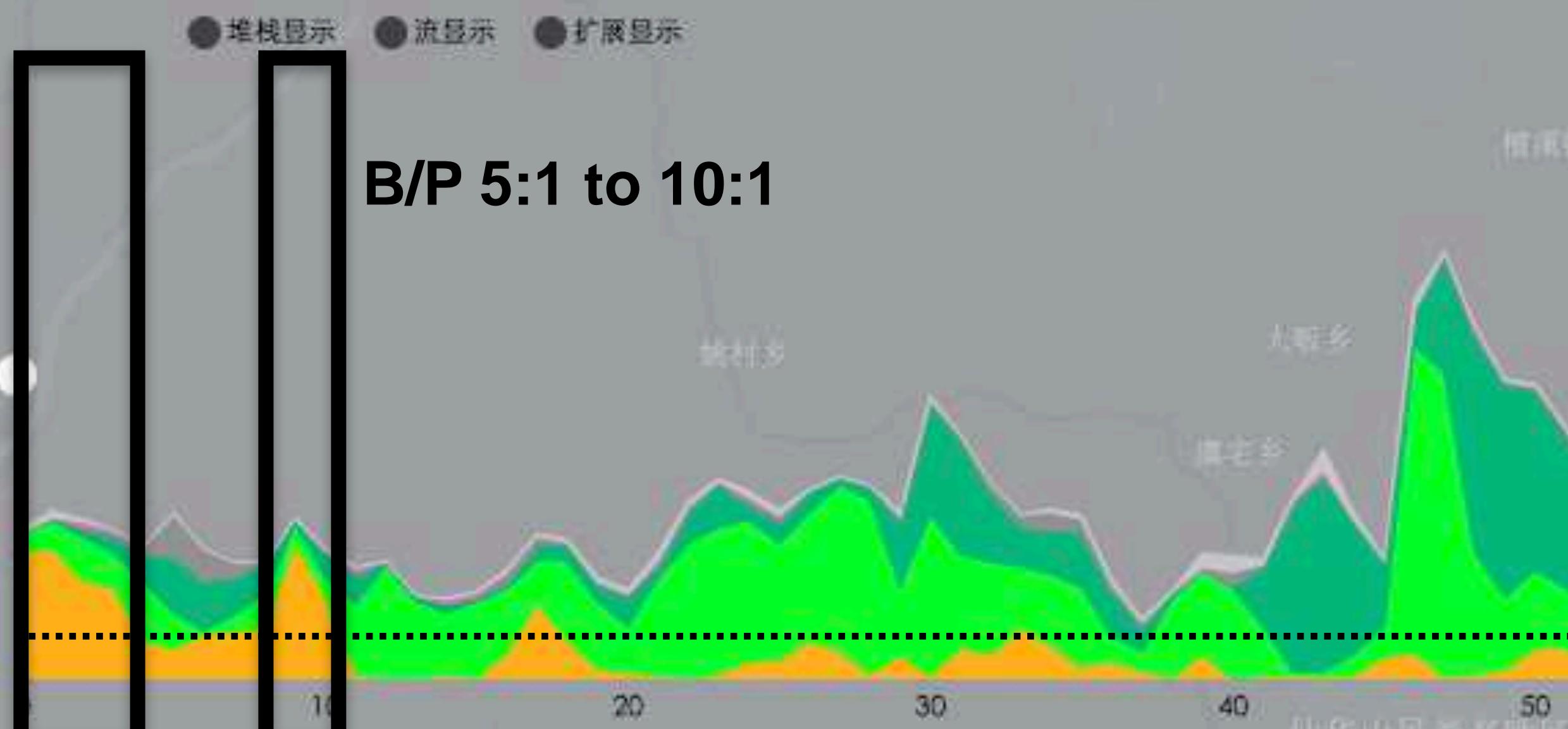
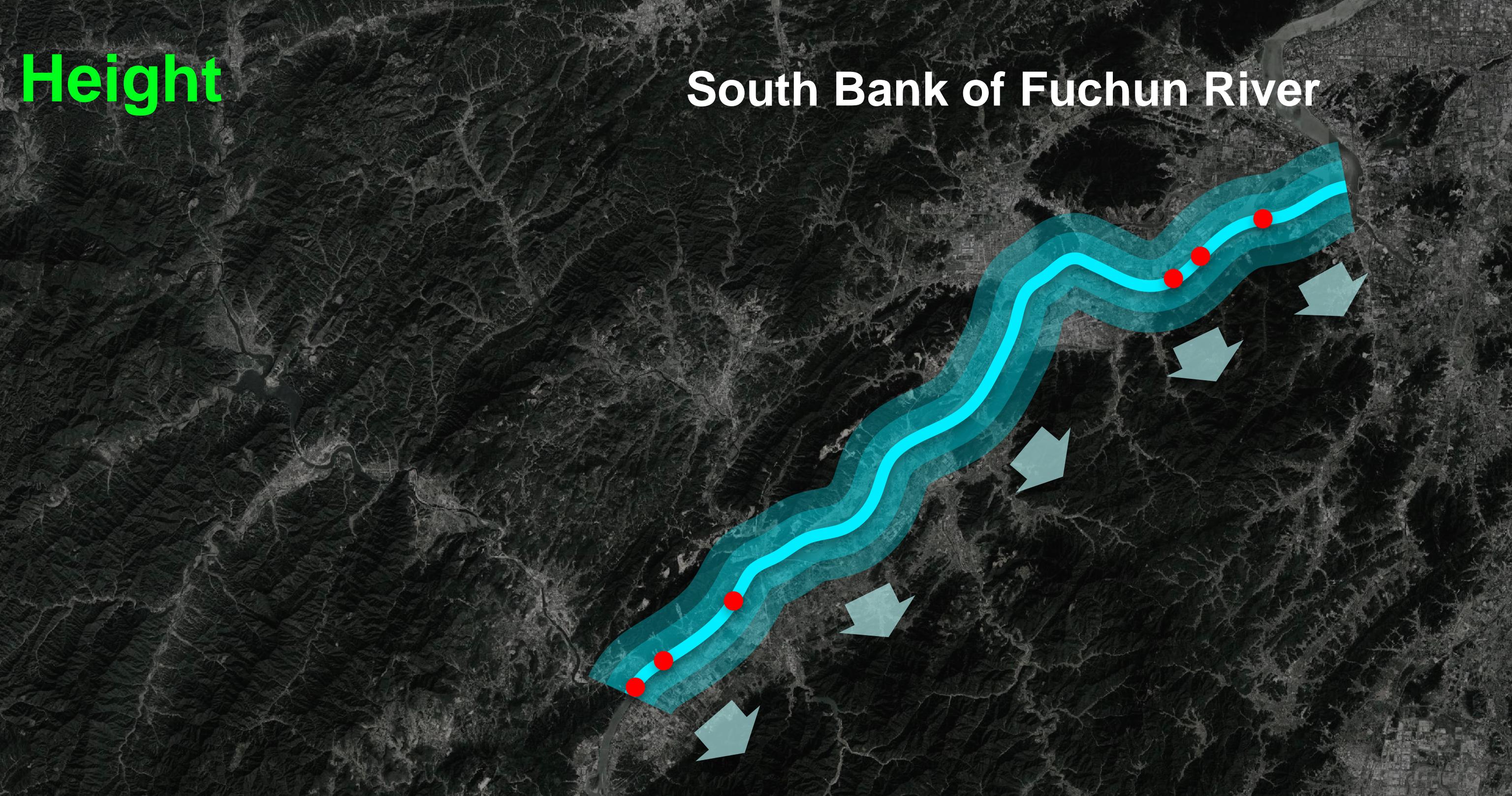
7:1



6:1



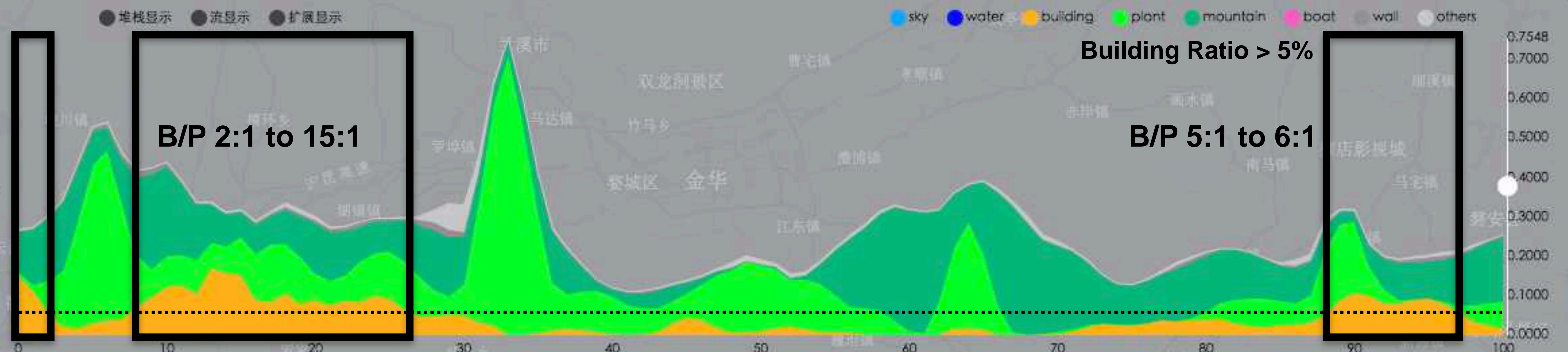
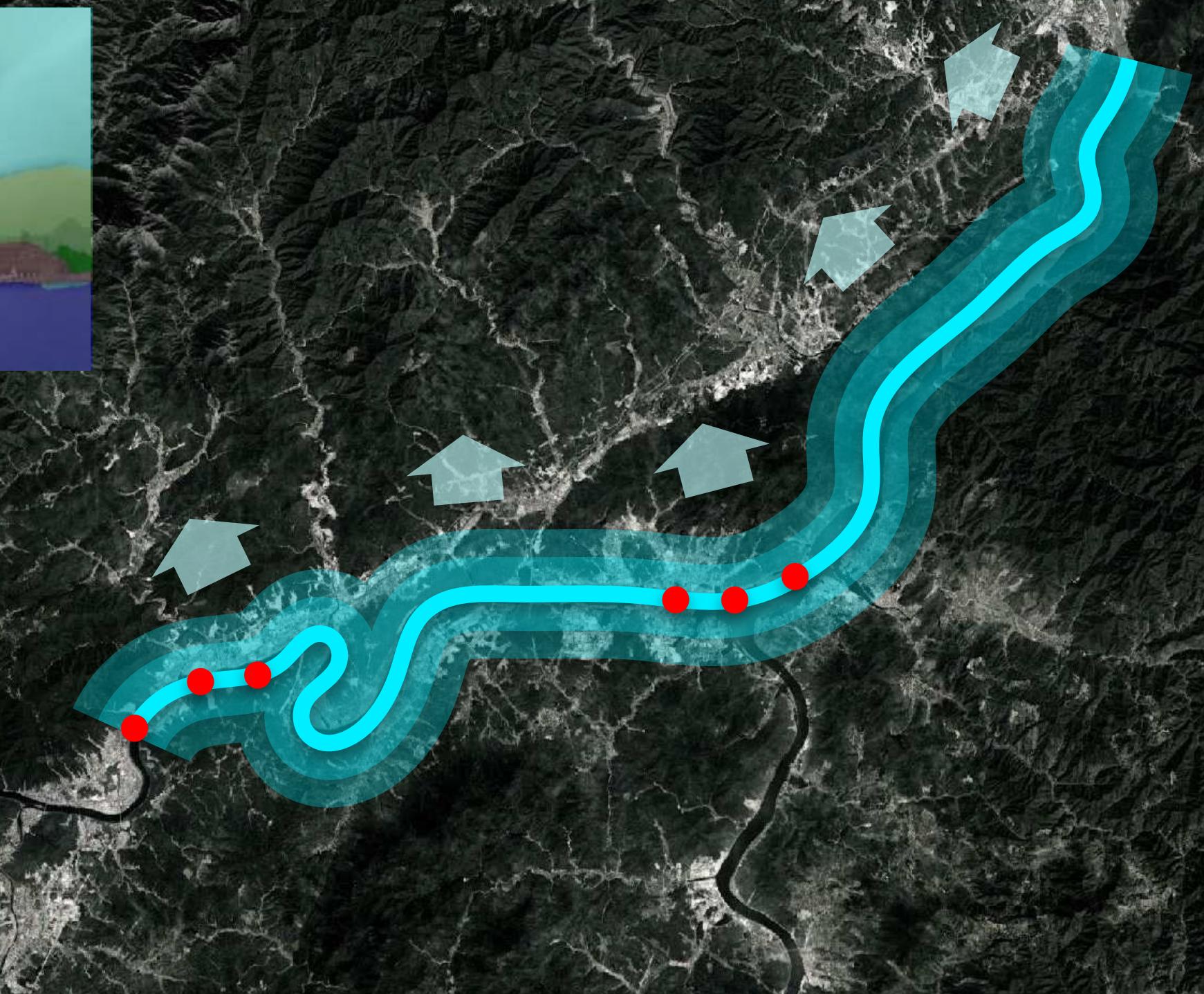
3:1



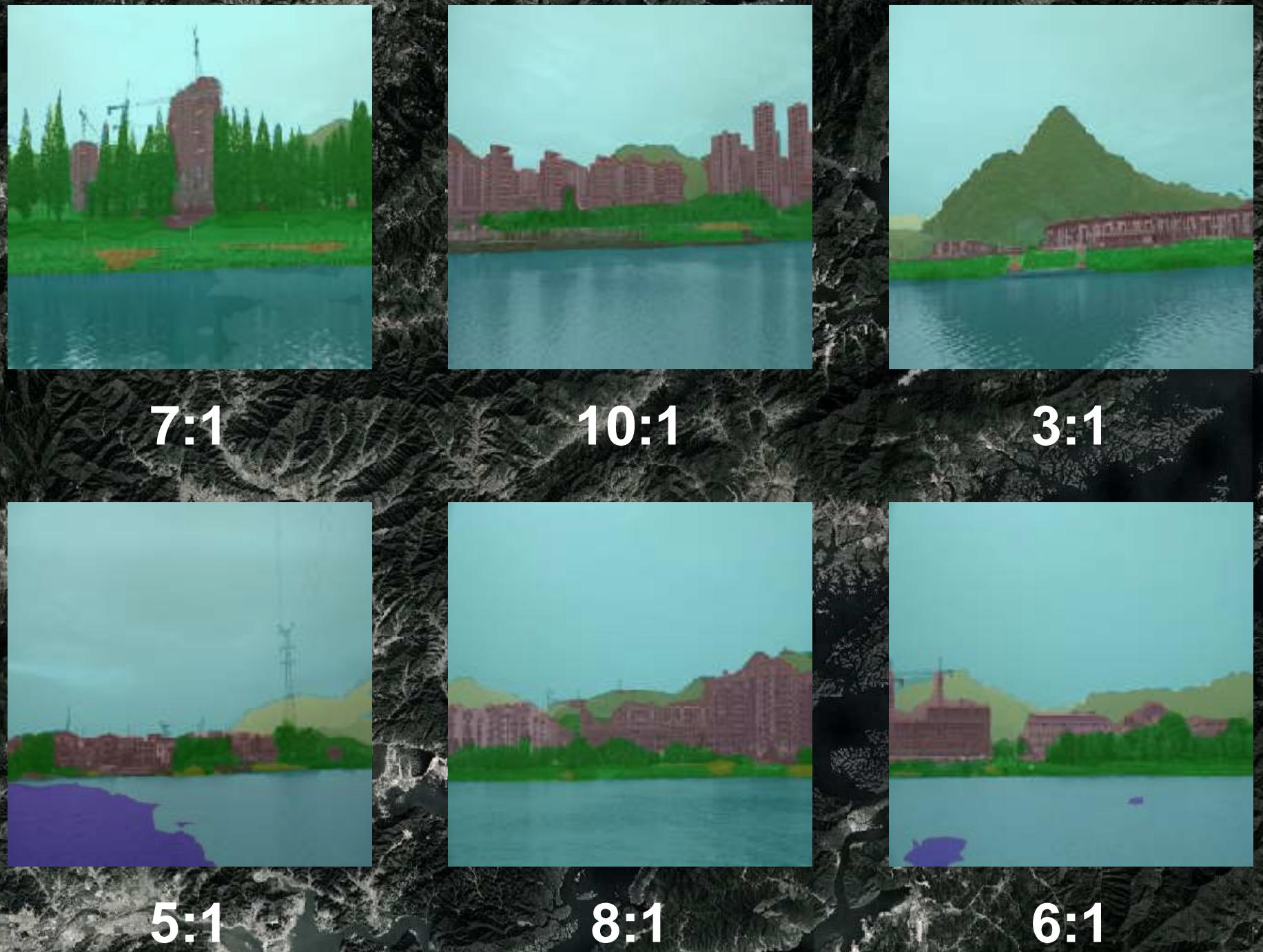
Ratio of Building Height / Plant Height



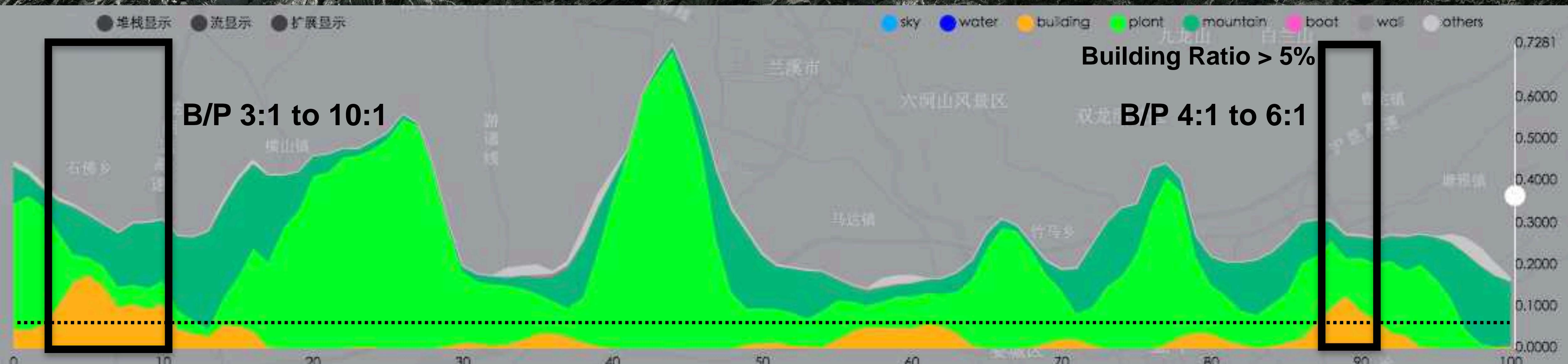
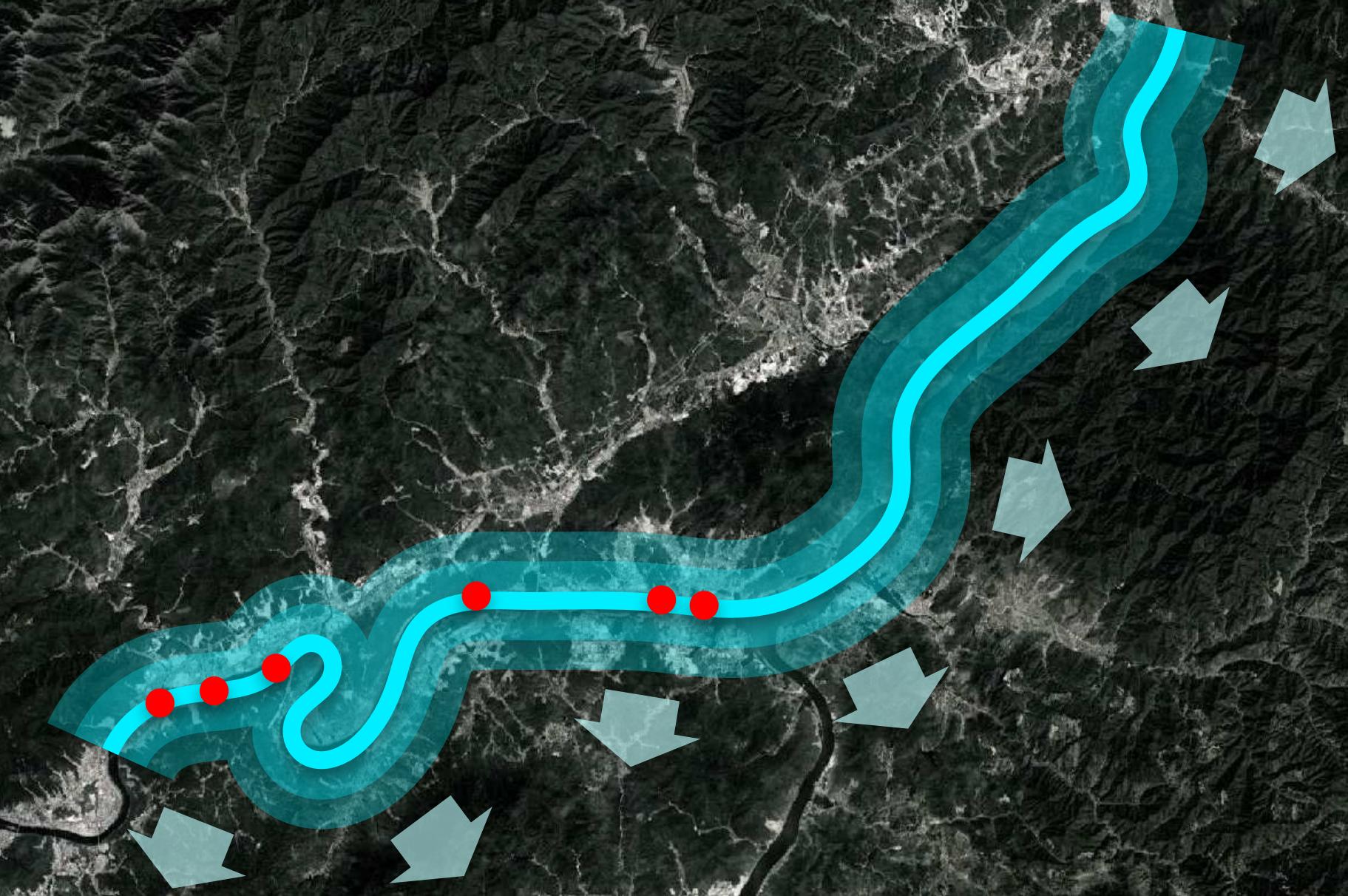
North Bank of Xin'an River



Ratio of Building Height / Plant Height



South Bank of Xin'an River



Identity Index

Based on confusion matrix

Identity Index

77.1%



Identity Index

96.6%

Identity Index

63.7%



Identity Index

62.5%



Identity Index

73.6%



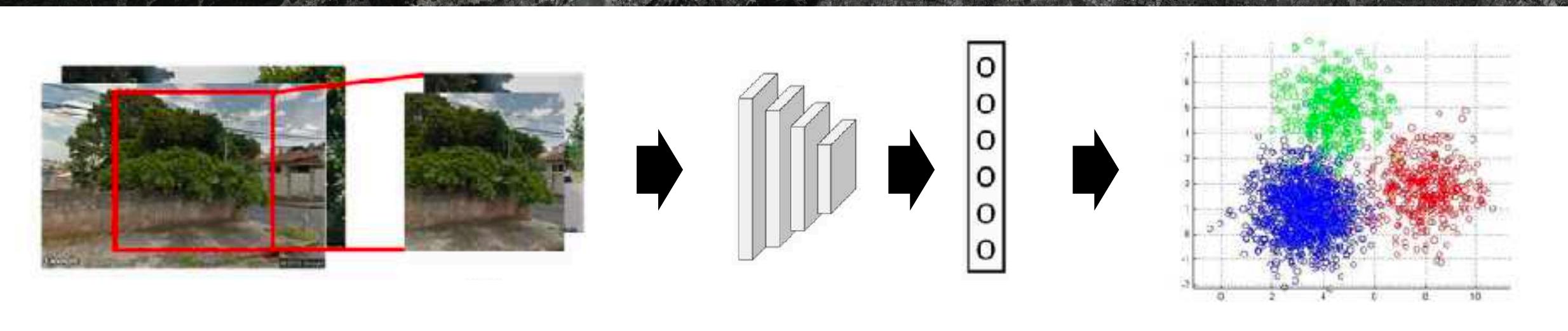
Identity Index

21.4%



Views Classification Based on Clustering of Deep Features

Type I: 21.03%



Type II: 6.69%



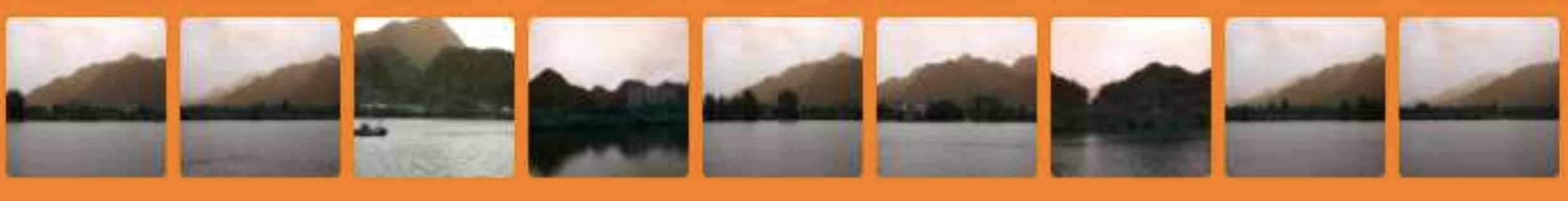
Type V: 9.68%



Type III: 12.26%



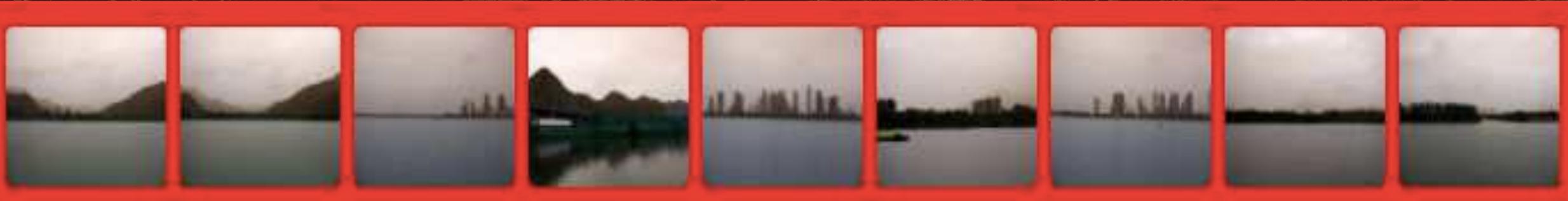
Type VI: 10.09%



Type IV: 11.35%



Type VII: 28.9%



Views Classification

Based on Clustering of Deep Features

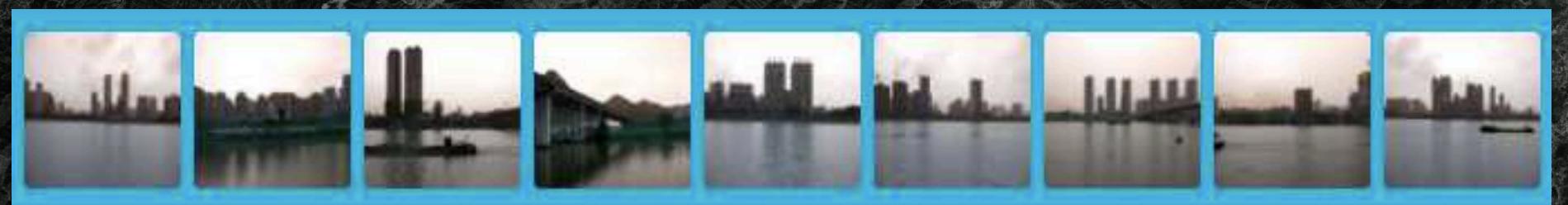
Type I: 21.03%



Type II: 6.69%



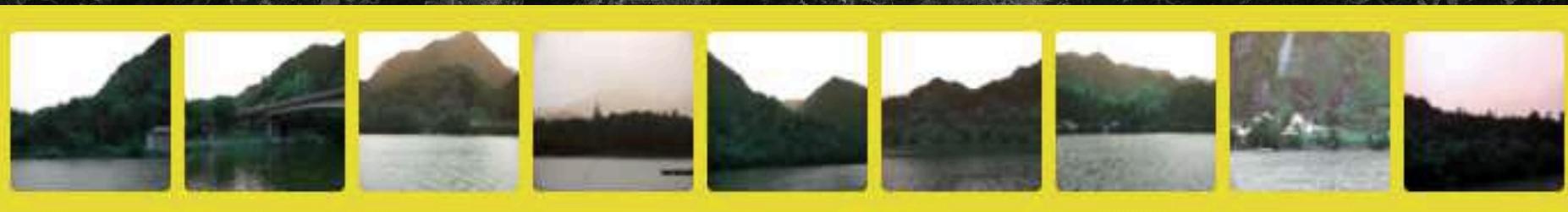
Type III: 12.26%



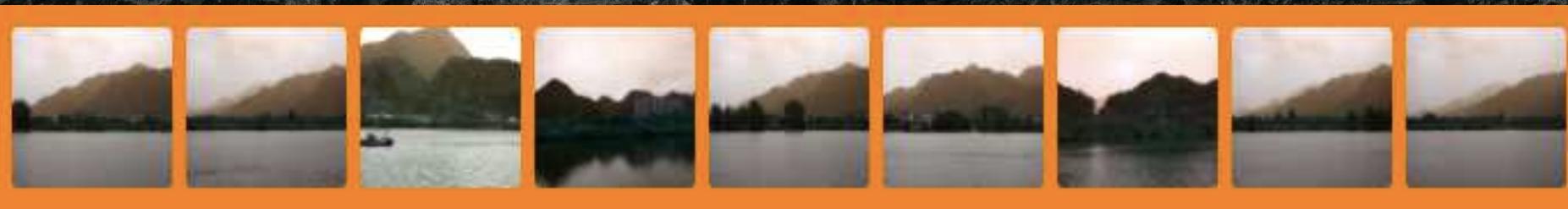
Type IV: 11.35%



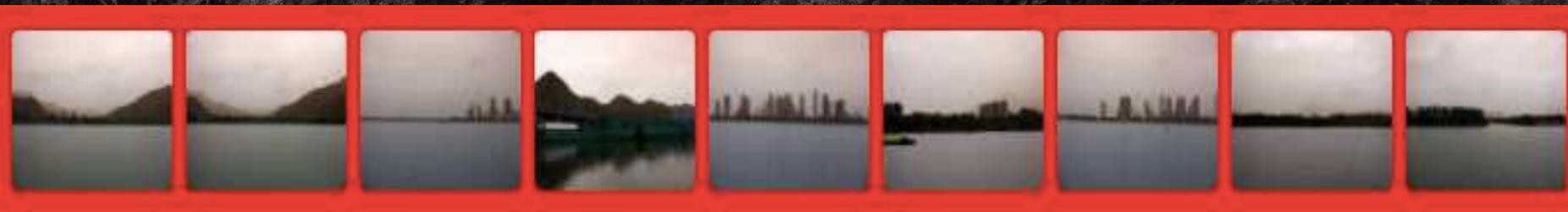
Type V: 9.68%

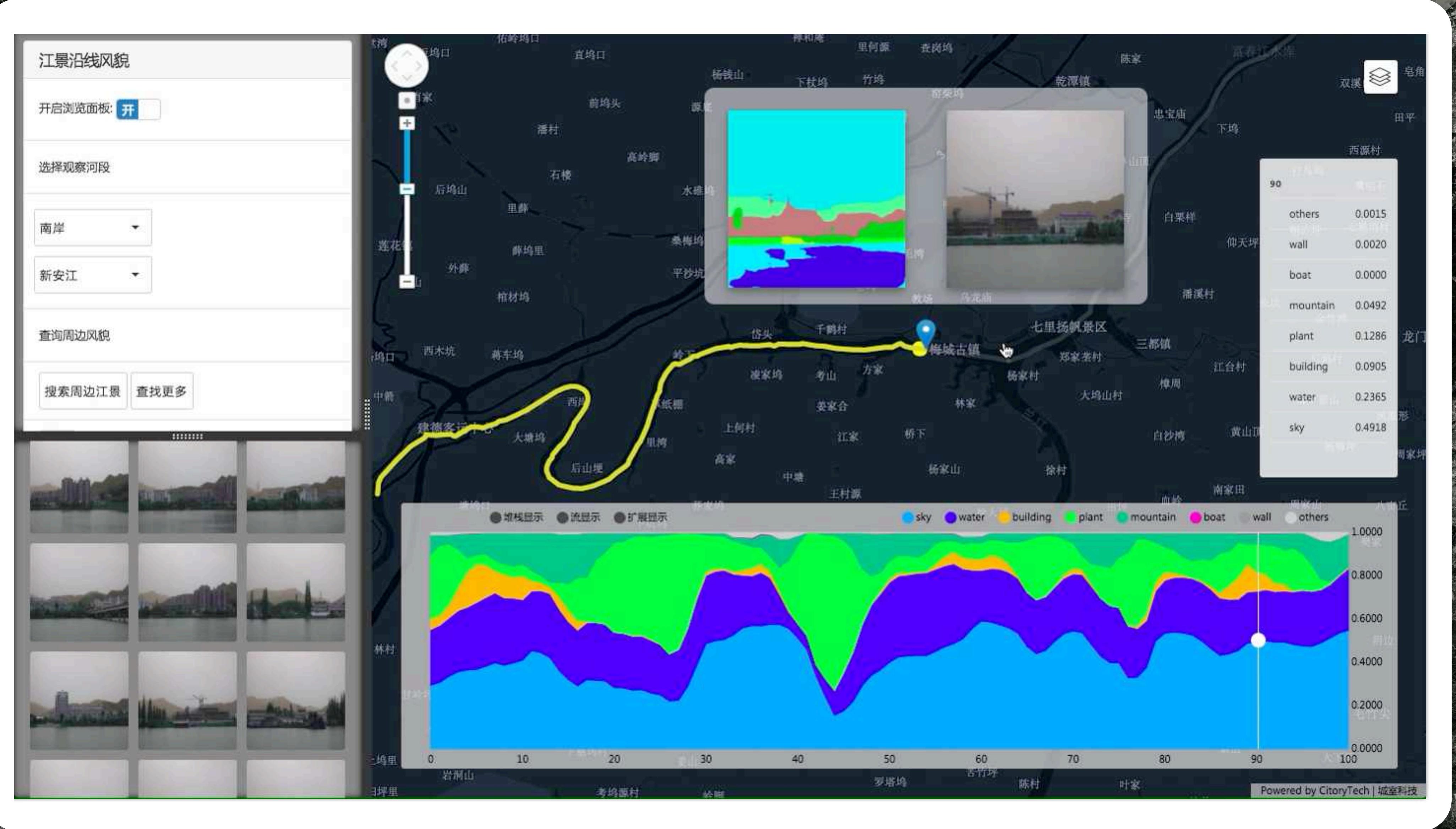


Type VI: 10.09%



Type VII: 28.9%





CONCLUSIONS

1 Detail Environment

good for overview, for decision making

2 Quantify Landscape Identity

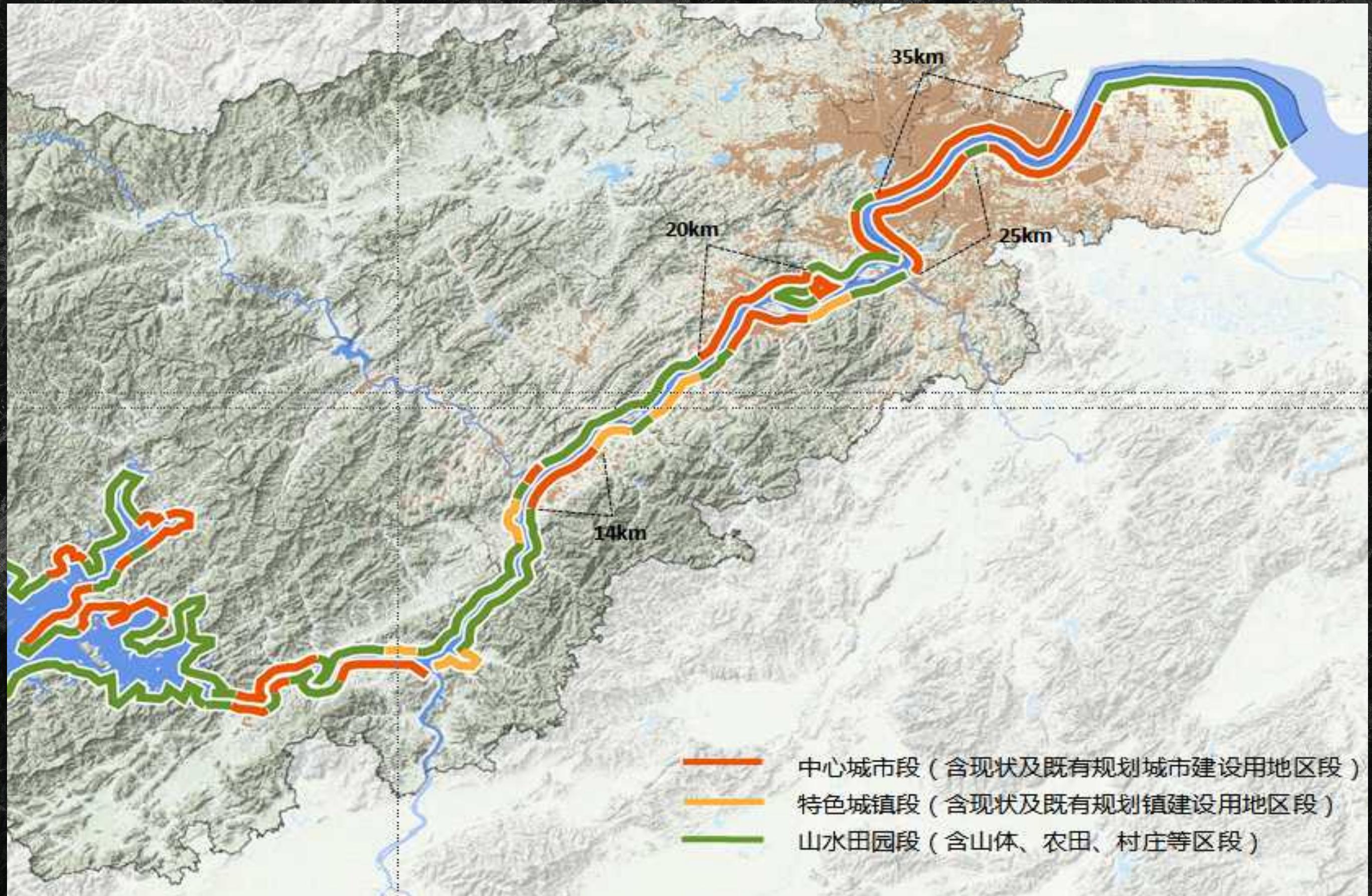
Customized index

3 Cluster based on Visual Contents

different standards for policies

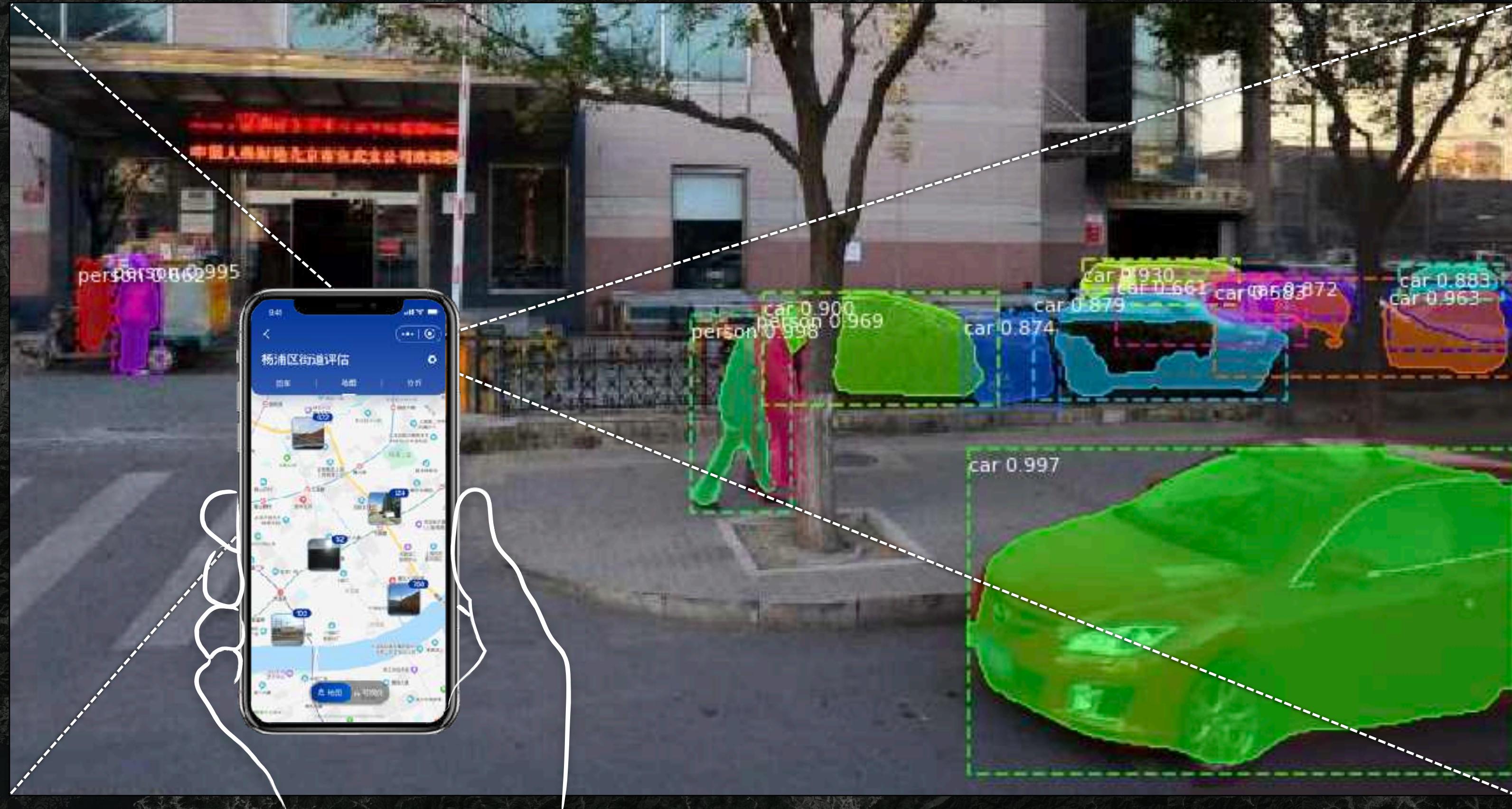
4 Not ideal for Dynamic Objects

no timestamps, no feedback



Two Directions

1 We need more Geo-Located Visual Data



project list member management mapping



photo calculation



statistics



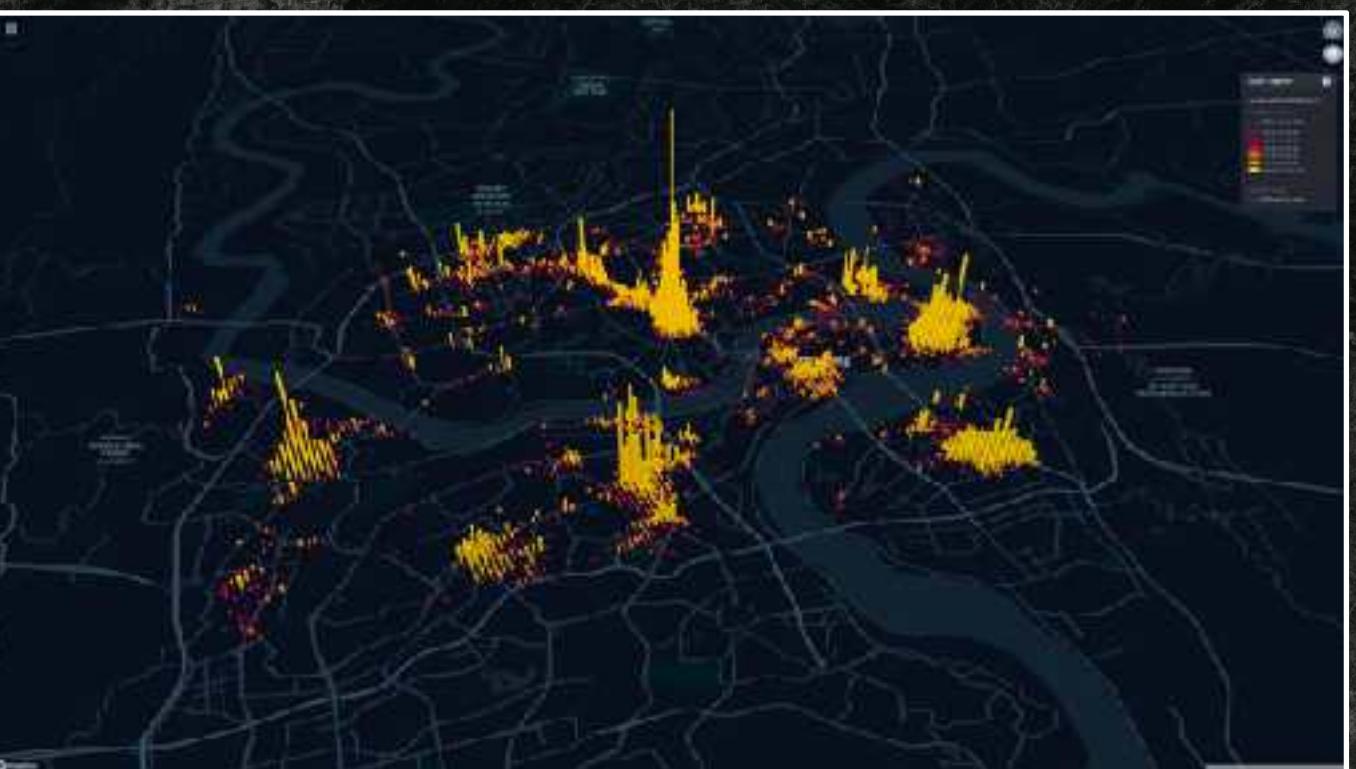
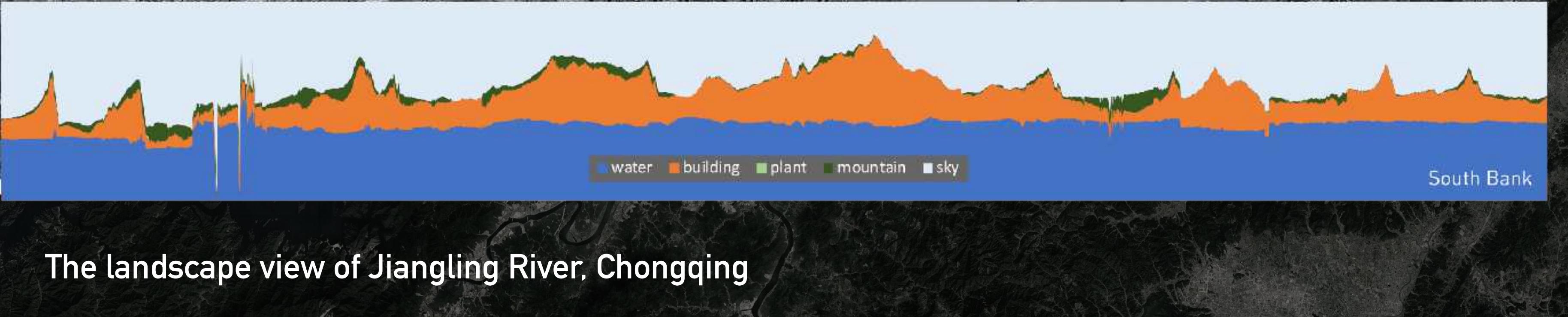
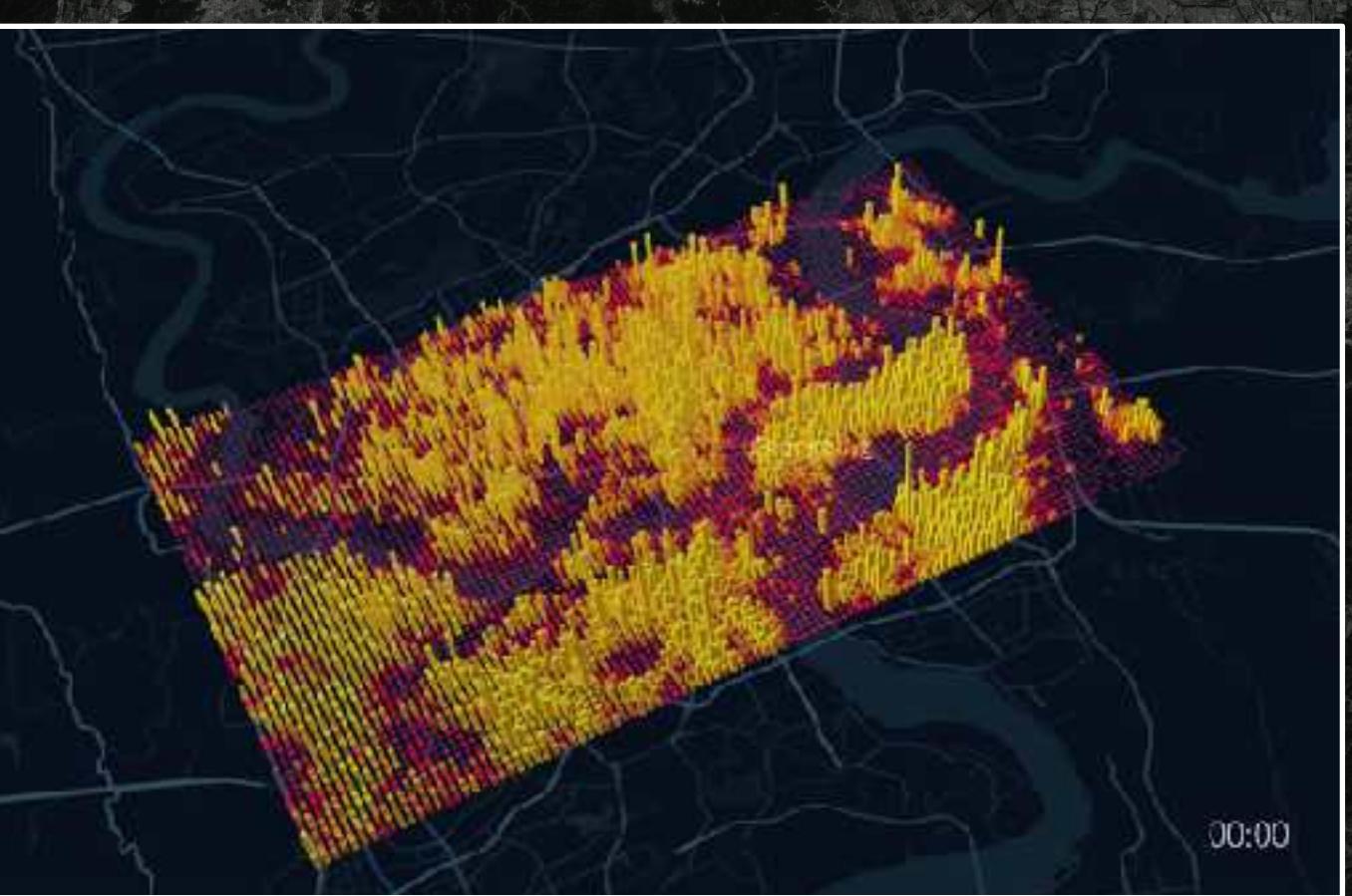
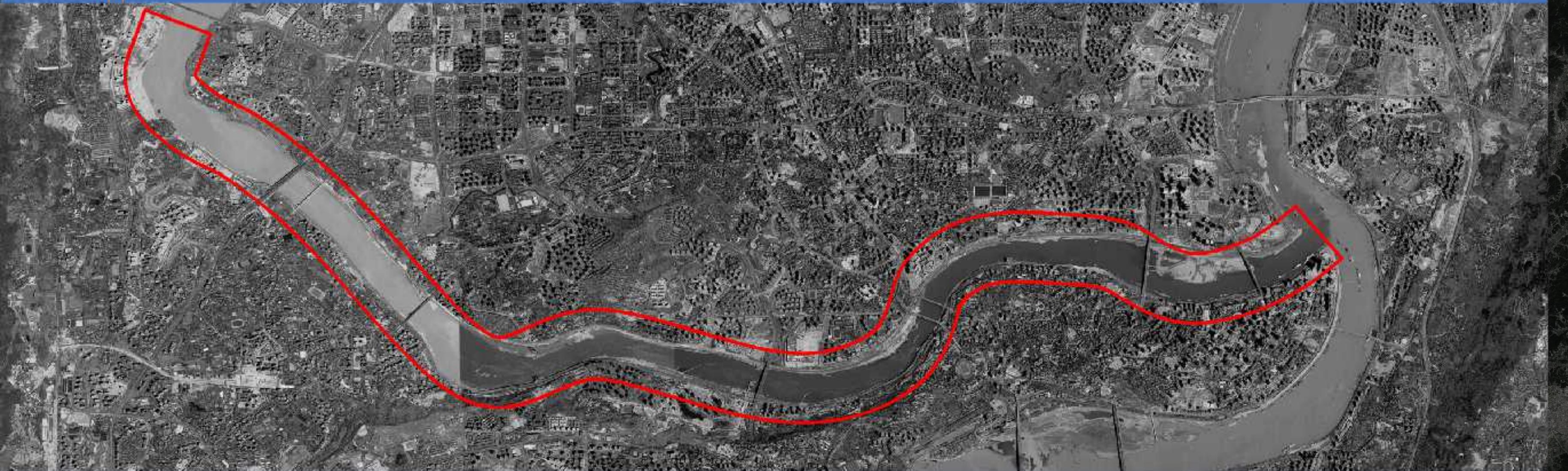
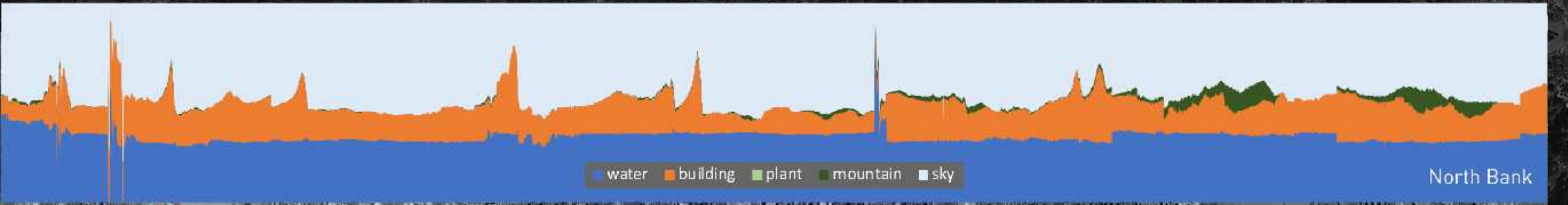
parsed data mapping



CityEye is a WeChat mini designed for group field trip. Now it is serving more than 10,000 users, mostly of who are design background students or planners. This urban photo survey tool integrates image collection, image recognition, and data analysis.

Two Directions

2 Collaboration with Human Behavior Data



The landscape view of Jiangling River, Chongqing