

# **SURFACE FORMS OF THE EARTH: ANTHROPOGENIC GEOMORPHOLOGY**

**Image Guide to Man-Made Landforms**

***500+ Images***

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the Higher Education Restructuring Fund of the Hungarian Government*

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# **WATER MANAGEMENT**

# **Classification of water management (river regulations)**

## **GOAL**

### **Flood control**

Dams, levees, oxbow lakes, flood levels rise, narrow flood plain - a broad floodplain, incision

### **Drying**

Artificial channels, drainage, erosion base level reduction, facilitating runoff

### **Flooding**

damming, limiting runoff, channel threshold, extra water addition

### **Irrigation**

Pump stations, canals, locks, dams

### **Shipping**

Dredging, deepening, artificial channels, locks, spurs, harbors, piers

### **Revitalization**

### **Power generation**

Damming, sediment-trap, sediment-transport, changes in deltas and bars

### **Water energy**

watermill dams, artificial channels, sediment accumulation

### **Recreation**

Meander cut, damming, constructions, roads

### **Drinkwater reserves**

Damming, canal building

### **Fishing**

Damming, flatwork, road construction, sediment accumulation

### **Mining**

terrace gravel mining, river width and flow conditions change

## ***Technique***

### **Flood dikes**

Height, width, material, backwater, animal intrusions

### **Dam**

Height, horizontal, terrace forming, abrasion, sedimentation

### **Channel threshold**

Height, durability

### **Spur**

### **Artificial channel**

Trail (new or former river bed)

### **Channel cut**

Oxbow lakes, sedimentation, eutrophication

### **Channel dredging**

sediment transport

### **Terracing**

Irrigation, sediment, mud spreading

### **Afforestation**

tree types, location

## ***Landscape***

**Mountains**

**Hills**

**Lowlands**

## ***Morphology***

**Positive**

Dams and dikes, embankments, mud spreading, spurs

**Negative**

channels, ditches, abrasive shapes, landslides scars, reservoir pools, docks, surface subsidence

**Leveled**

Polders, settlements, roads, paved beaches

## ***Climate***

**Cold**

Ice erosion, migration routes

**Temperate**

Taiga: strong winds, beach degradation, deforestation

Continental, Mediterranean: there are limited data on the discharge estimation, strong water level fluctuations, uneven sediment transport, strong evaporation

**Hot**

Equatorial: strong weathering, landslides, effective sediment transport, huge masses of water, fast surface evolution, soil degradation, huge catchment areas

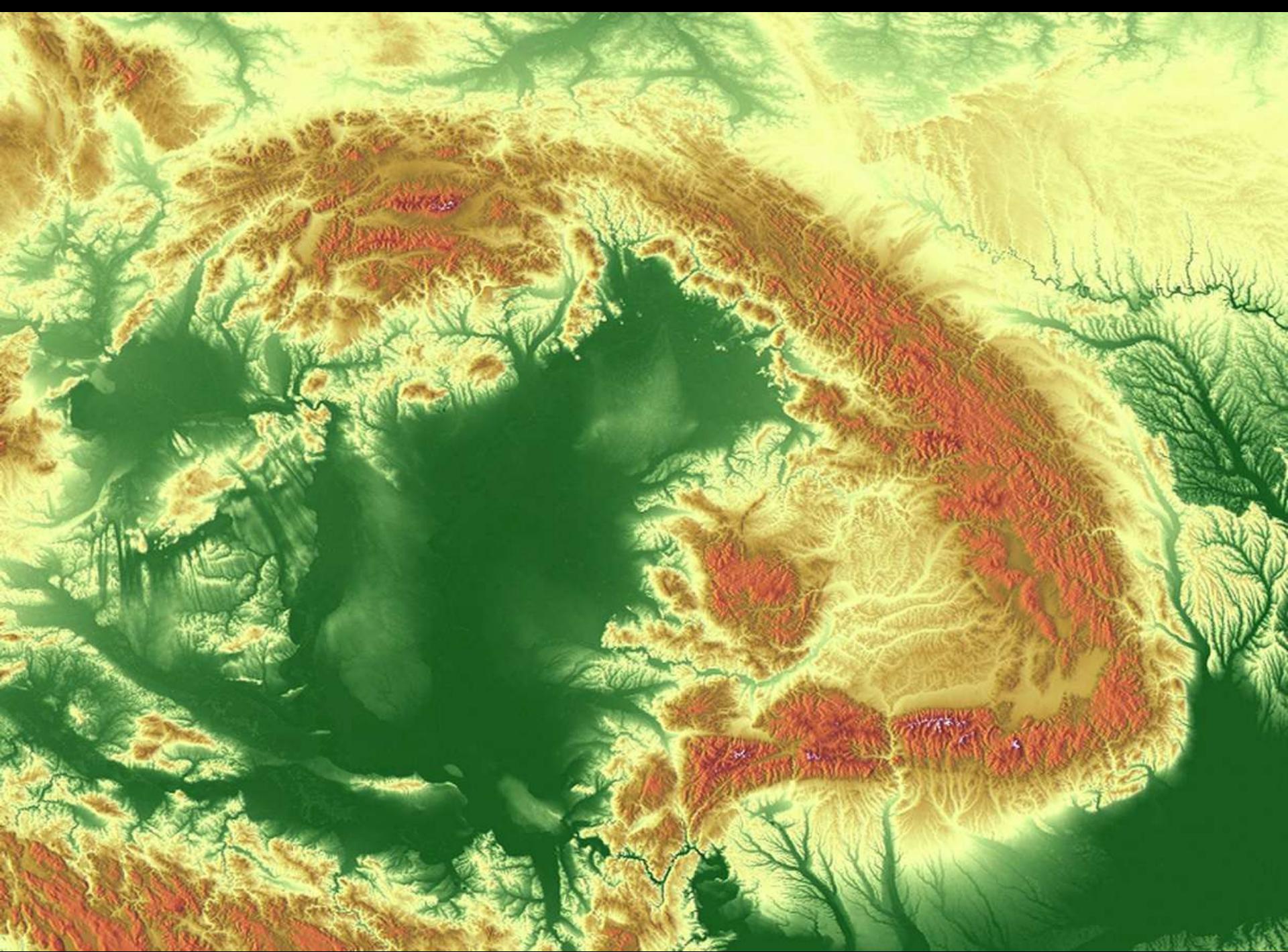
Natural meandering, broad floodplains, oxbow lakes, swamps





Artificial channel, narrow  
floodplains, meander cuts,  
oxbow lakes, shortening  
of river courses





# Flooded lowlands before the river regulations (17<sup>th</sup> Century)



Csörsz-trench (3-4<sup>th</sup> Century)  
- non-permanent streams  
in the hollows



**ÉCZET.**

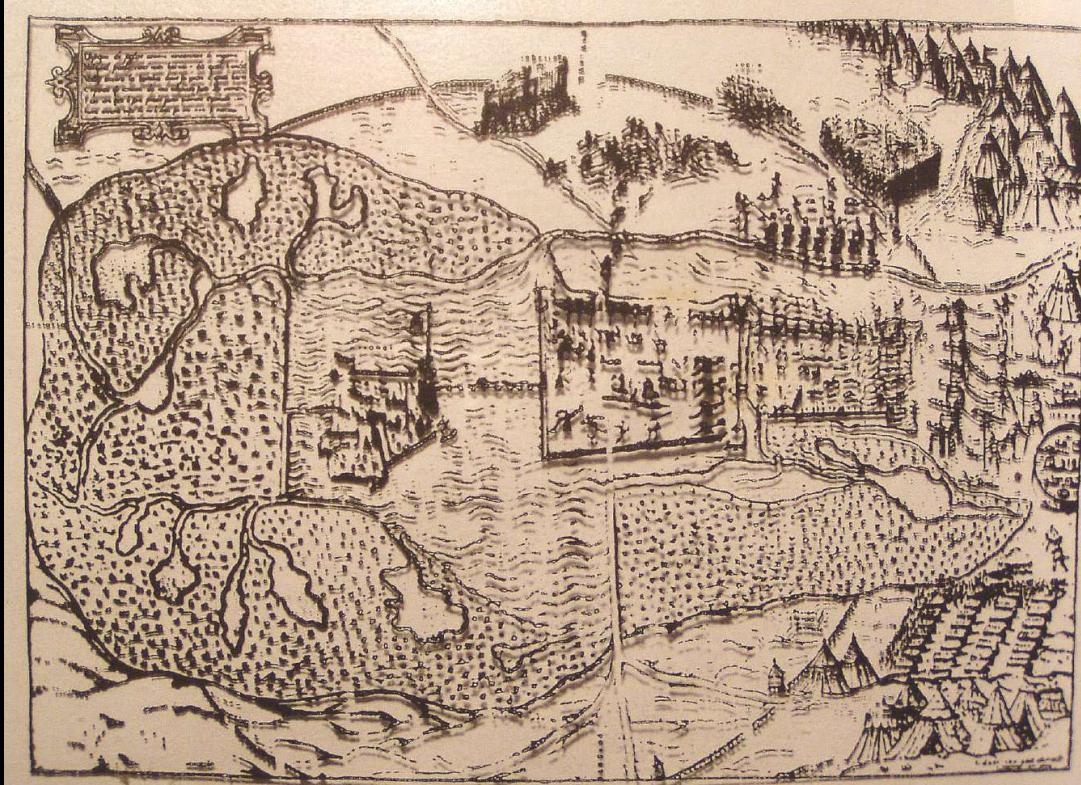


Ecsed

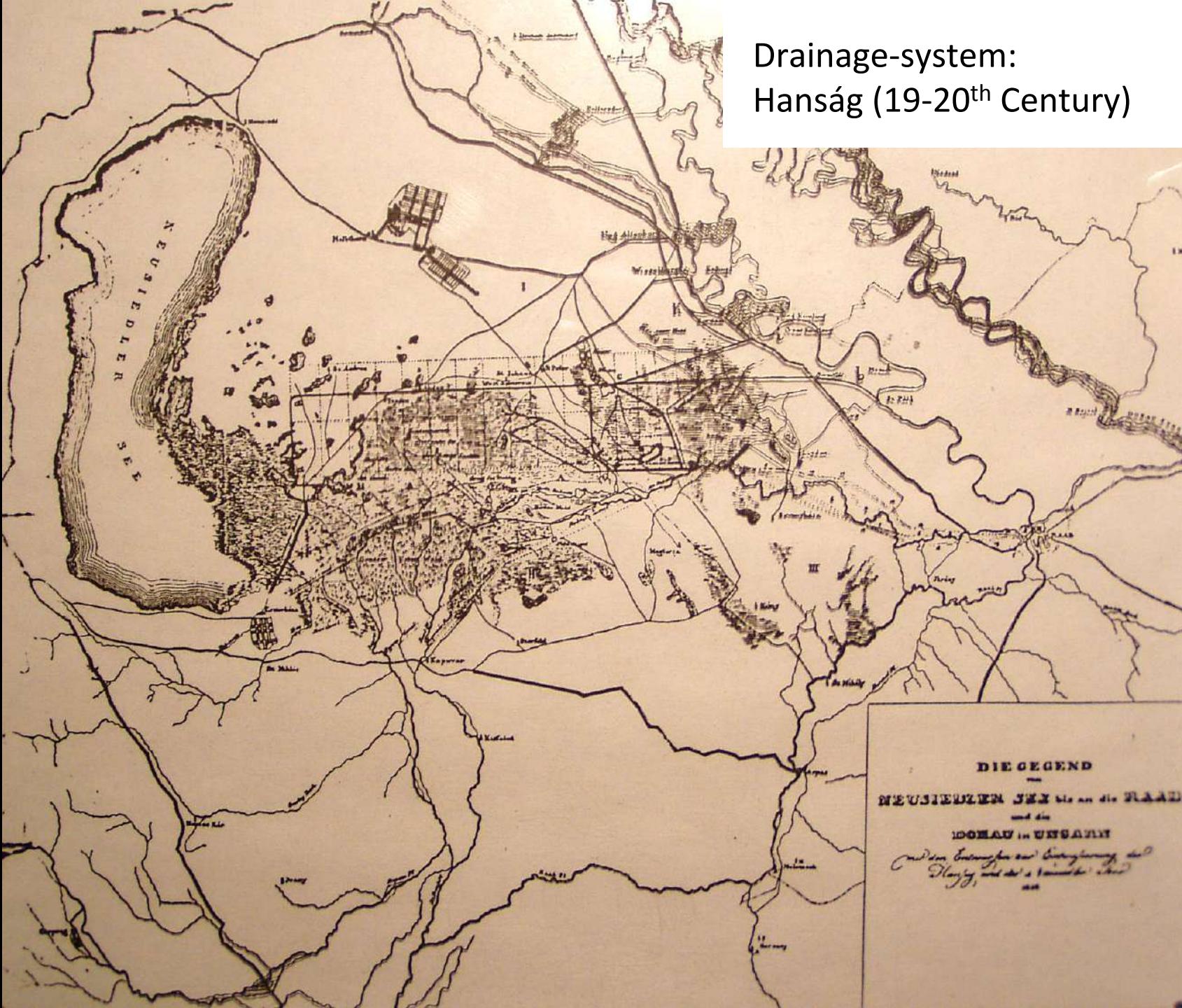
Szigetvár

Fortifications:

- water around the fortresses



Drainage-system:  
Hanság (19-20<sup>th</sup> Century)





River ice

Danube

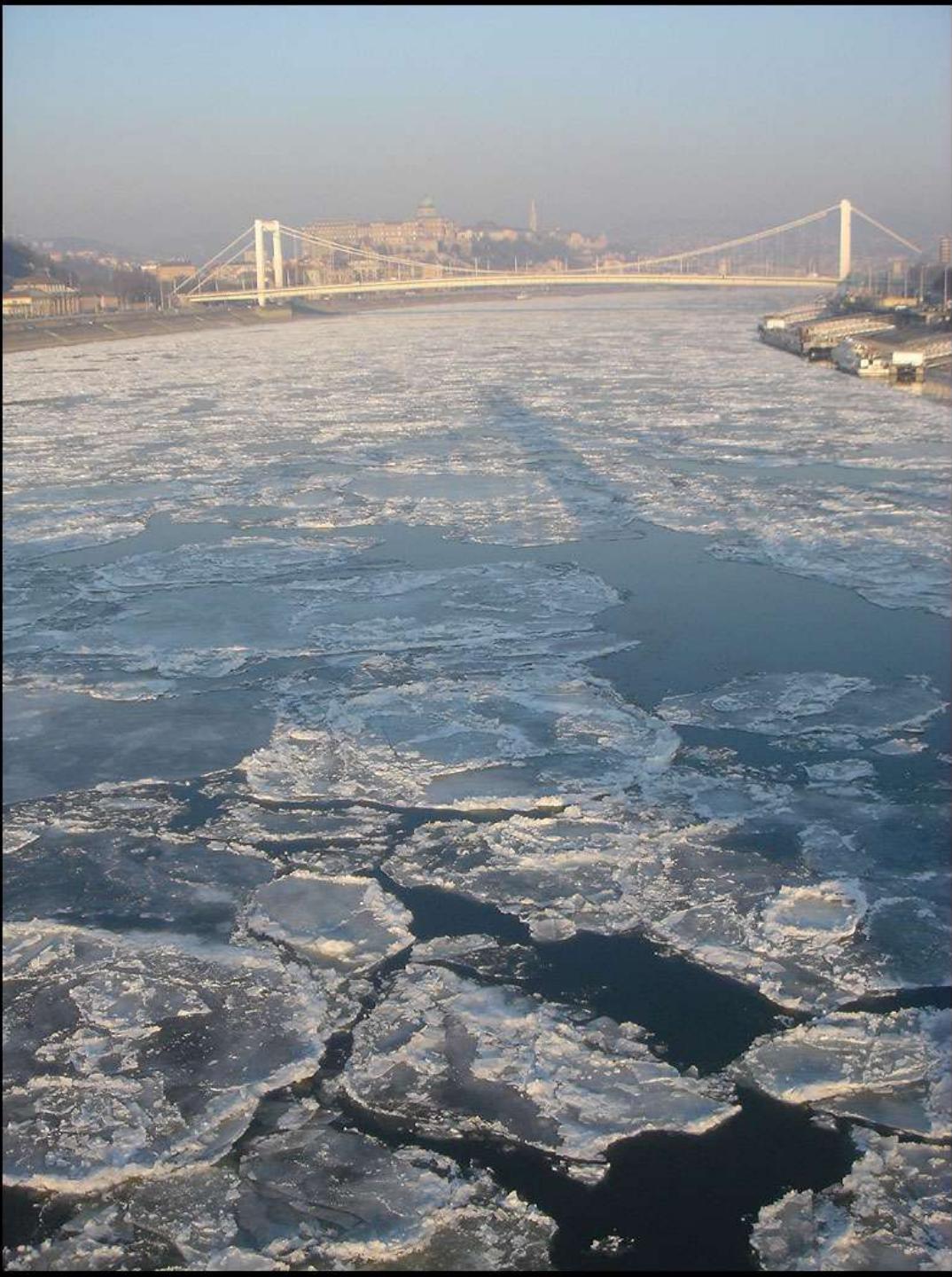




River ice (pack ice)

Danube

Budapest





Danube  
Frozen harbor



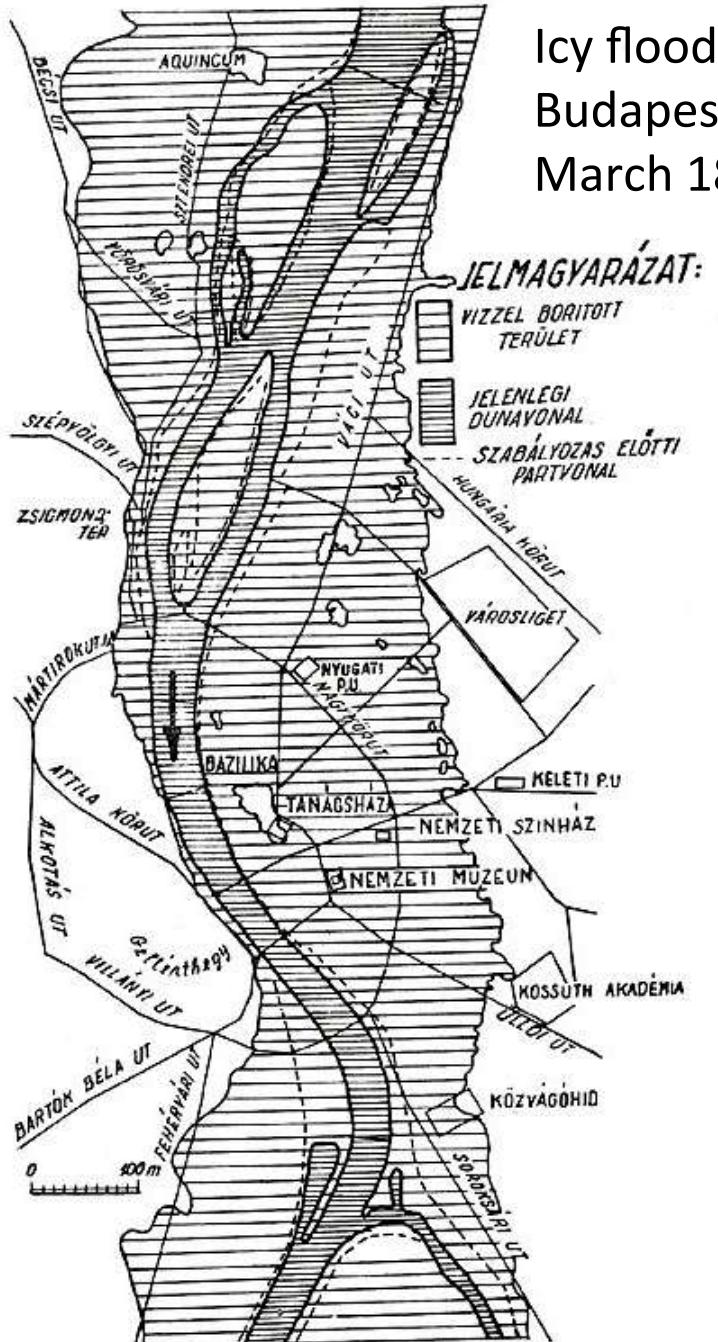
Danube  
Icebreaker



# Winter Danube-crossing and activities on ice (Budapest)



Icy flood  
Budapest  
March 1838



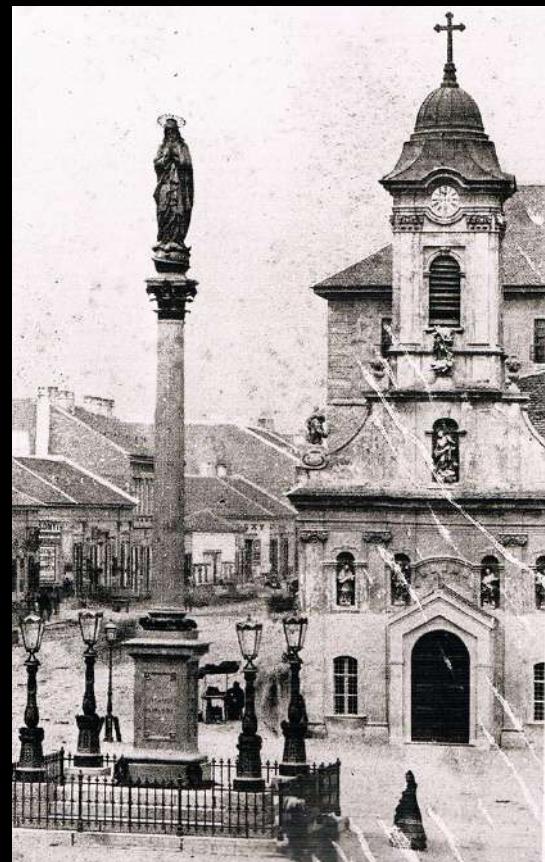
Az 1838-i árvíz pusztítása a főváros mai területén



Icy flood

Budapest, March 1838

- artificial surface uplift  
(arrow: floodwater level)



Icy flood  
Budapest  
March 1838

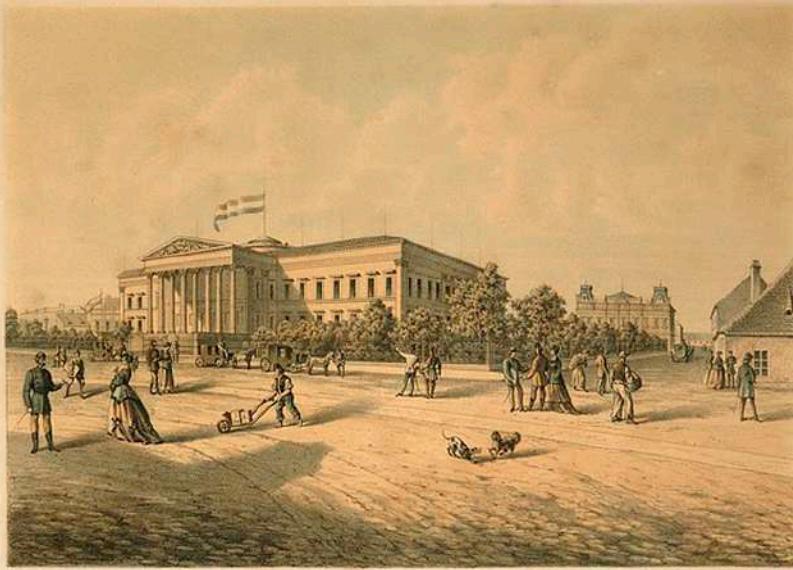




Franzstadt.

Icy flood  
Budapest, March 1838





MAGYAR NEMZETI MUZEUM  
PESTEN

UNGAR NATIONAL MUSEUM  
IN PEST



MAGYAR NEMZETI MUZEUM  
in Pest

HUNGARIAN NATIONAL MUSEUM  
in Pest

Icy flood  
Budapest, March 1838  
- Kálvin Square:  
Artificial filling,  
surface uplift (max. 7m)



Budapest, paved riverbanks



Nagymaros: icy flood level (1838)



Verőce: stone walls, filled riverbank  
(late 19<sup>th</sup> early 20<sup>th</sup> Century)



Budapest, icy flood, 1876



## Budapest downtown: metropolis on the floodplain

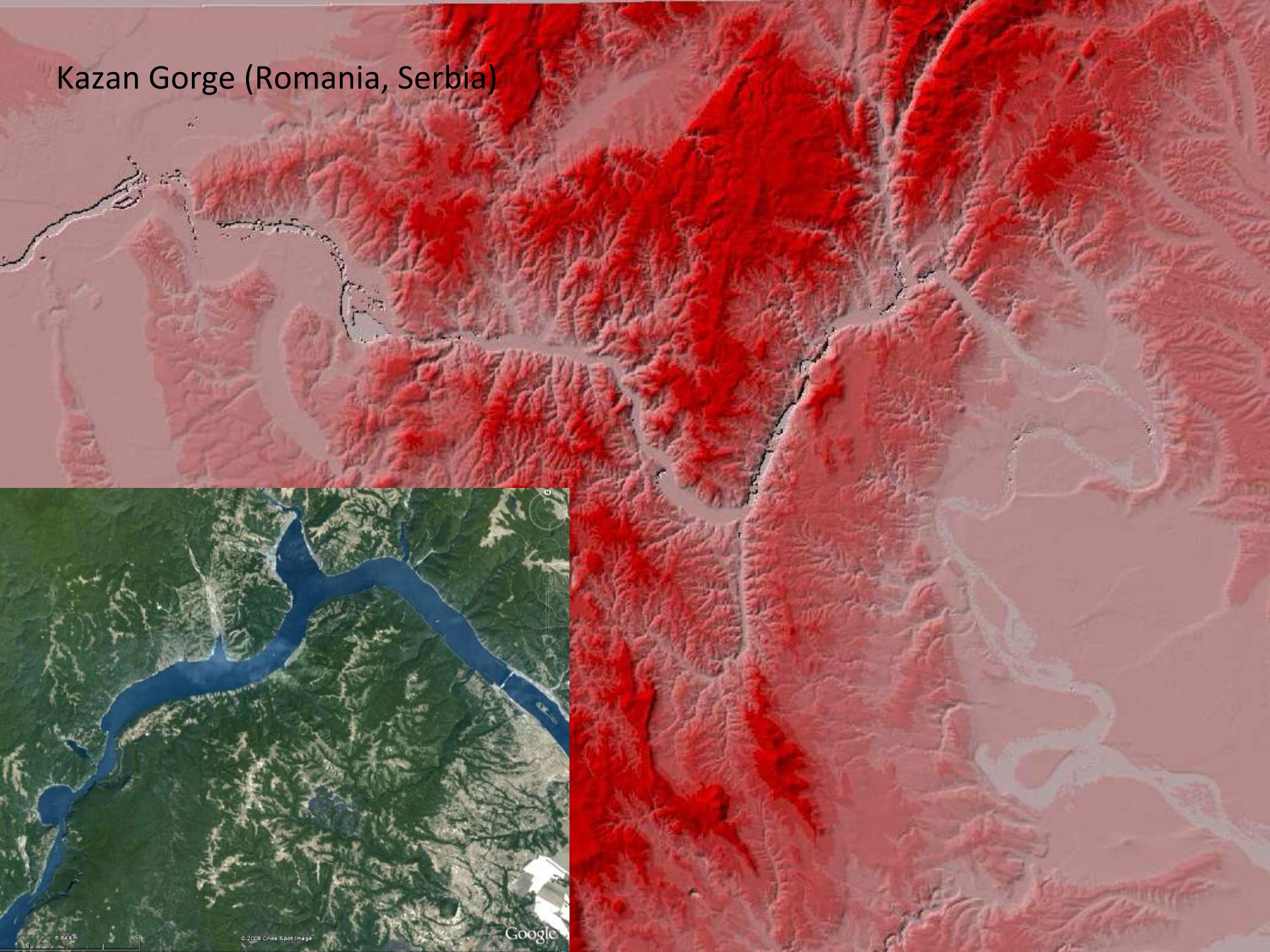




1950's: lower Danube



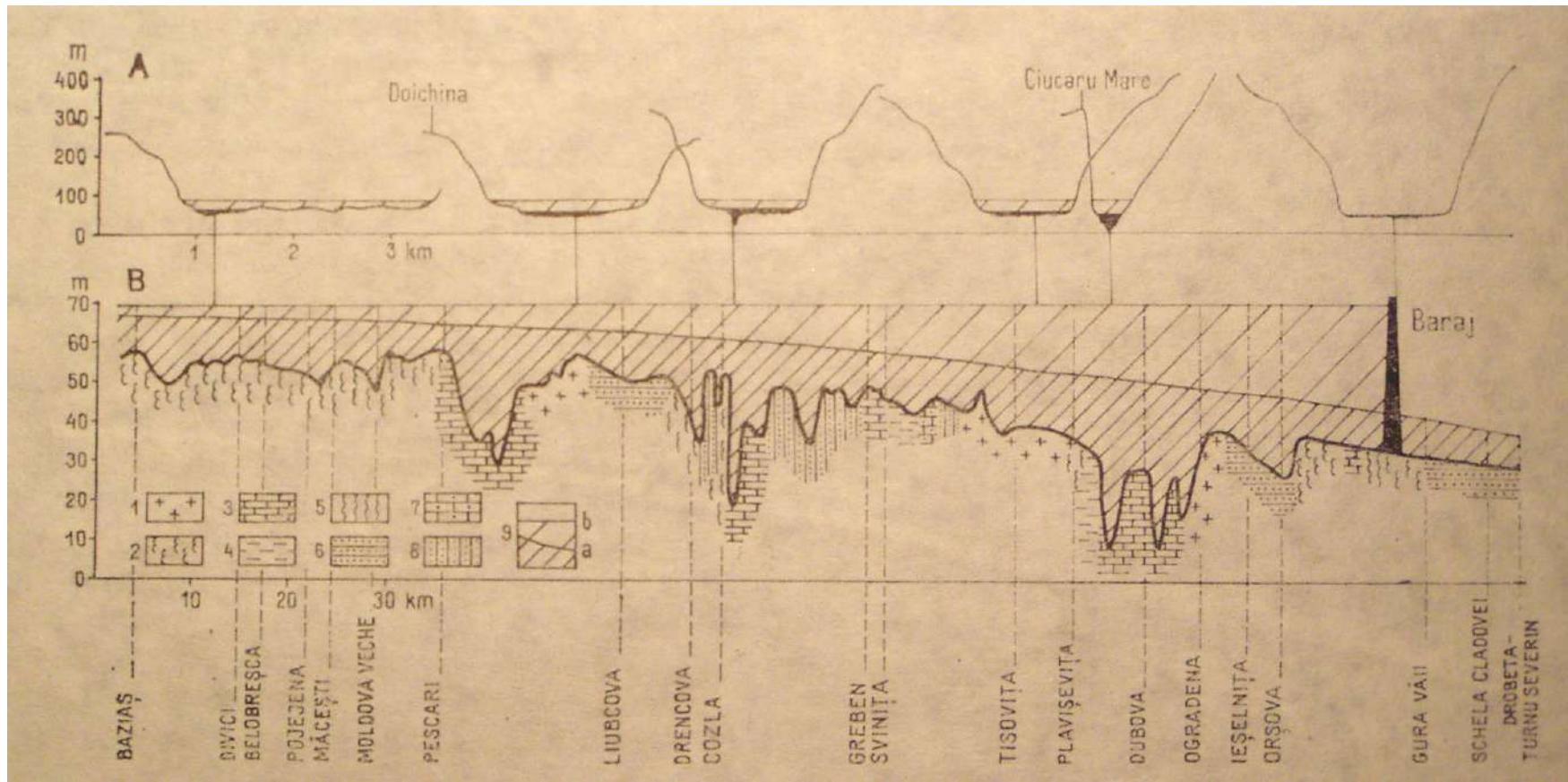
Kazan Gorge (Romania, Serbia)



Kazan Gorge (Romania, Serbia)



# Kazan Gorge – Iron Gate damming (Romania, Serbia)



Kazan Gorge (Romania, Serbia)





Kazan Gorge – Iron Gate damming  
(Orsova - Romania)

## Danube Delta





Danube Delta



# Danube Delta: Tulcea, Romania





Danube Delta





Danube Delta  
(Sulina, Romania)





Danube Delta  
(Sulina, Romania)





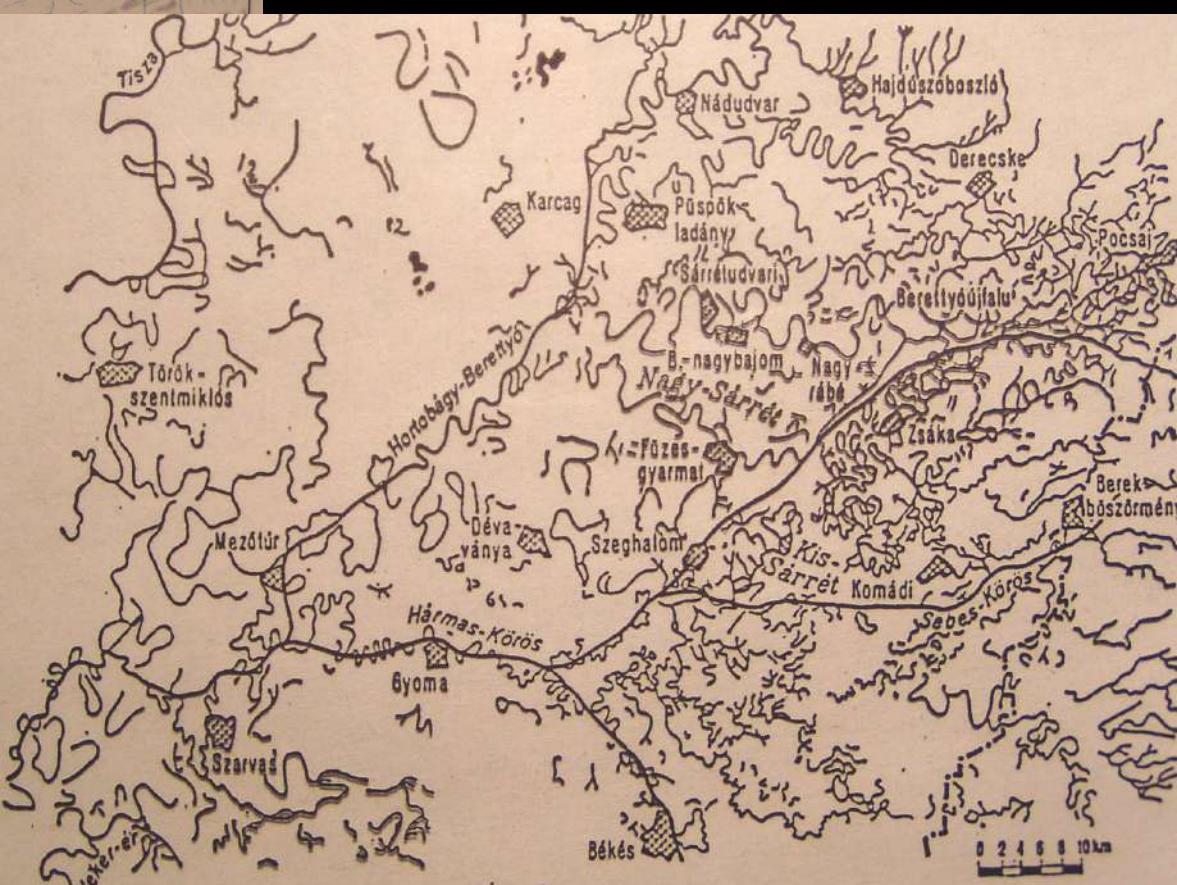
Danube Delta  
(St. George, Romania)



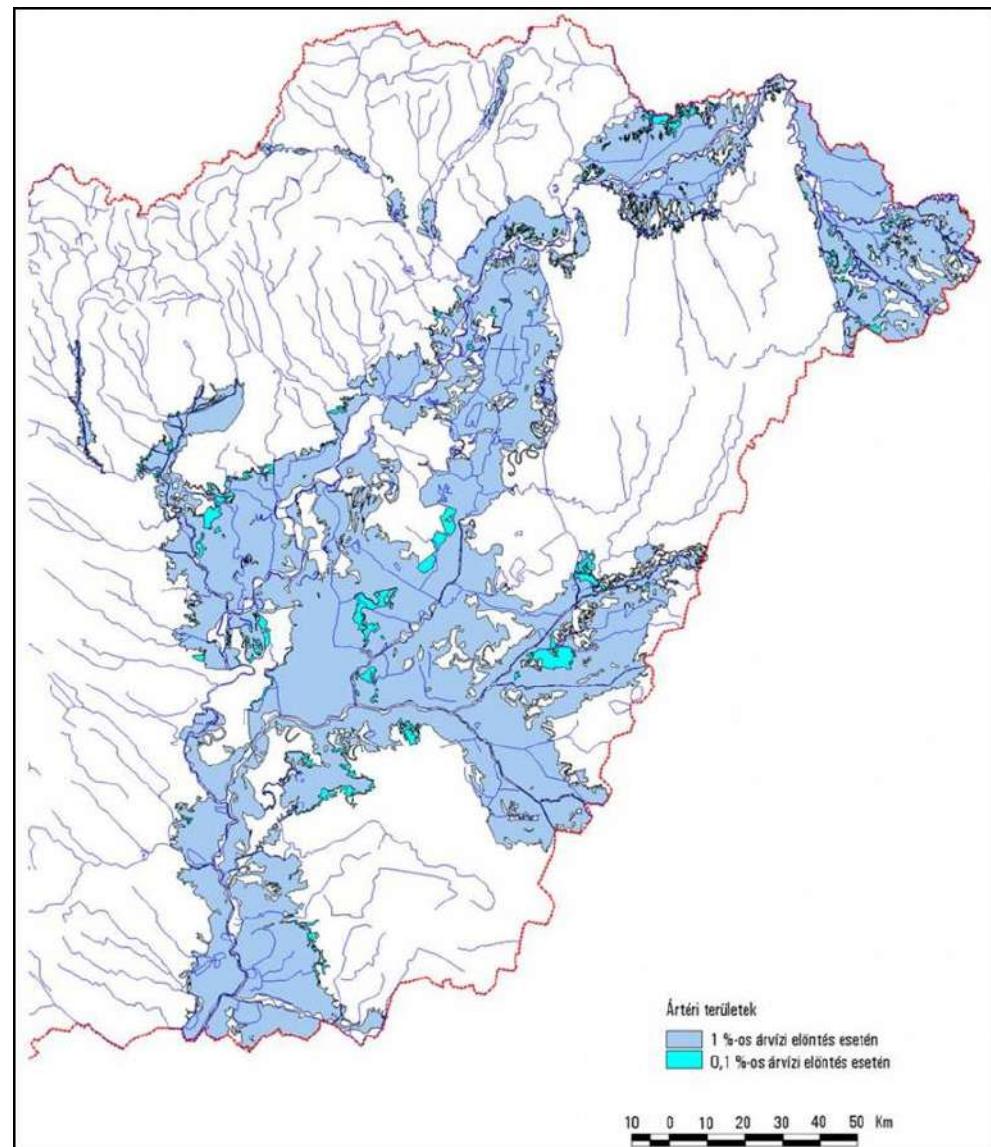
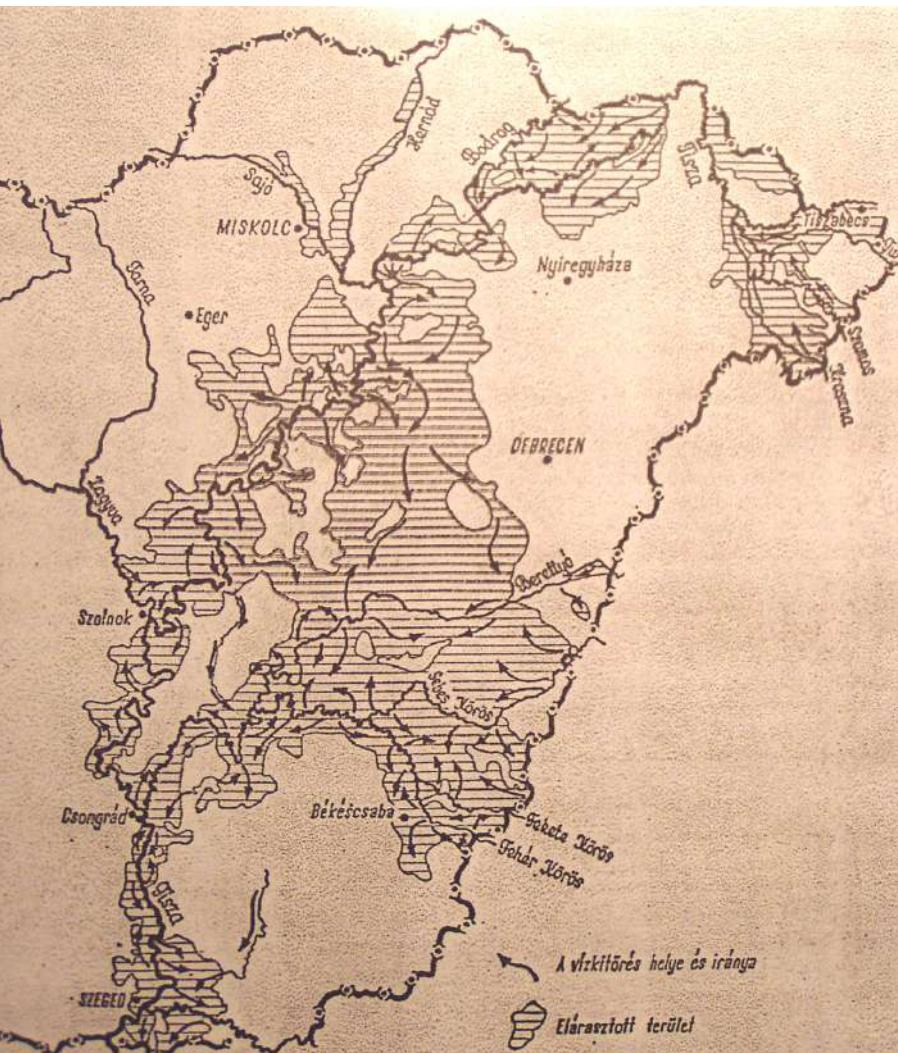
A KÁRPÁT-MEDENCE AZ ÁRVÍZMENTESÍTÉS ELŐTT



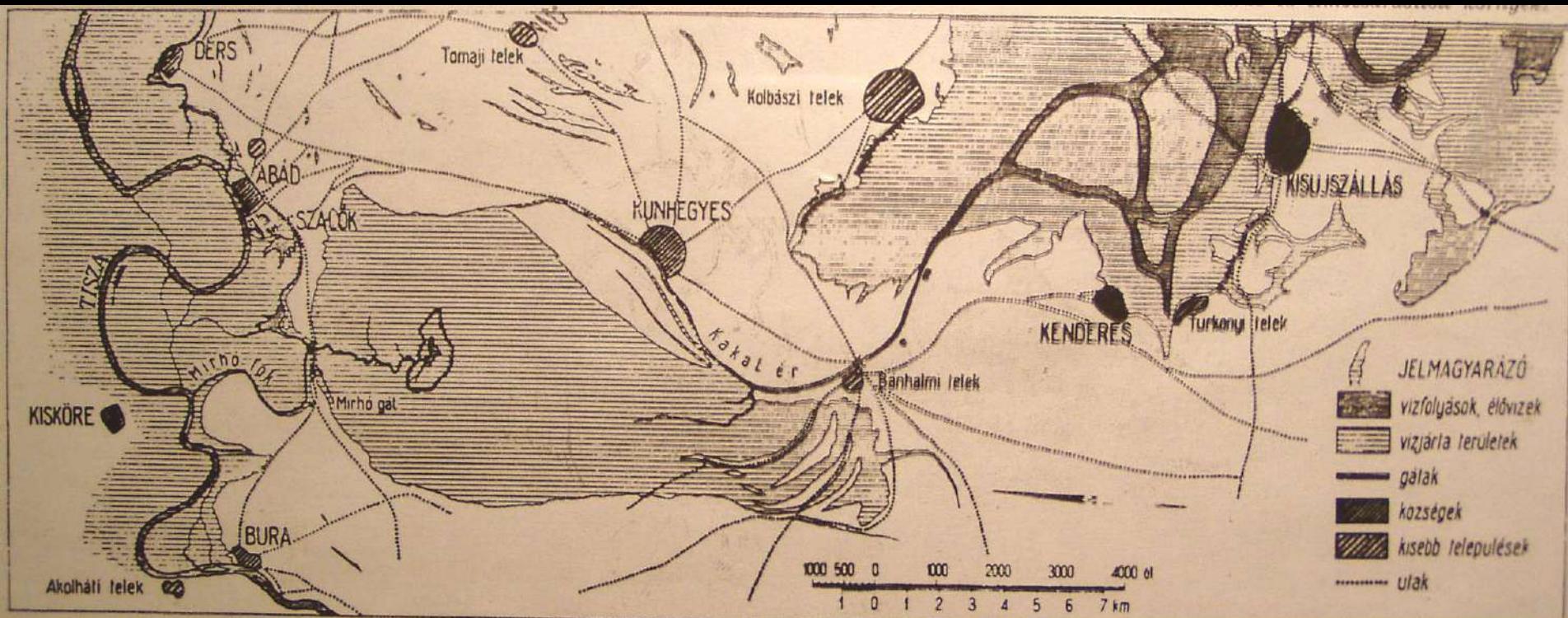
Alluvial lowlands,  
Southern part of the  
Great Hungarian Plain

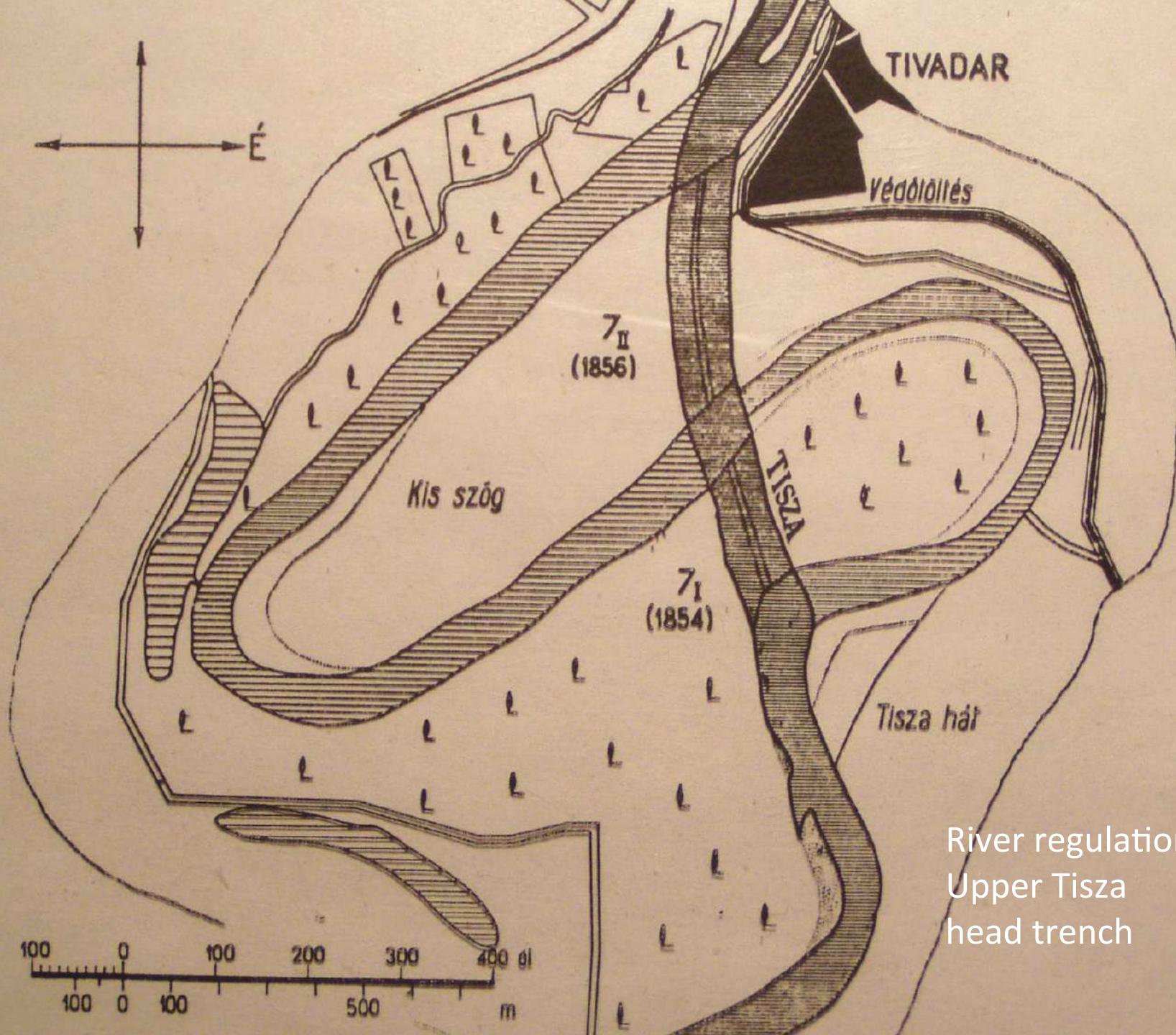


## Floodwater routes – before the river regulations, Tisza region



# River regulations, Tisza Region, Mirhó dike





River regulations  
Upper Tisza  
head trench

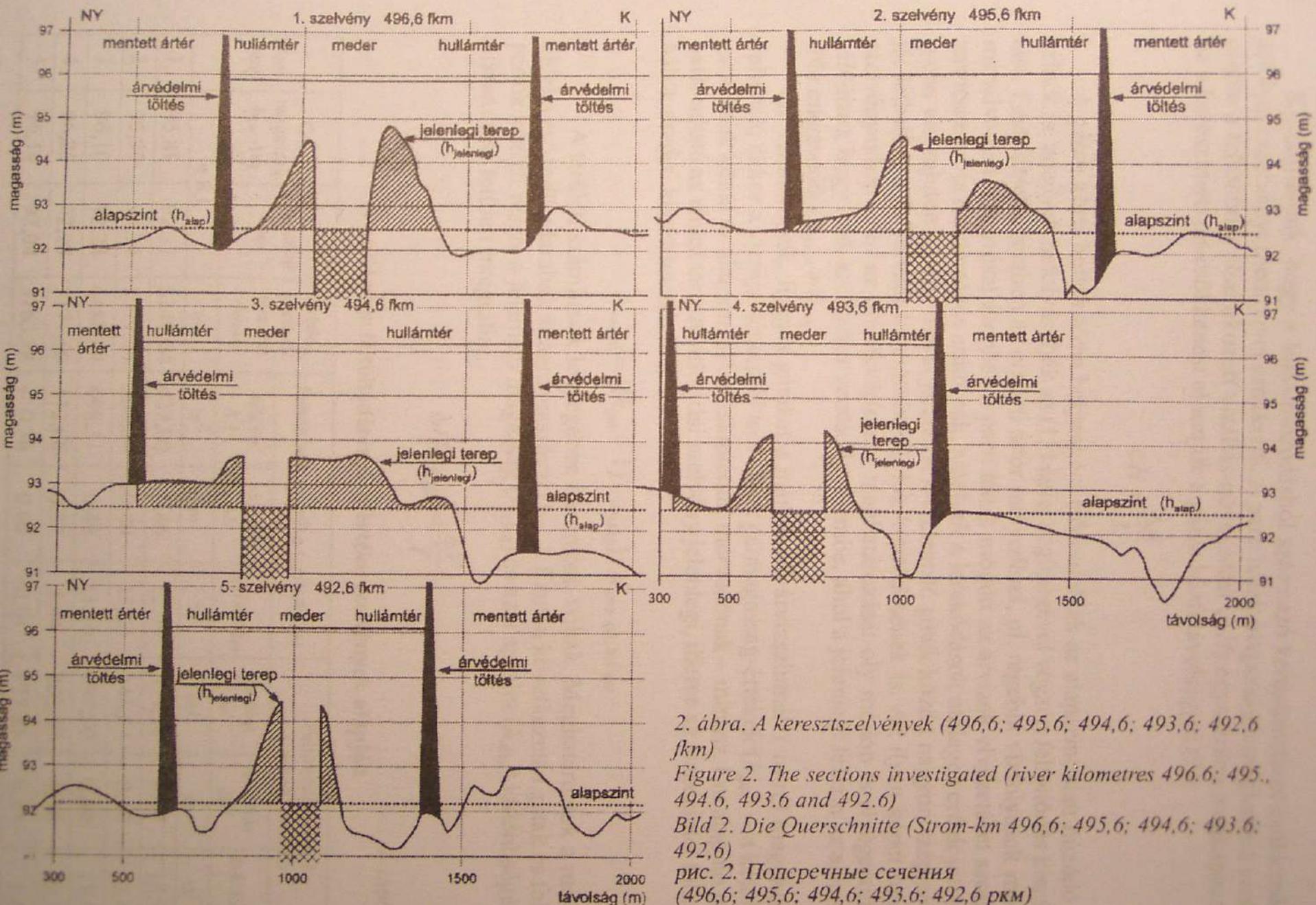
## River regulations, Lower Tisza, Szeged





River regulations, Tisza Region  
Tiszadob: the first step, 1846





2. ábra. A keresztszelvények (496,6; 495,6; 494,6; 493,6; 492,6 fkm)

Figure 2. The sections investigated (river kilometres 496.6; 495., 494.6, 493.6 and 492.6)

Bild 2. Die Querschnitte (Strom-km 496,6; 495,6; 494,6; 493,6; 492,6)

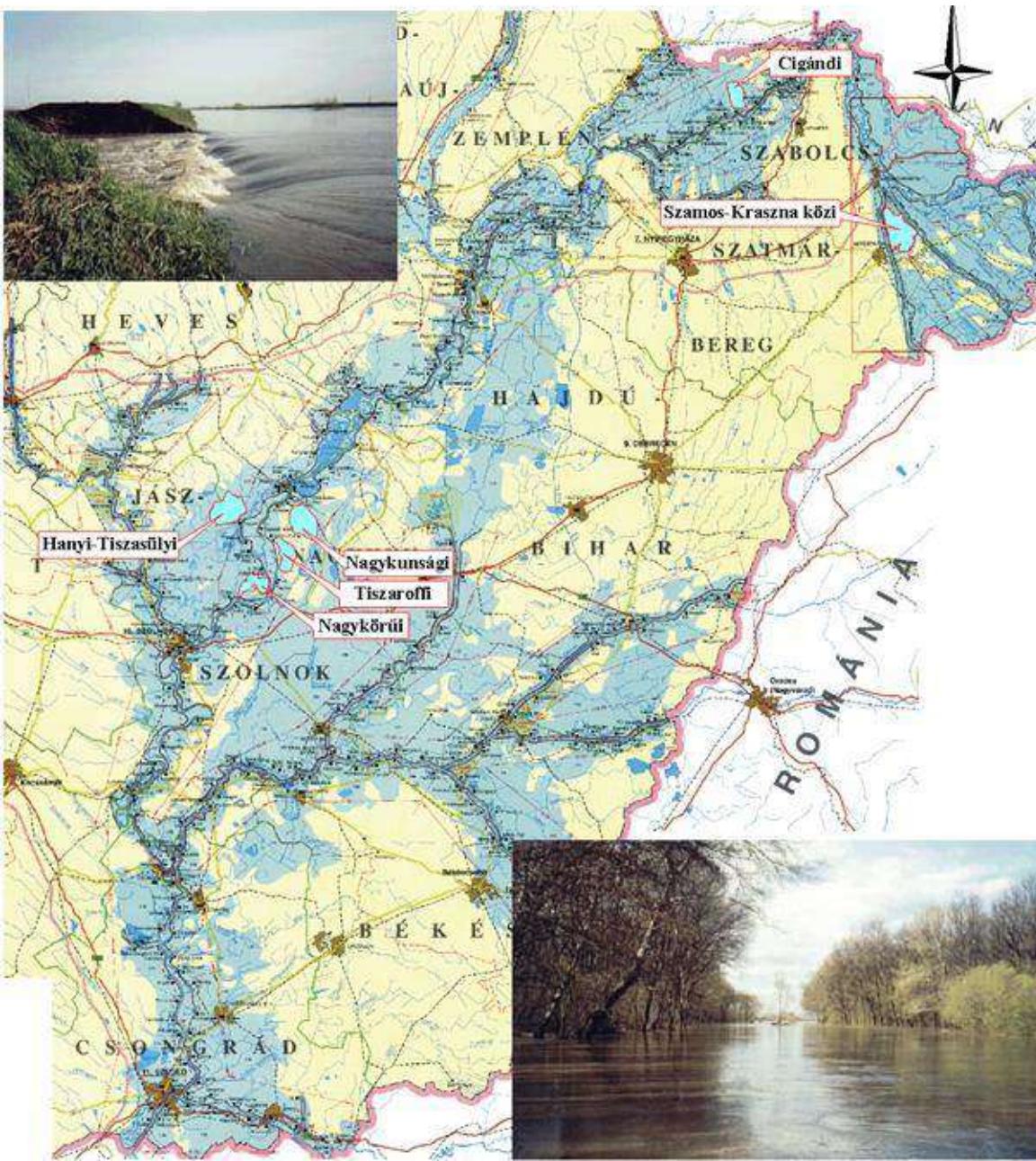
рис. 2. Поперечные сечения  
(496,6; 495,6; 494,6; 493,6; 492,6 ркм)

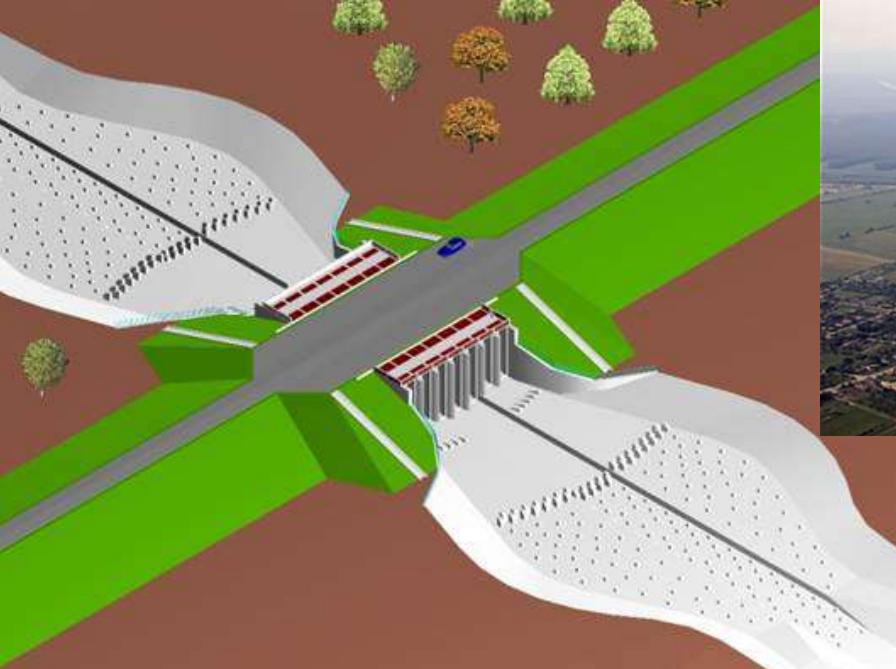


Upper Tisza flood, 2001



# New Vásárhelyi Plan: floodplain reservoirs, Tisza region





New Vásárhelyi Plan:  
Dike gates for the  
floodplain reservoirs,  
Tisza region



Too much water on the Tisza-lowland?



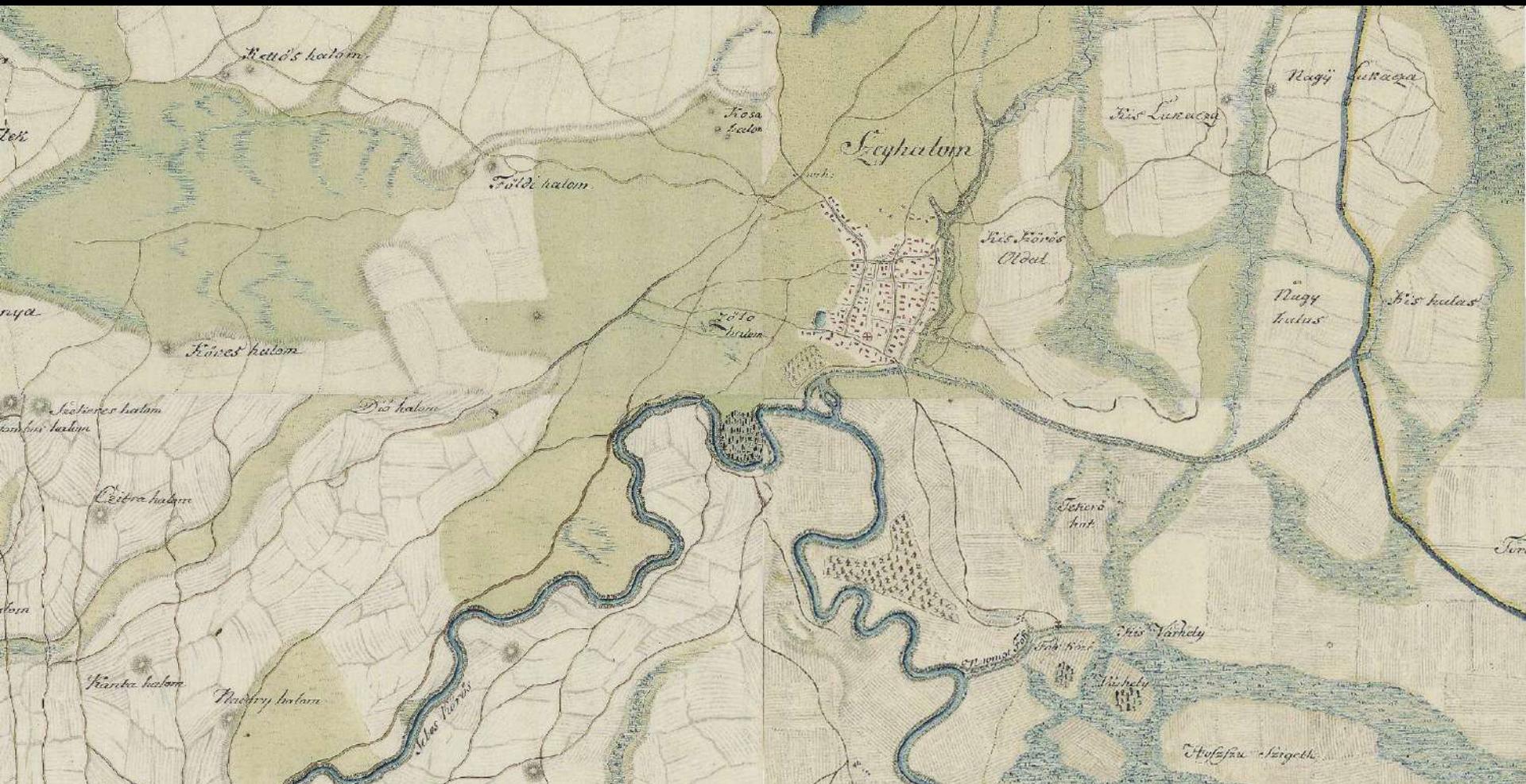
DEBRECEN



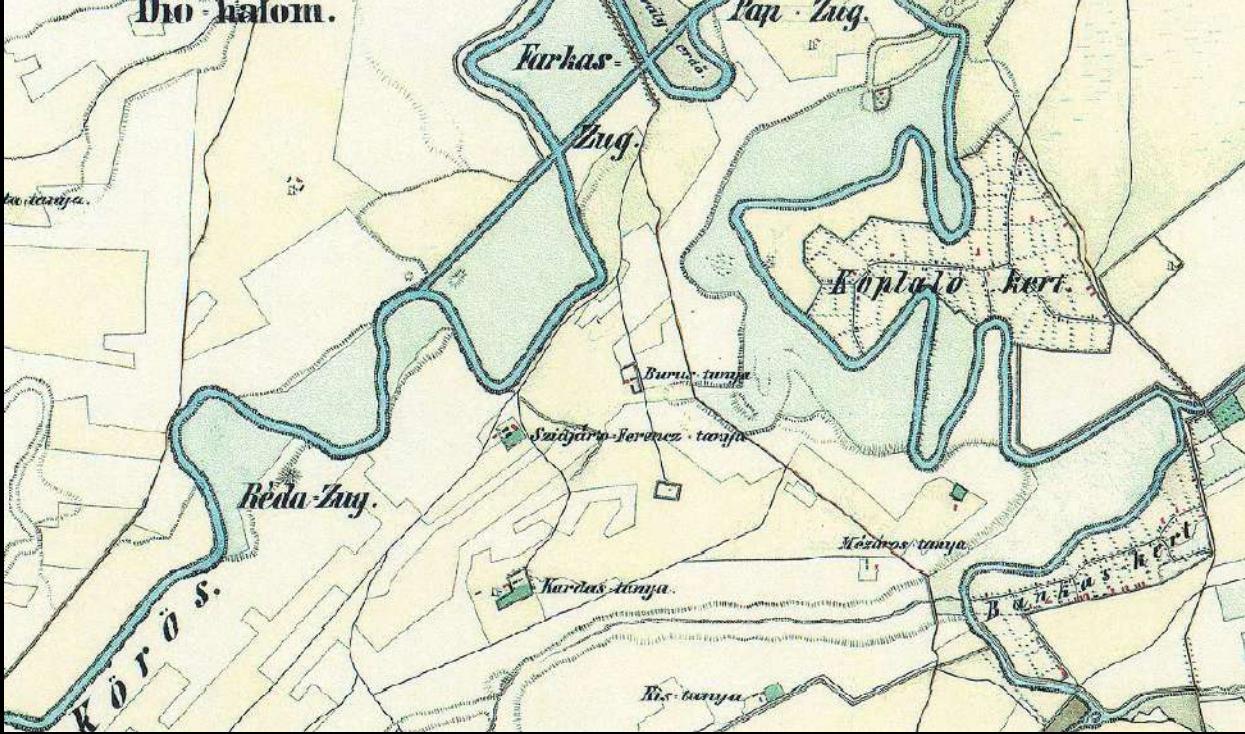
Körös Region  
before the 19<sup>th</sup> century:  
swampy area,  
large wetlands

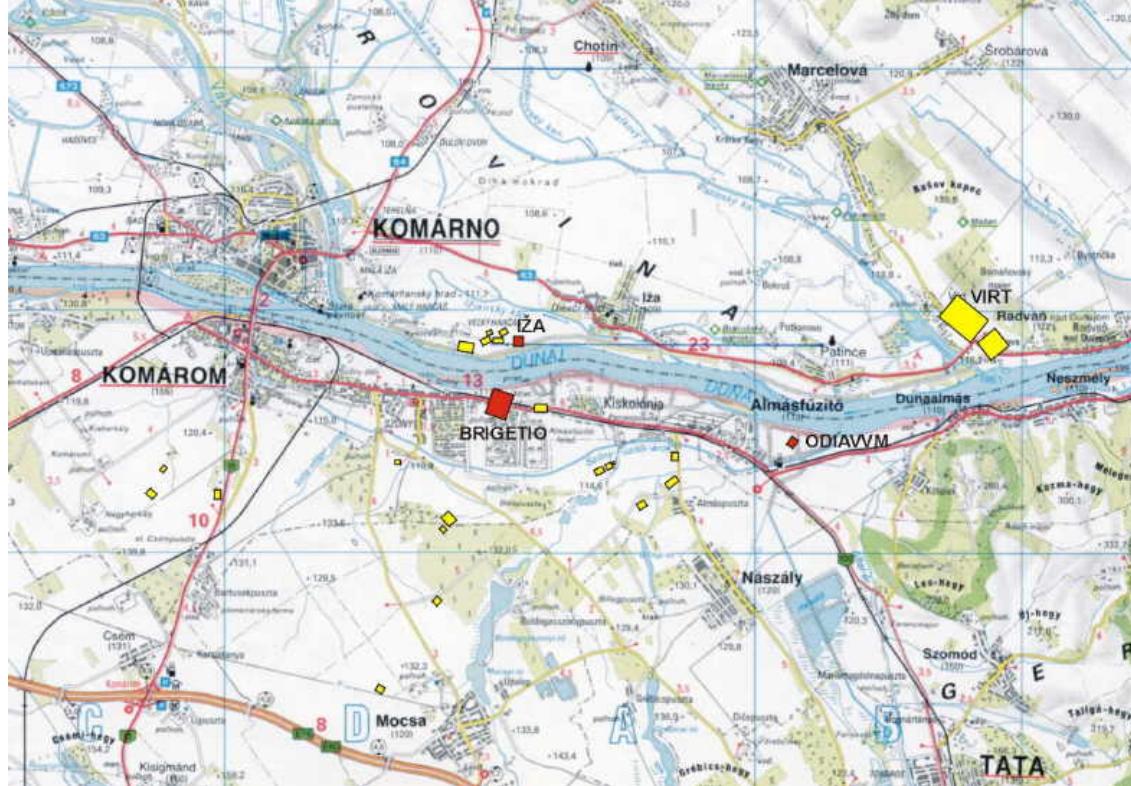


# Sebes-Körös, 18<sup>th</sup> Century



# Sebes-Körös, 19<sup>th</sup> Century

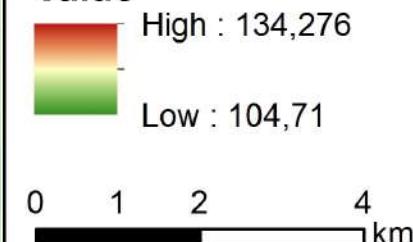




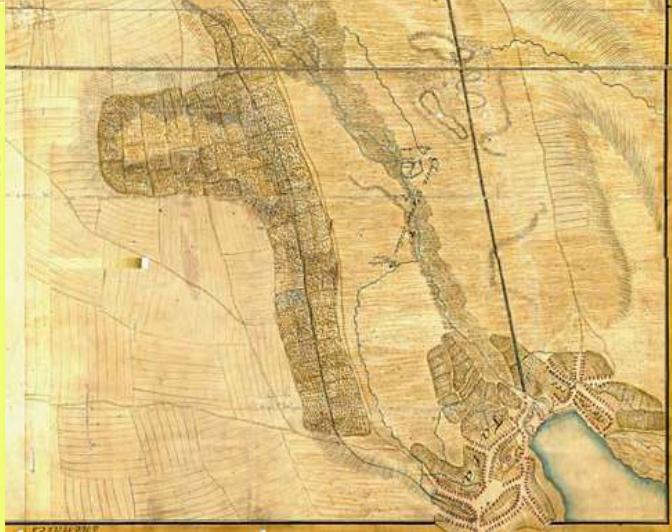
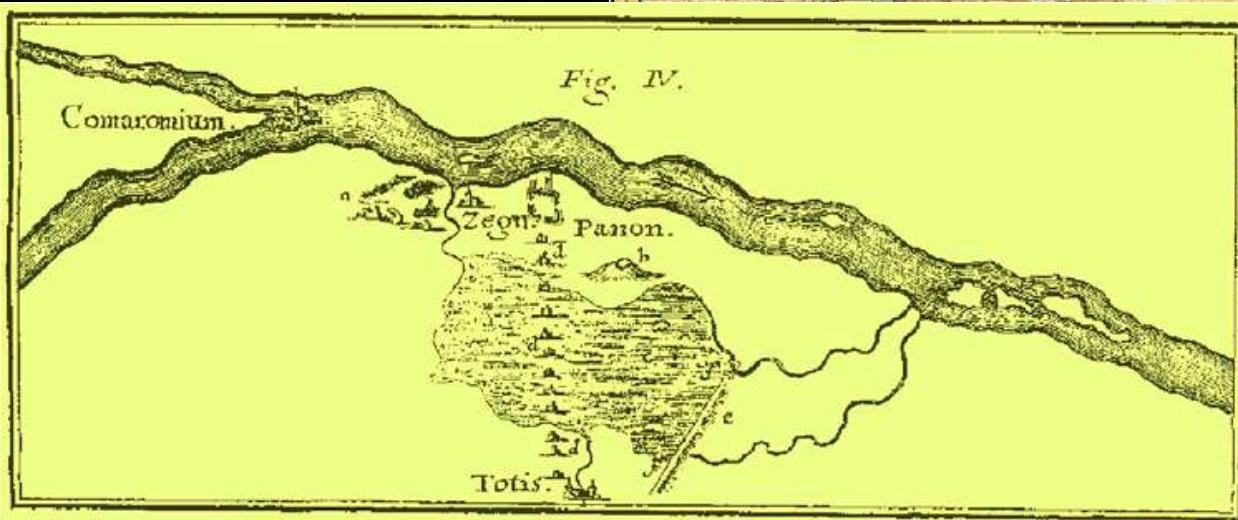
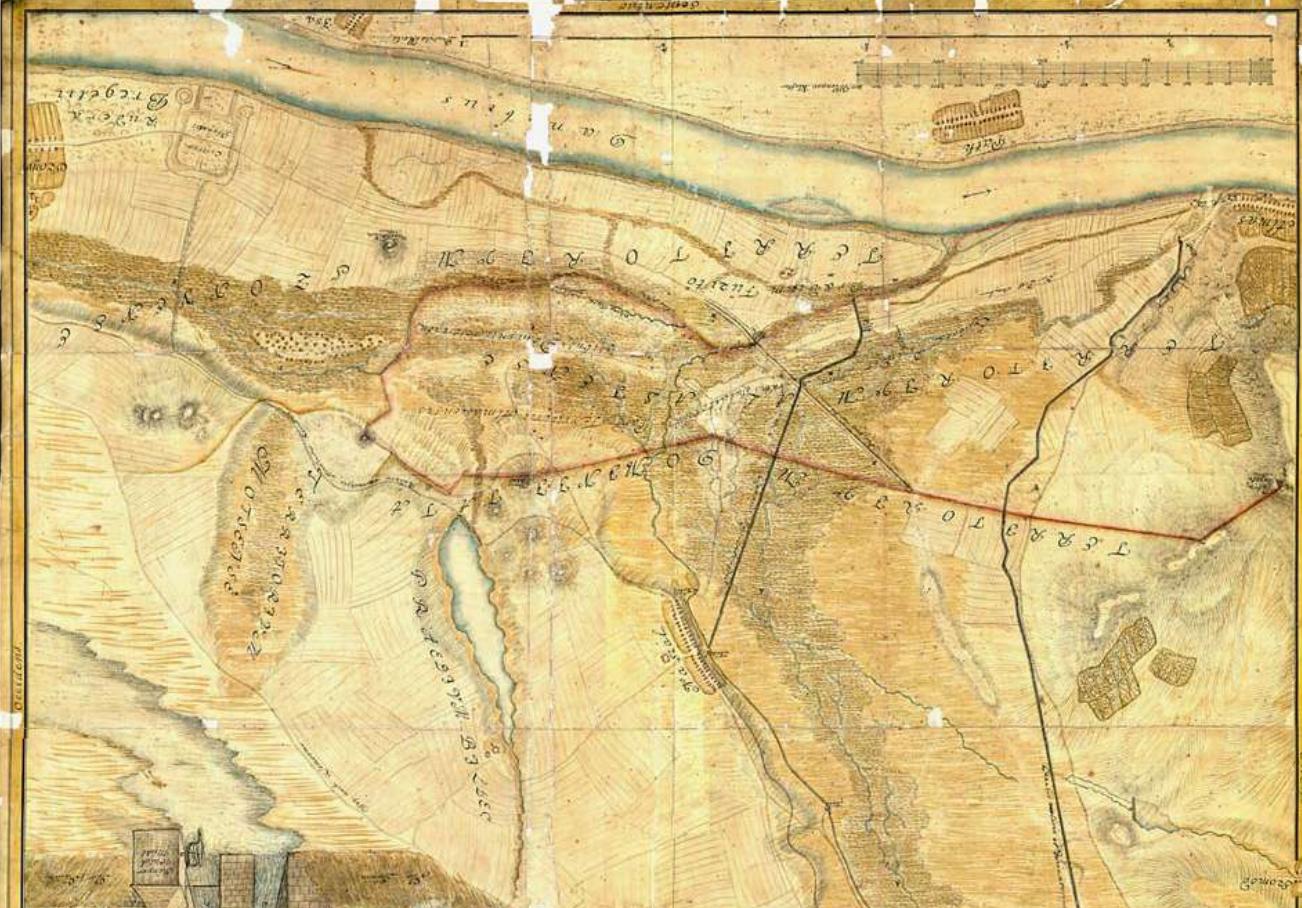
Danube floodplain  
Roman Brigetio  
3-4<sup>th</sup> Century



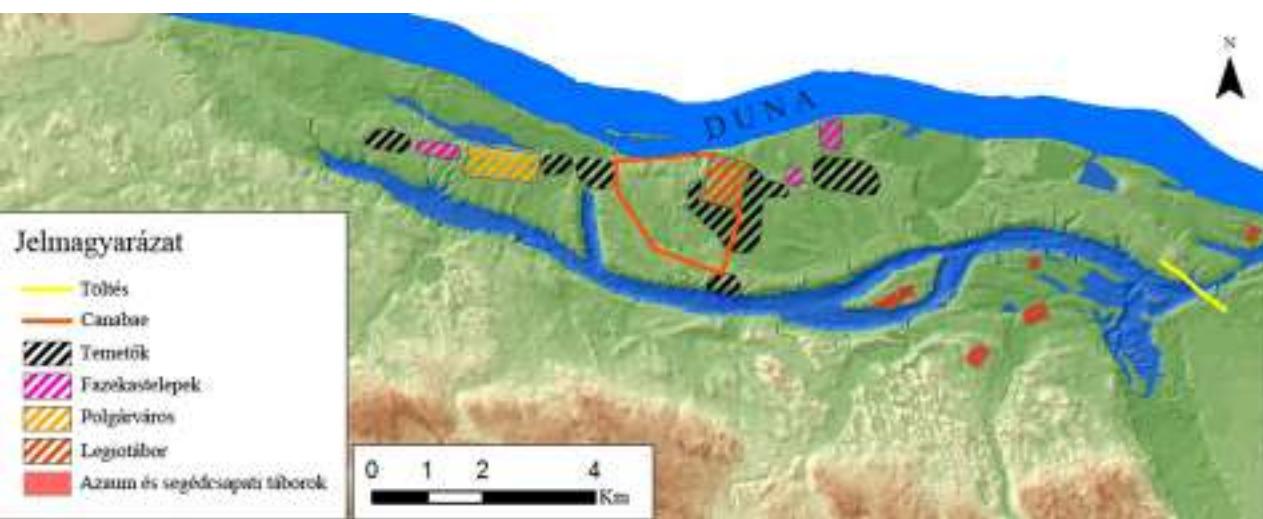
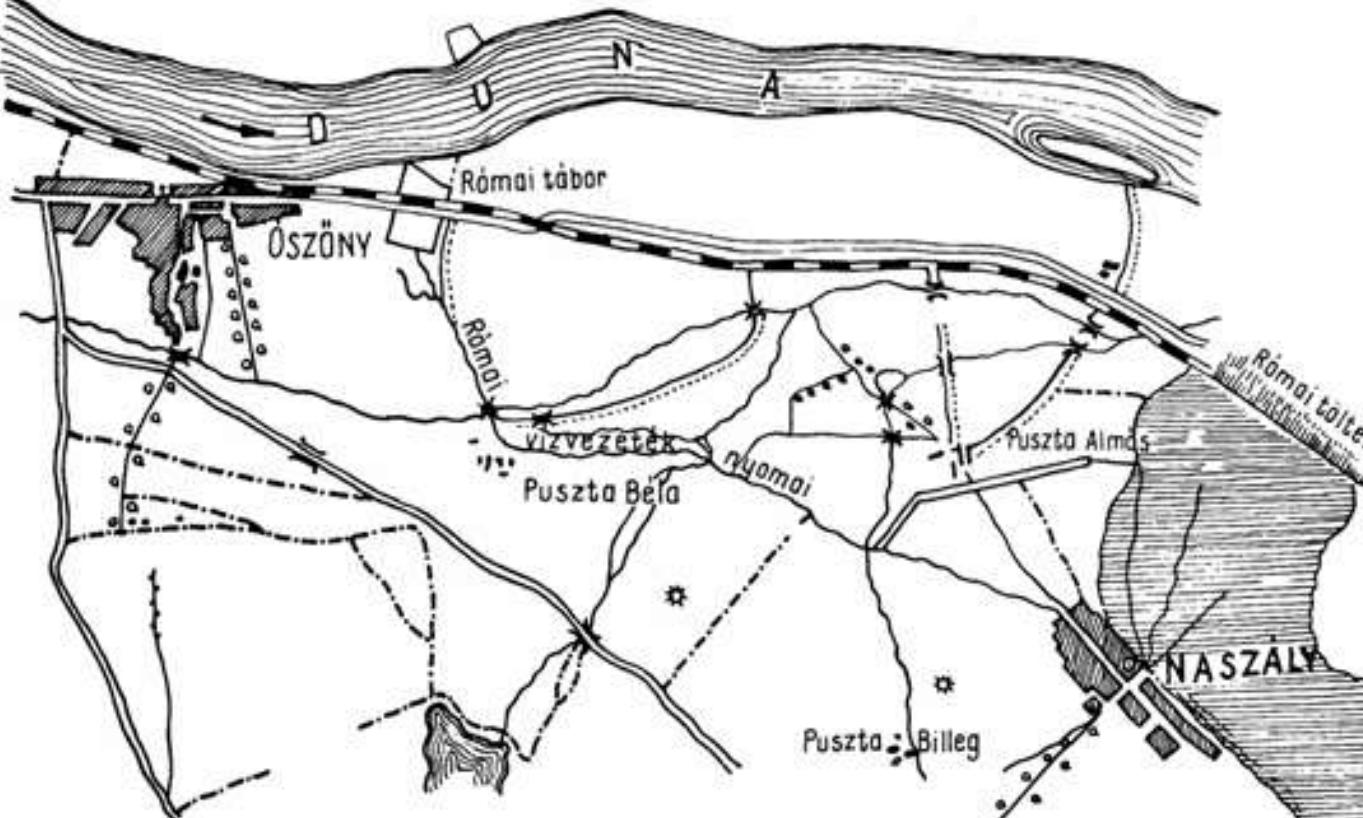
**komarom\_5m.tif**  
**Value**



Danube floodplain  
Roman Brigetio  
3-4<sup>th</sup> Century



Danube floodplain  
Roman Brigetio  
3-4<sup>th</sup> Century



Jelmagyarázat

- Töltés
- Canabae
- Temetők
- Fazekastelepek
- Polgárváros
- Legiotábor
- Azum és segédcsapati táborok

0 1 2 4 Km



Danube Bend: formerly planned (not completed) dam





Danube Bend:  
terrace system and the  
site of the formerly  
planned dam



"Korit" Dam - Age : 700 years



## Dams around the World

ancient dam, Iran

Apuseni Mountains,  
Romania



Olt River, Southern Carpathians, Romania



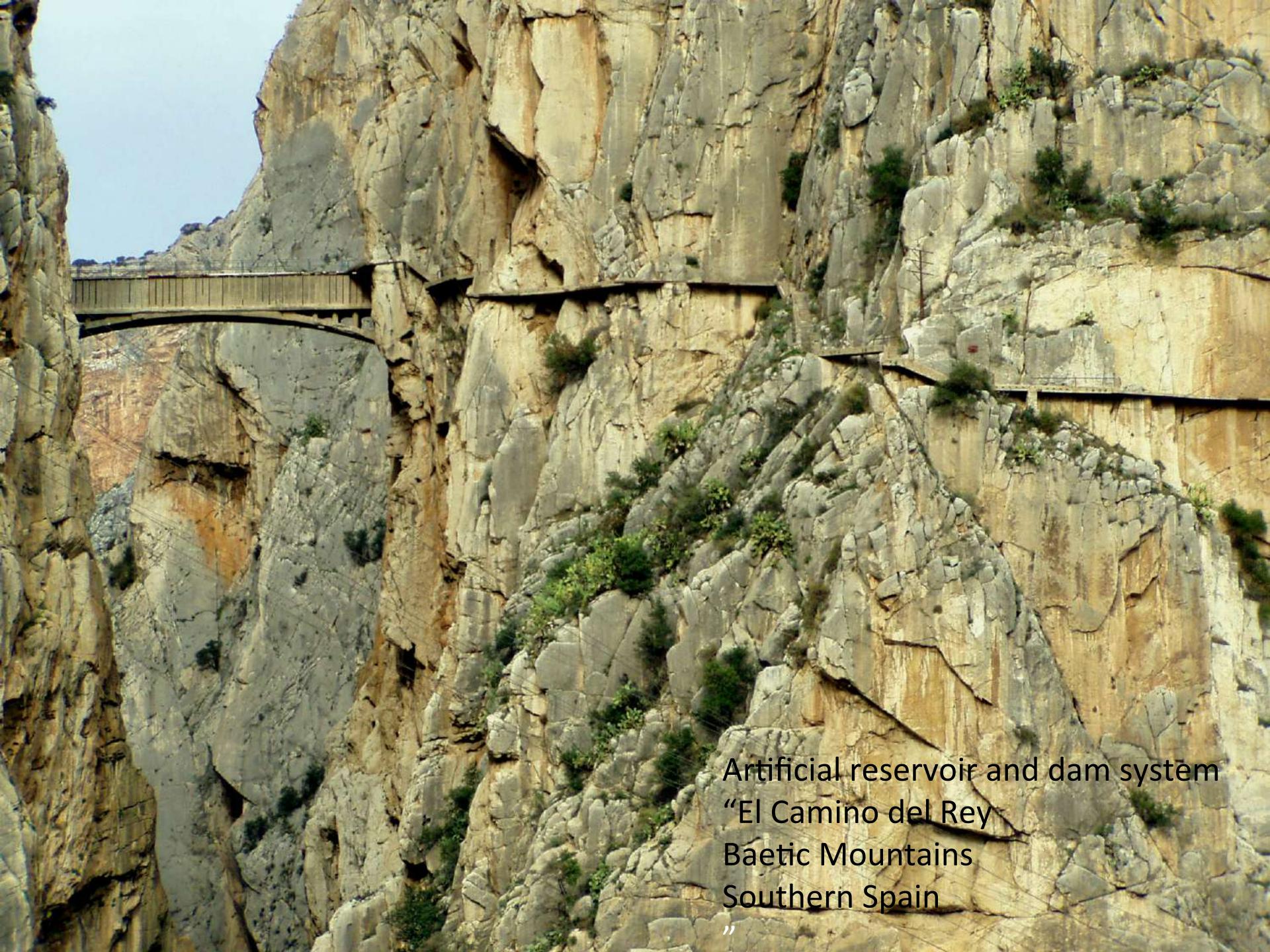


Artificial reservoir and dam system  
Baetic Mountains  
Southern Spain

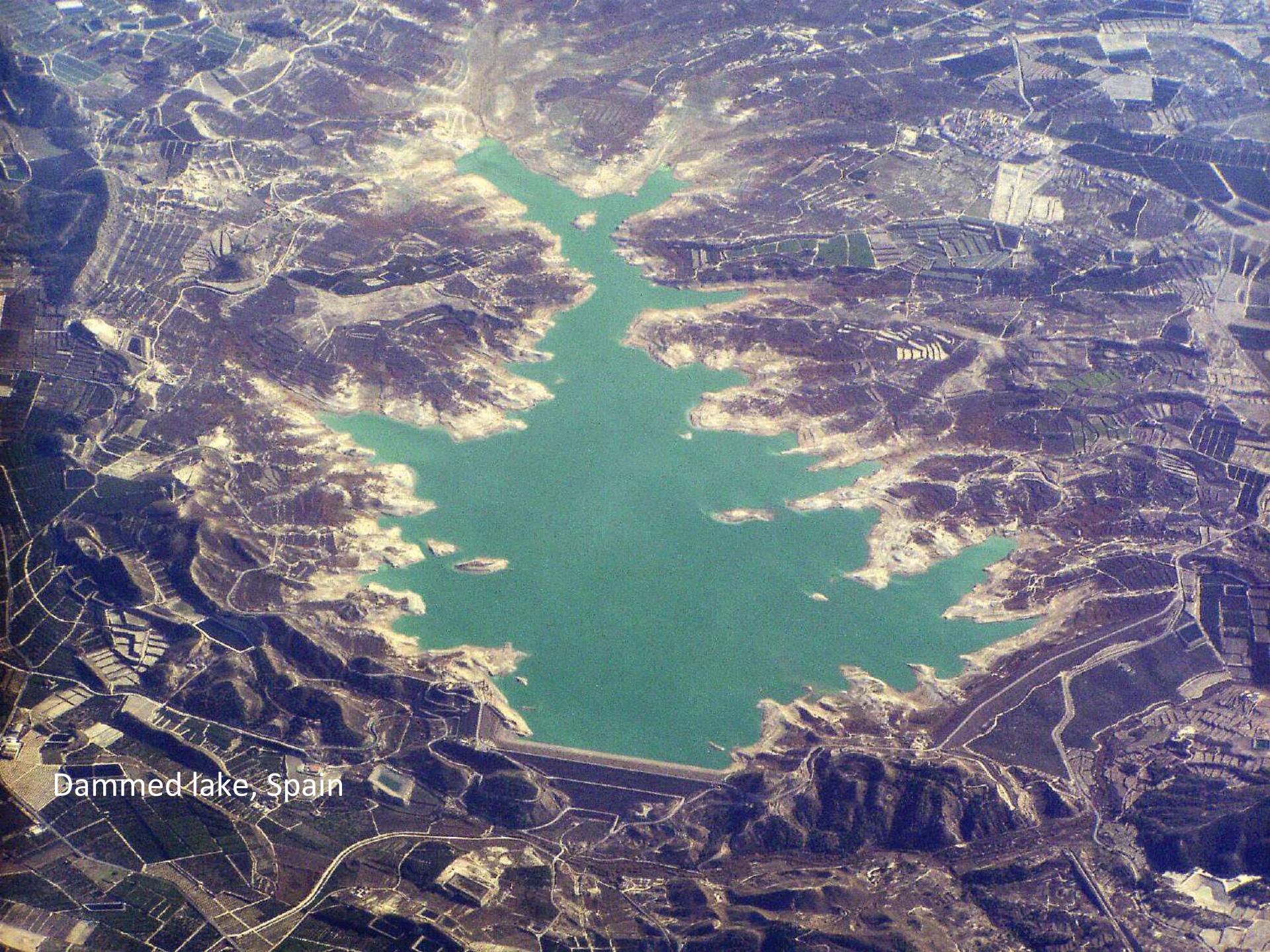




Artificial reservoir  
and dam system  
Baetic Mountains  
Southern Spain



Artificial reservoir and dam system  
“El Camino del Rey  
Baetic Mountains  
Southern Spain  
”



Dammed lake, Spain



Dammed lake, Spain



Dammed lake, Spain

Dammed lake (Sajan-Susenski Power Station), Jenisey River  
Sayan Mountains, Siberia, Russia



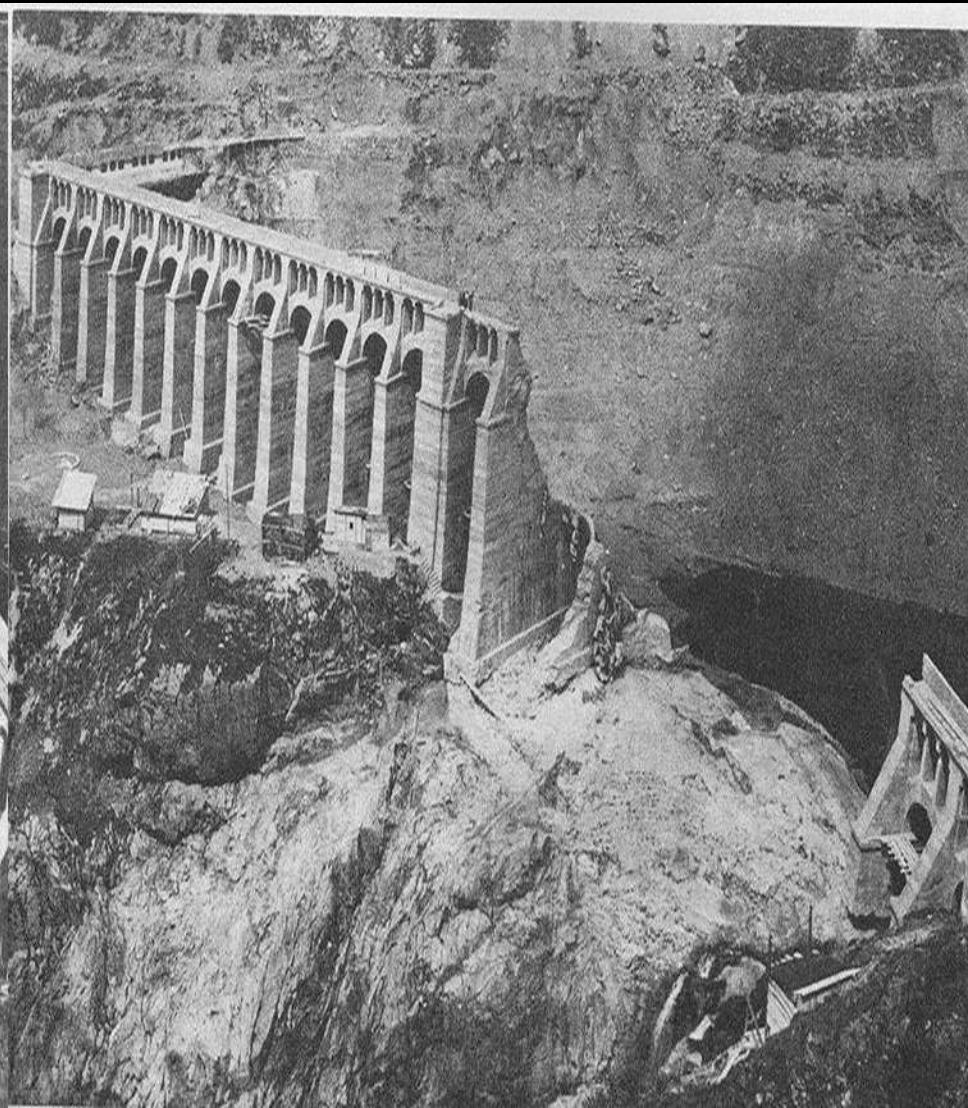
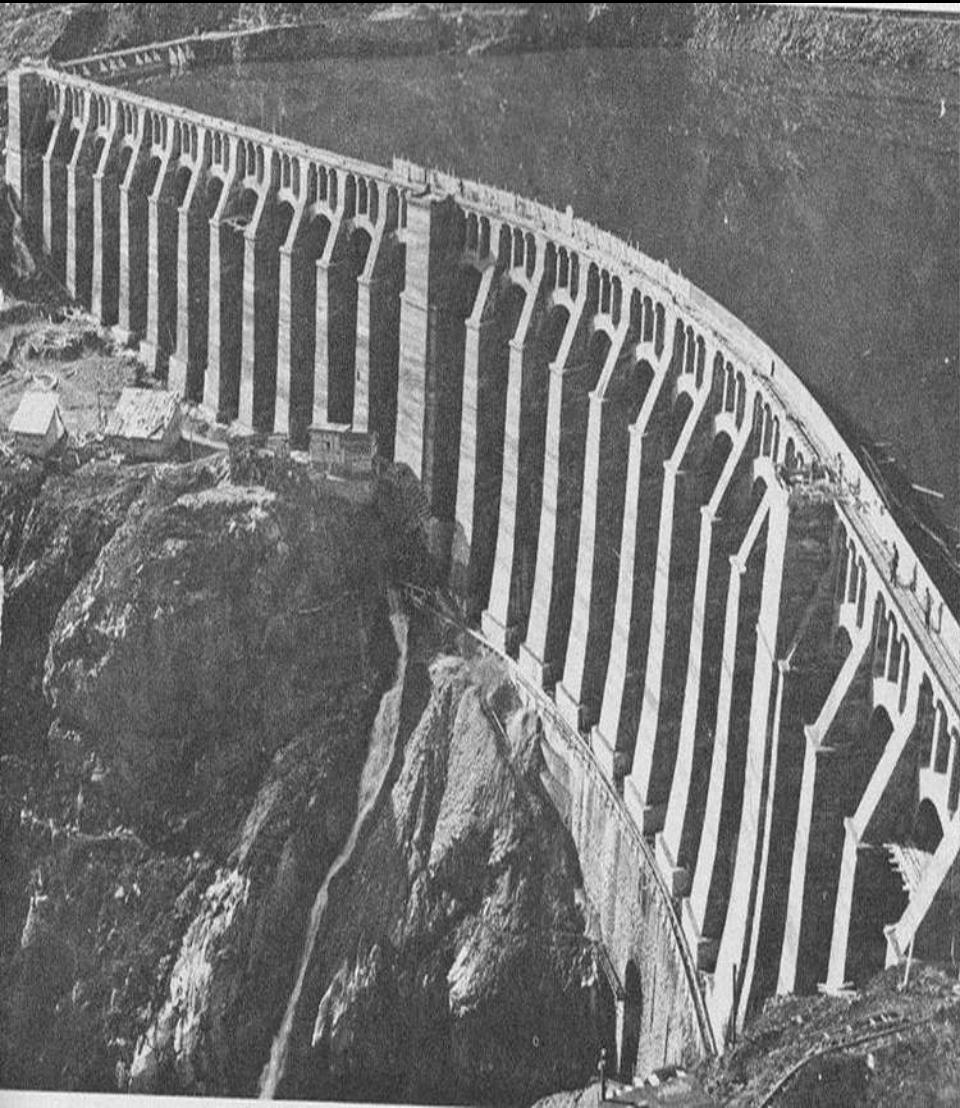
# Yangtze River, Three Gorges Dam, China



Dam-collapse, Italian Alps



Dam-collapse, Italian Alps



Dam-collapse, Italian Alps





Landslides, Vajont Dam catastrophe, Italian Alps



Vajont Dam catastrophe  
Italian Alps



# Das Schlegeistal aus der Vogelschau

D o l o m i t e n

Breitnock

Hoher Weißzint

Hochfeiler  
3.509 m

Hochferner  
3.463 m

Hinter  
Weißspitze  
3.437 m

Vorder  
Weißspitze  
3.276 m

Hochsteller

Schlegeis Kees

Schlegeisbach

Innere  
Spiegelkar

Standort

# High-mountain reservoir Zillertaler Alps, Austria





High-mountain reservoir  
(flood-control dam system)  
Zillertaler Alps, Austria





Meltwater reservoirs  
King George Island  
Antarctica





Stiol Lake 1994-2004  
illegal dam  
Rodna Mountains  
Romania

watermill-system  
Banat, Romania

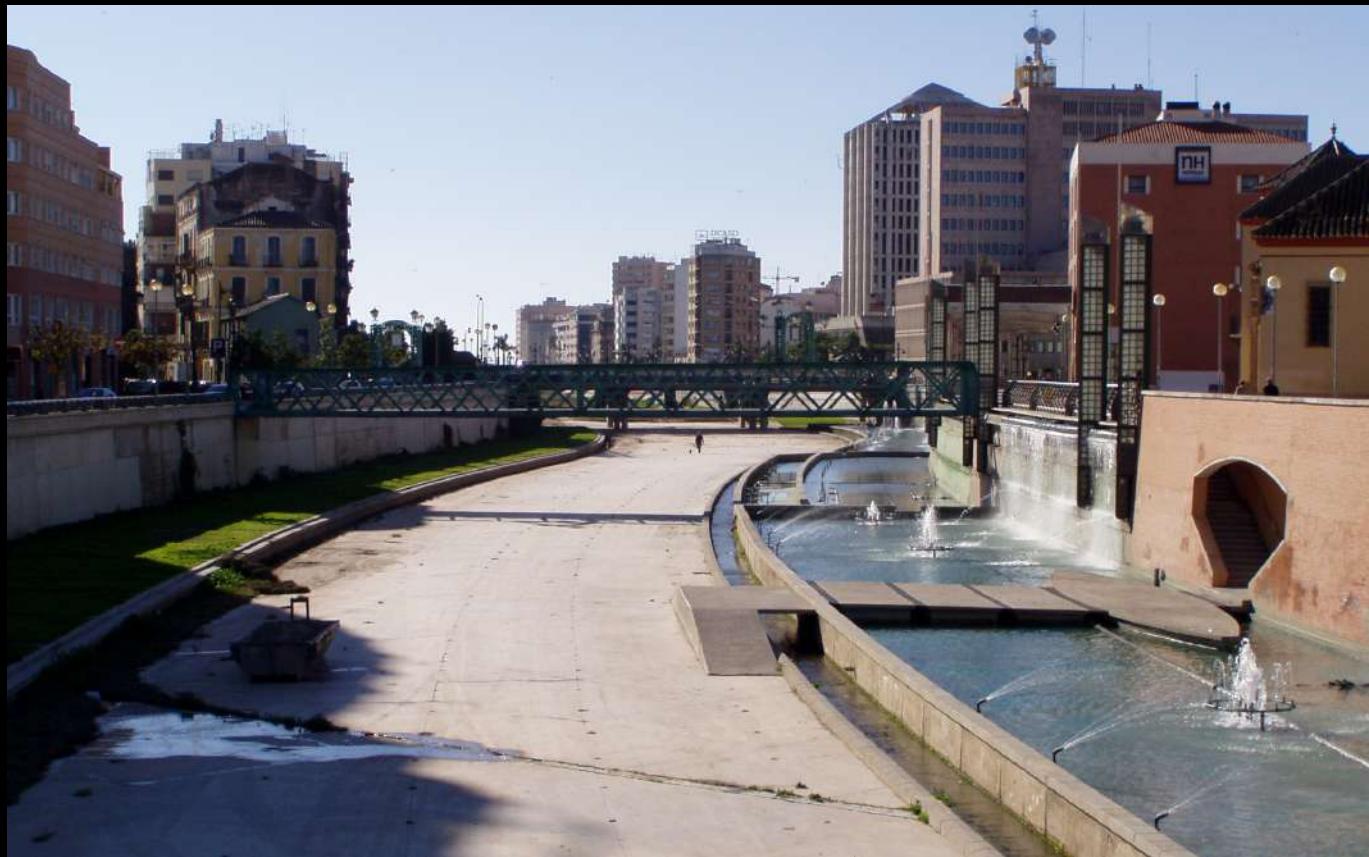


Dry “fiumara” channel - Nice, Southern France





Dry “fiumara” channel  
Nice, Southern France



Straight channel and dikes, Salzach River - Salzburg, Austria



Meltwater channel, Erciyes Volcano, Turkey





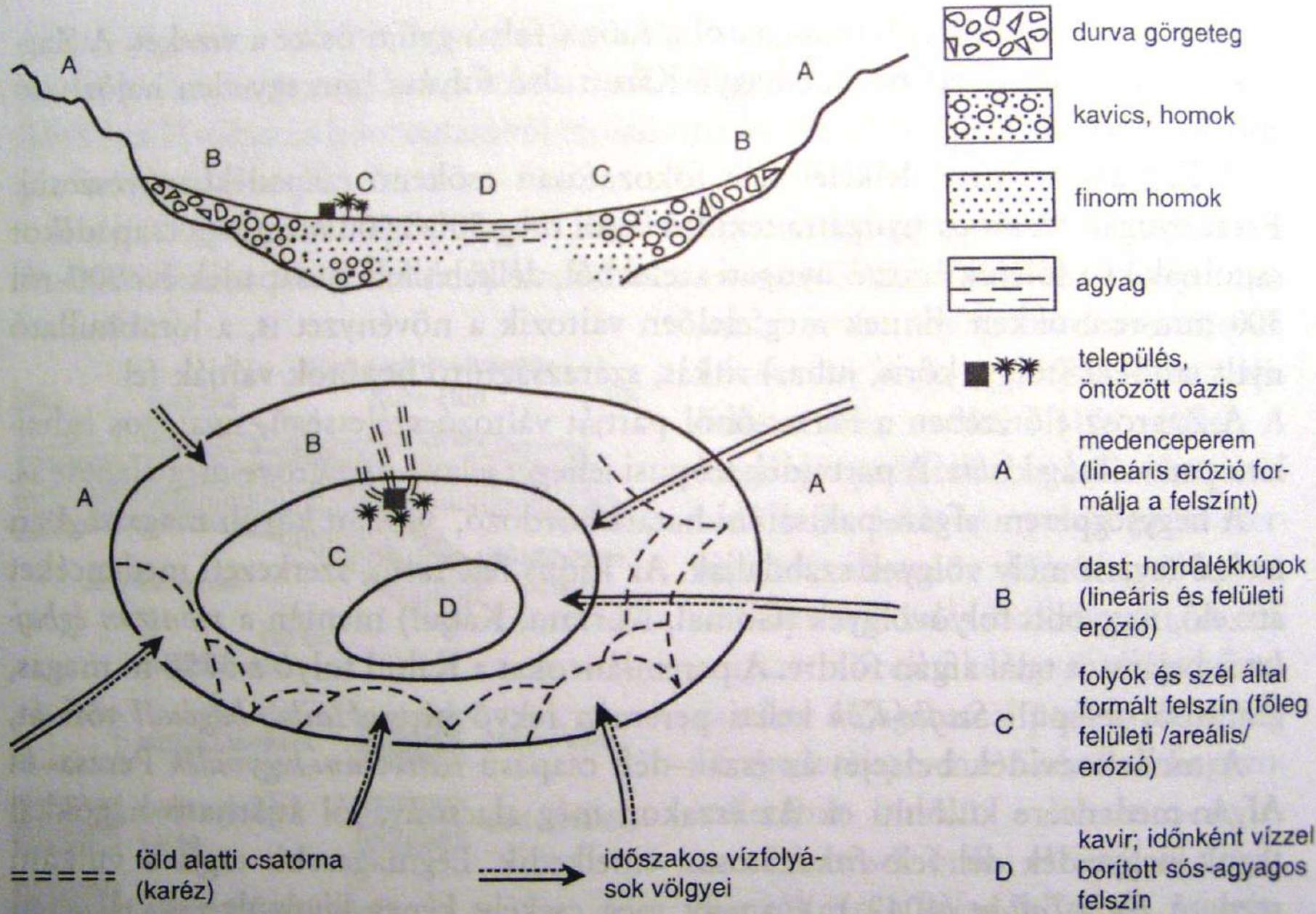
Meltwater channel,  
Dry Himalaya, Zanskar, India

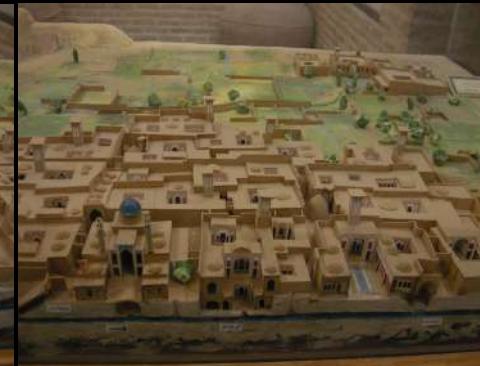


Meltwater channel, Himalaya, Zanskar, India



# Underground channels, traditional “water pipelines” (ghanats), Iran





## Former plans for riverflow changes - Russia



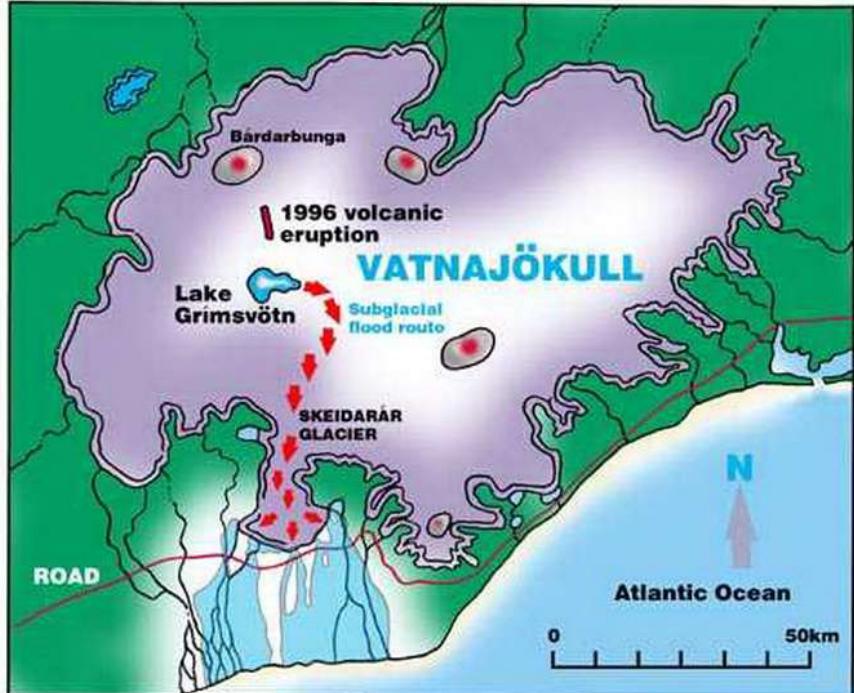
Niagara Falls  
underground power station, Canada





St. Lawrence River, Ottawa, Canada





Jökulhlaup flood area  
-dike system on the  
outwash plain  
Southern Iceland





New beaches  
-Gomera, Canary Islands  
-Corse



Dubai shoreline



Perzsa-öböl



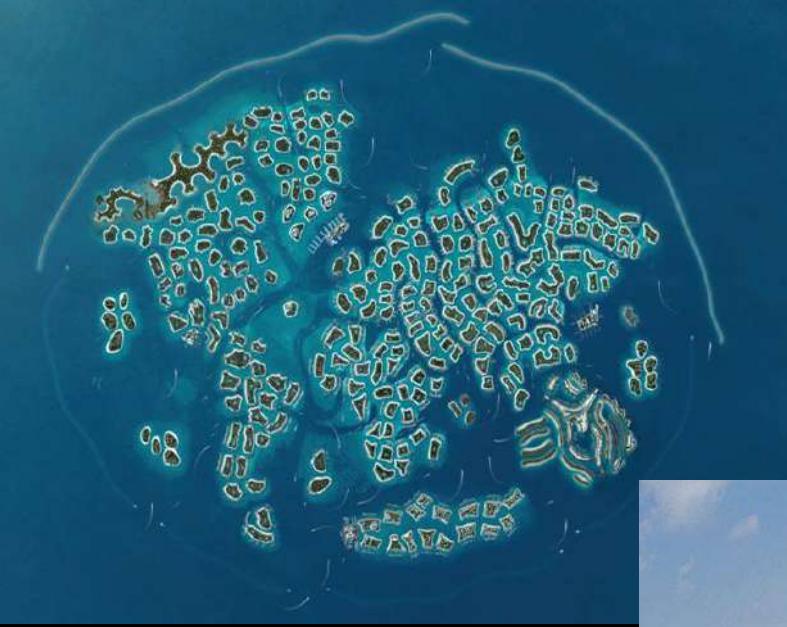


Palm Dzsumeira, Dubai



The World, Dubai





The World, Dubai





Seaport walls  
Bastia, Corse



Imported Sahara sand, Tenerife, Canary Islands



Paved lava beach  
Garachico  
Tenerife, Canary Islands





Paved lava beach  
Garachico  
Tenerife, Canary Islands

Paved Black Sea coast  
Crimea





# Complex seashore hightide dike system

## The Nederlands



# **MINING**

## Limestone quarry, Syria





Limestone quarry  
Bélkő, Bükk Mountains,  
Hungary

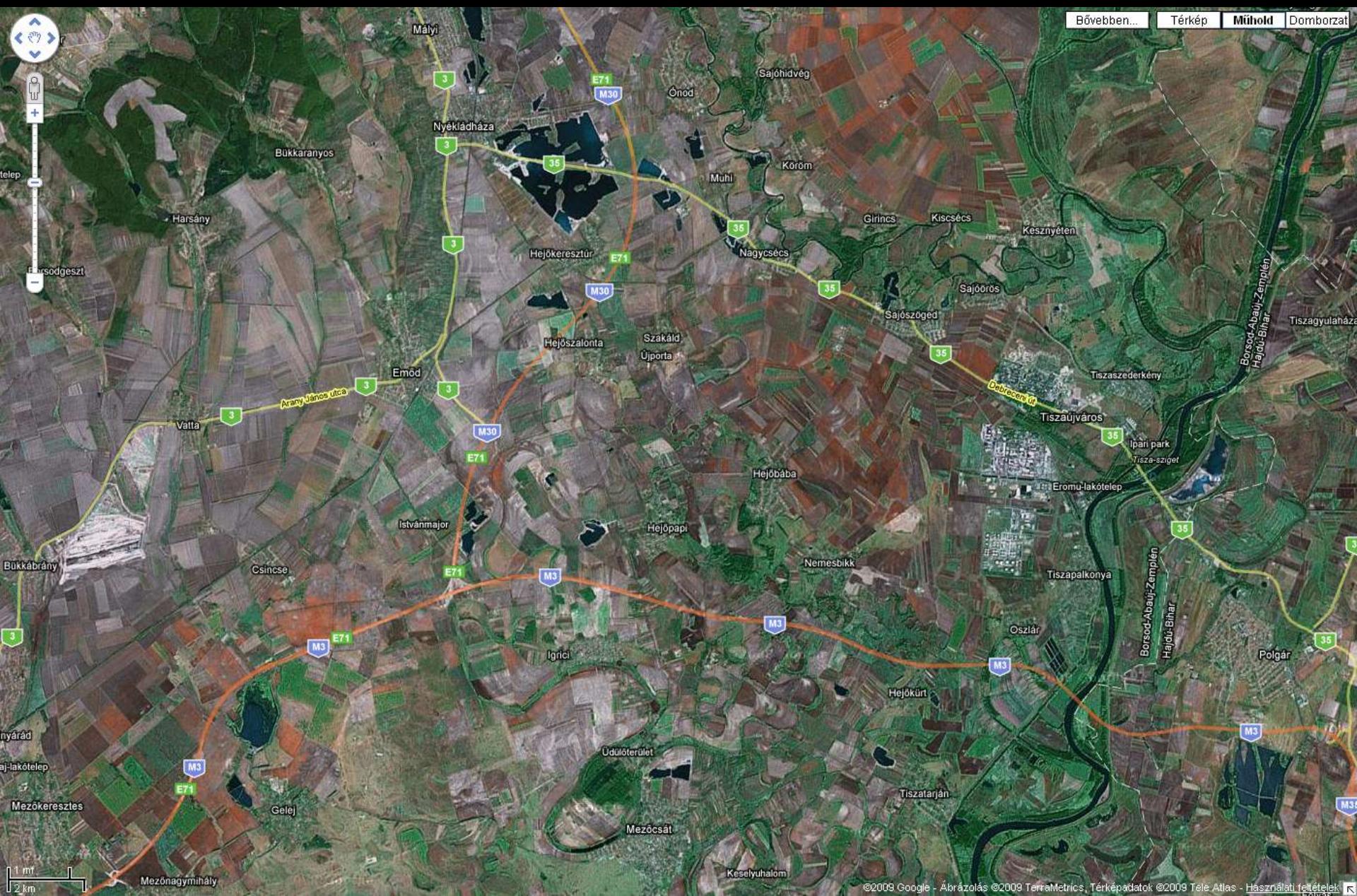


Dolomite quarry  
Bükk Mountains, Hungary

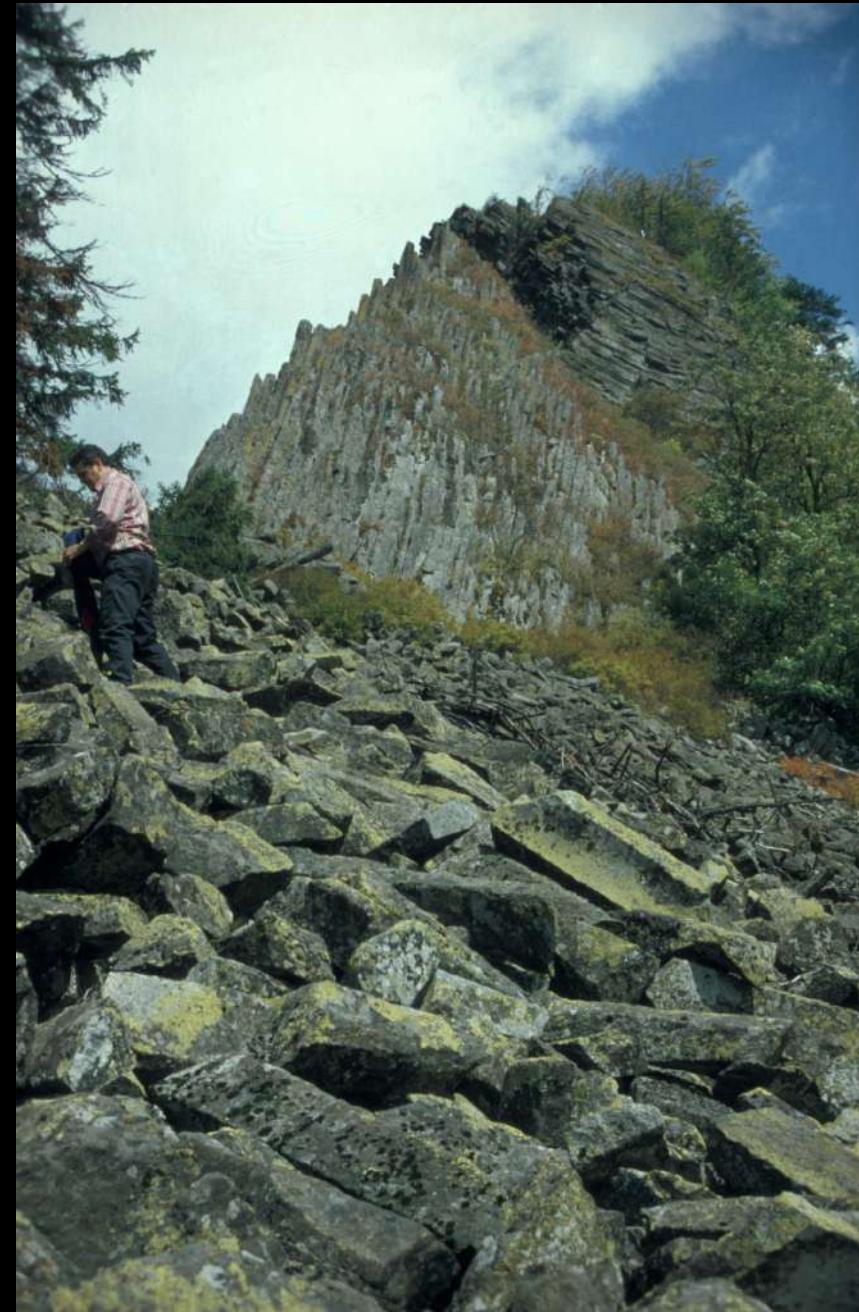
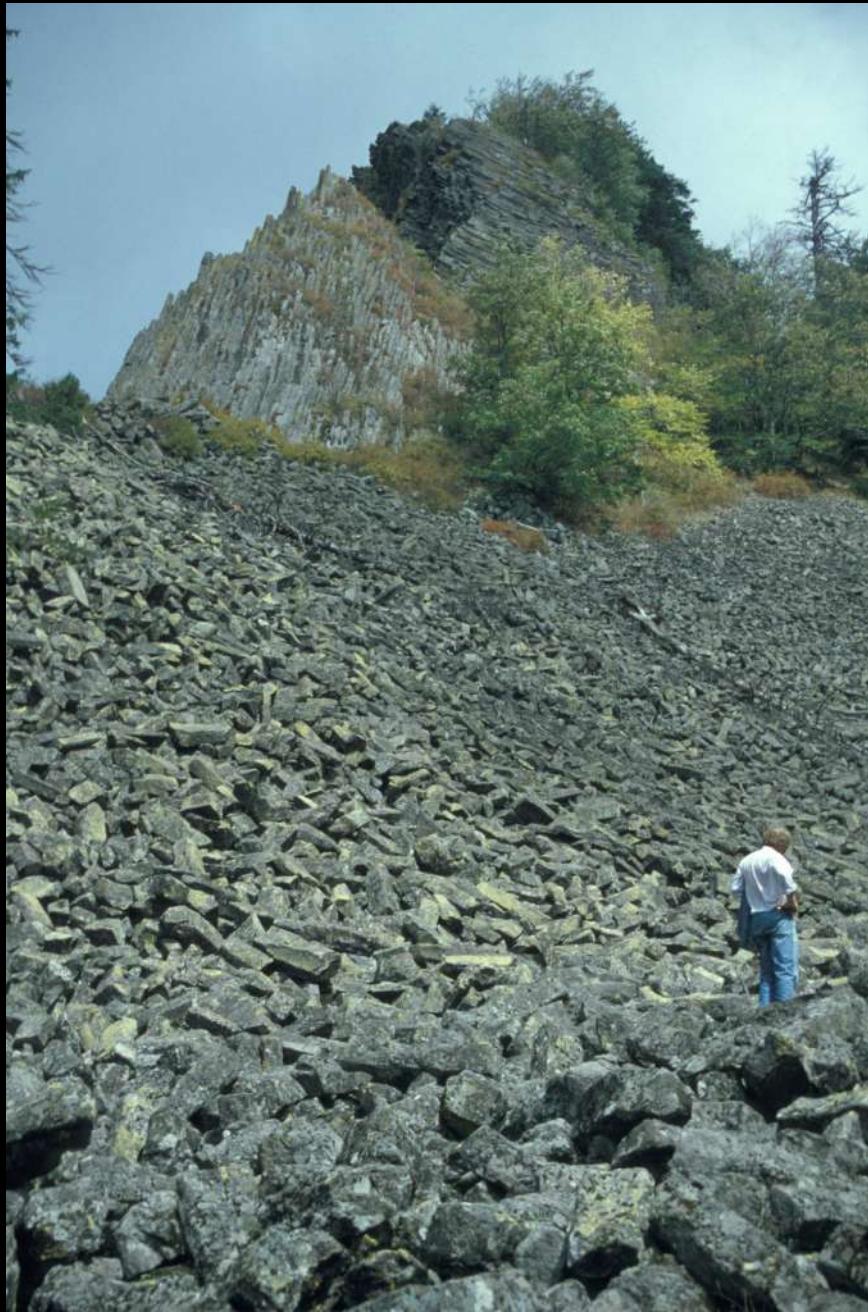
Granite quarry  
Hohe Tauern, Austria



# Gravel quarry Sajó-Hernád alluvial fan, Hungary



# Basalt quarry, Detunata, Romania





Basalt quarry (and movie location)  
Ság Hill, Hungary





Salt flat (dry period)  
Salar de Uyuni, Bolivia





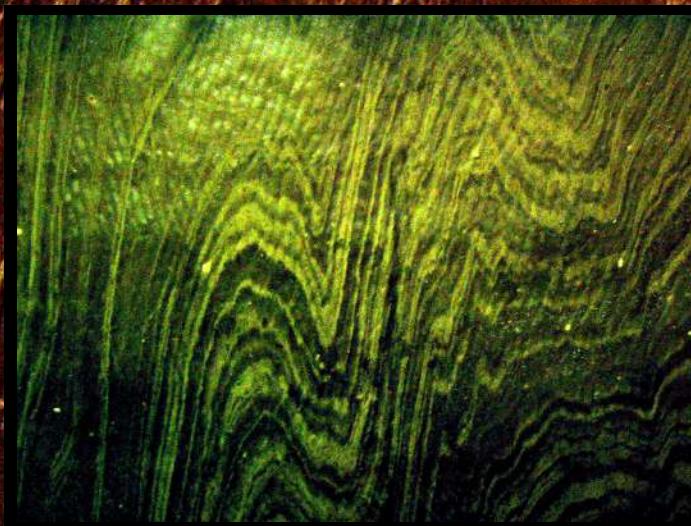
Salt flat (wet period)  
Salar de Uyuni, Bolivia



Salt mine  
Turda, Romania



Salt mine  
Turda, Romania



Salt mine (collapsed surface)  
Slatina, Ukraine



Salt mine  
(micro surfaceforms)  
Slatina, Ukraine



# Salt mine (collapsed surface, salty spring and lake), Slatina, Ukraine



# Salt mine (salt outcrops, sinkhole, spring)

Parajd, Romania



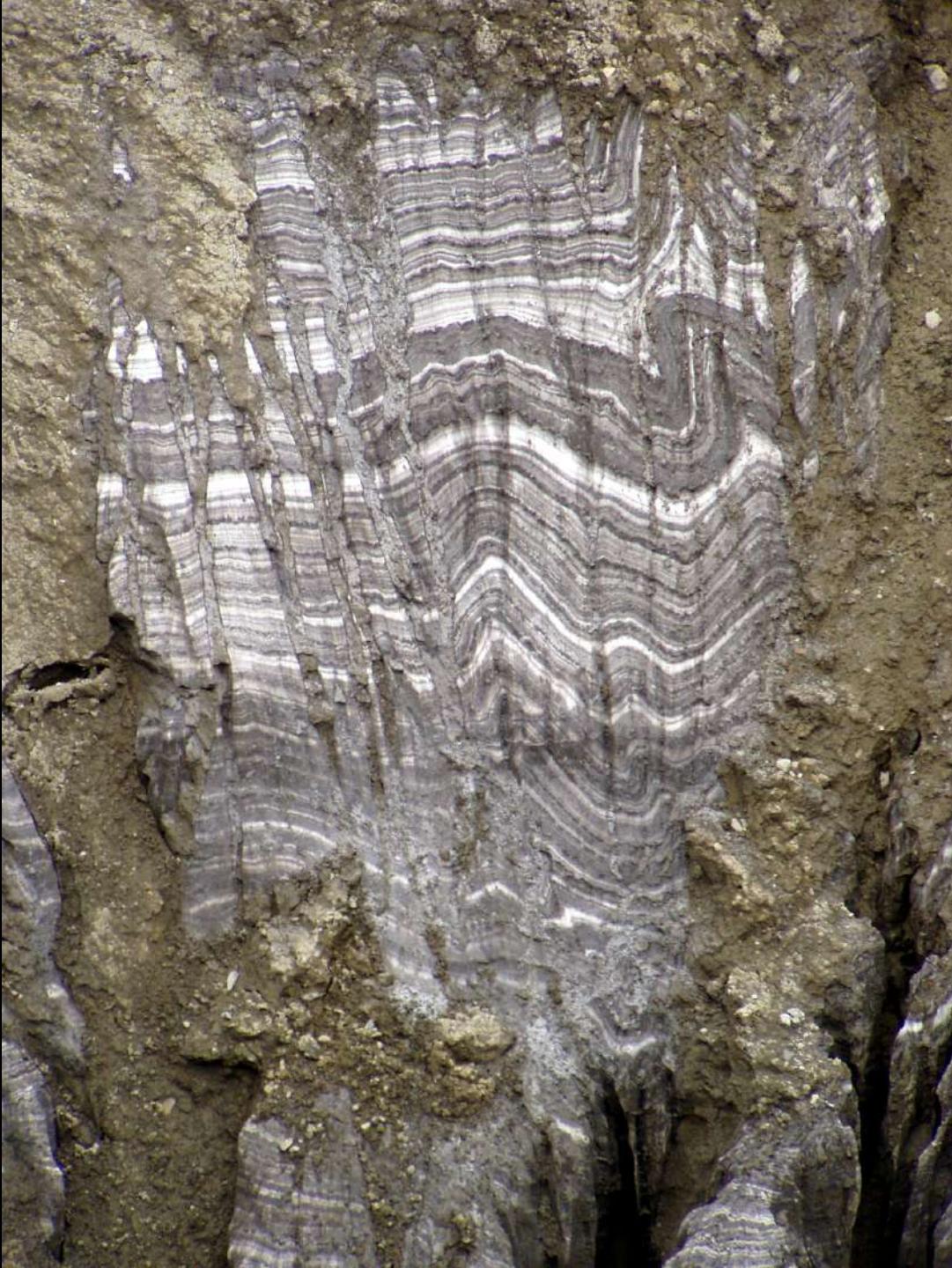
Salt mine (collapsed surface, salty lake)  
Dej, Romania





Salt mine  
(collapsed surface, landslides)  
Dej, Romania





Salt mine (collapsed surface, landslides), Dej, Romania



Salt mine (collapsed surface, landslides)  
Dej, Romania



Salt mine (collapsed surface, landslides, old mining channel)  
Dej, Romania



Sulphur mine (open pit, abandoned), 1400-1800 m asl  
Calimani Mountains, Romania



The caldera rim above the sulphur mine, Calimani Mountains, Romania





The central hollow and the refuse of the abandoned sulphur mine, Calimani Mountains, Romania



Terraces of the open pit  
The central hollow of the sulphur mine,  
Calimani Mountains, Romania



Sulphur mine (open pit, abandoned),  
Calimani Mountains, Romania



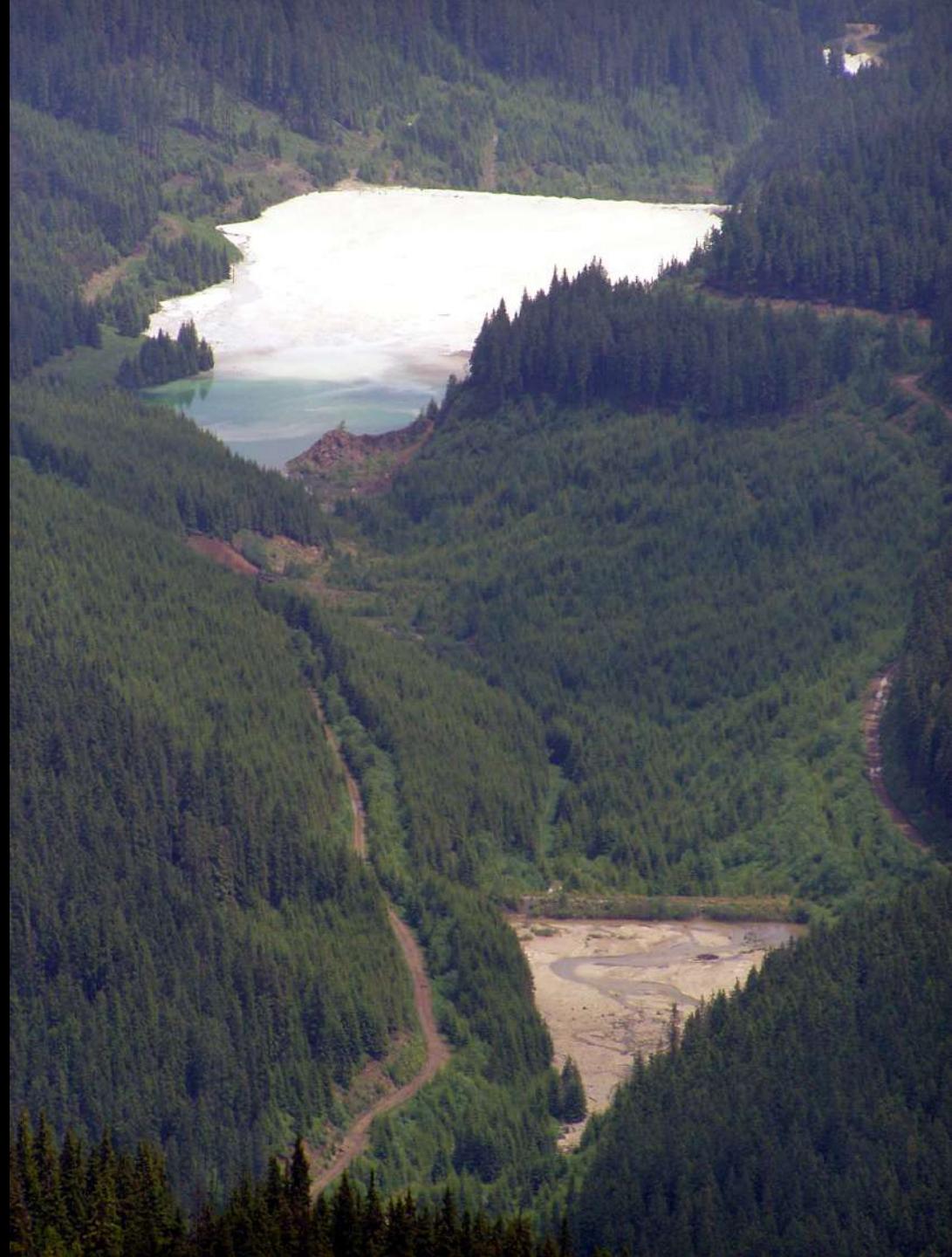
Refuses in the mountain pass  
Sulphur mine (open pit, abandoned), Calimani Mountains, Romania





Refuse in the mountain pass  
Sulphur mine  
Calimani Mountains  
Romania

Refuse and settler lakes  
Sulphur mine (open pit, abandoned)  
Calimani Mountains, Romania





Remnants of the sulphur mine  
Calimani Mountains, Romania



Bauxite open pit, Vértes Mountains, Hungary



Manganese open pit (abandoned), paleokarst, Úrkút, Hungary



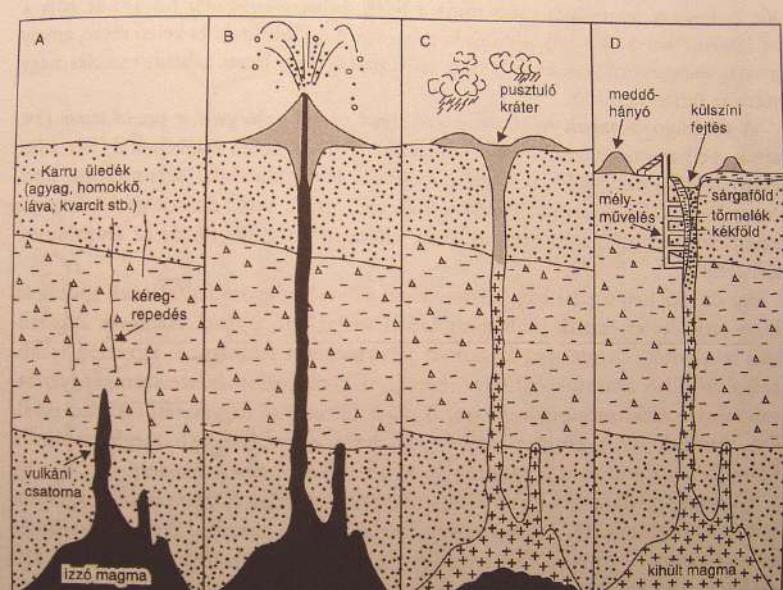


Open pit of a coal mine, Mecsek Mountains, Hungary





Open pit and its refuse, Spain



## Diamond mine, South Africa

38. ábra. A gyémántot rejti kimberlit-kürtök keletkezése. A - a szilárd kéreg hasadékaiba a mélyből folyékony közvetolvadék (magma) nyomul. B - a vulkáni kitörés anyagaiból kúp épül fel; a kúrtó lebúló anyagában gyémánkrisítidyok alakulnak ki. C - a vulkáni tevékenység megszűnése után a kráter pusztulásnak indul. D - évmilliók múltán a vulkáni kúp teljesen eltűnik, a felszín több száz méterrel alacsonyodik. Megkezdődik a felszínen, majd a mélyben is a bányaművek.





Refuses of diamond mines  
Johannesburg, South Africa





Open pit of the Mirnij diamond mine  
Siberia, Russia





Open pit of a diamond mine  
Canadian tundra



## West African diamond mine



Terrace-system of a copper mine, Chile





Abandoned iron mine, Tenerife, Canary Islands



High mountain gold mine (5500 m asl)  
Cerro Azufre, Puna de Atacama, Chile



High mountain gold mine (5500 m asl), Cerro Azufre, Puna de Atacama, Chile



# Cerro Rico silver mine, Potosí, Bolivia

Potosí, Bolivia

Cerro Rico





Cerro Rico silver mine,  
Potosí, Bolivia





Cerro Rico silver mine,  
Potosí, Bolivia



# Cerro Rico silver mine, Potosí, Bolivia



# **TRAFFIC AND TRANSPORTATION**

# Mountain roads: Transfagaras Highway, Fagaras Mountains, Romania



Mountain roads: Transfagaras Highway, Fagaras Mountains, Romania

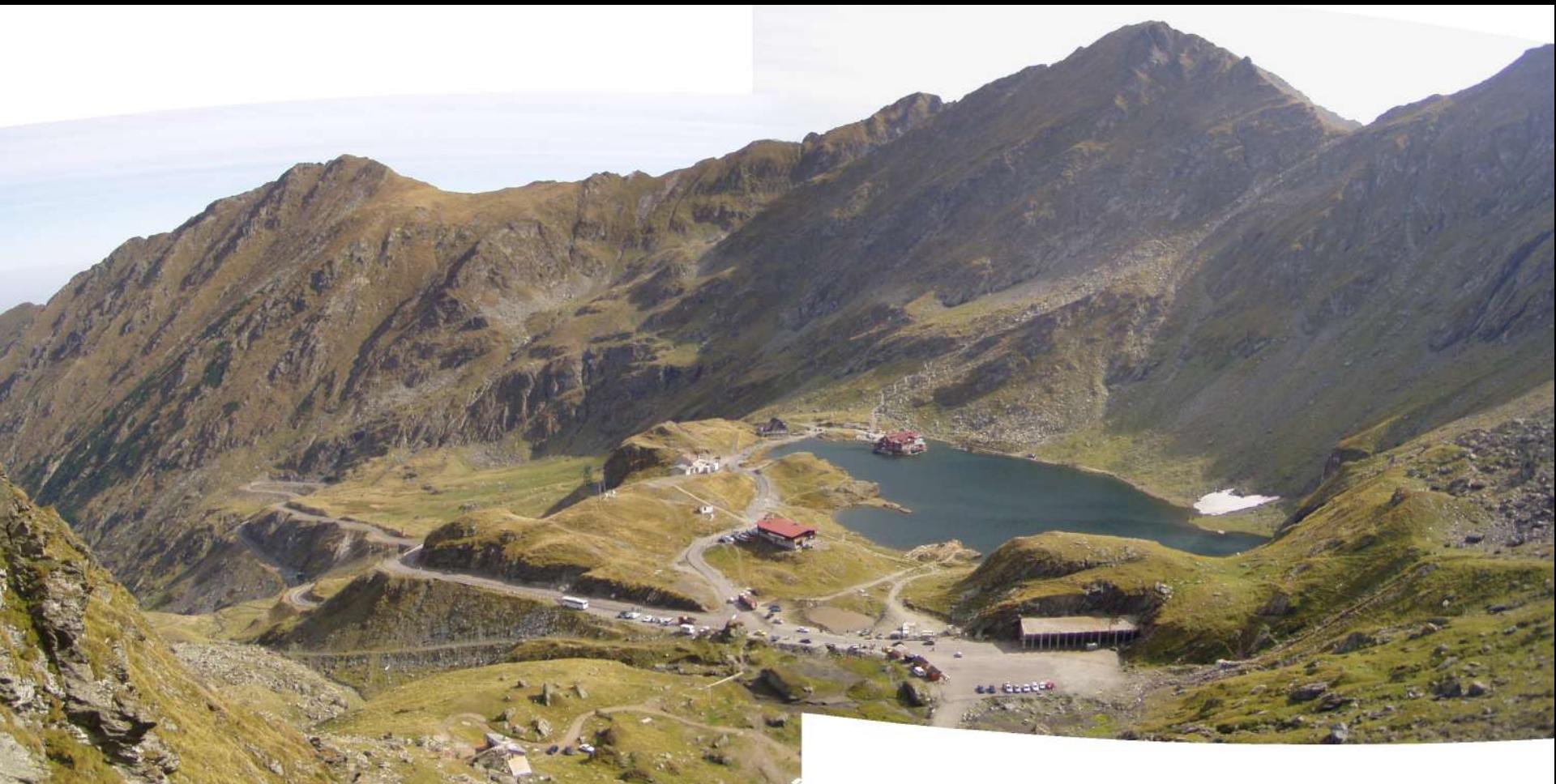




## Mountain roads and avalanches: Transfagaras Highway, Fagaras Mountains, Romania



Transfagaras Highway, tunnel across the main ridge (cca. 2000 m asl)  
Fagaras Mountains, Romania





Mountain roads:  
steep slopes and landslides,  
Italian Alps





Mountain roads:  
Transcaliman Road  
Calimani Mountains,  
Romania



Mountain roads: the Transcaliman Road on the caldera rim  
Calimani Mountains, Romania



Mountain roads: remnants of the mining roads  
(from the 50-60's) on the caldera rim  
Calimani Mountains, Romania





Roads in the Paring Mountains,  
Romania





Basic roads on loess  
like sediments





Basic road in a dry valley,  
Atacama desert, Chile





Remnants of a mining road in a  
high mountain valley (cca 4000 m asl),  
Mercedario, Argentina



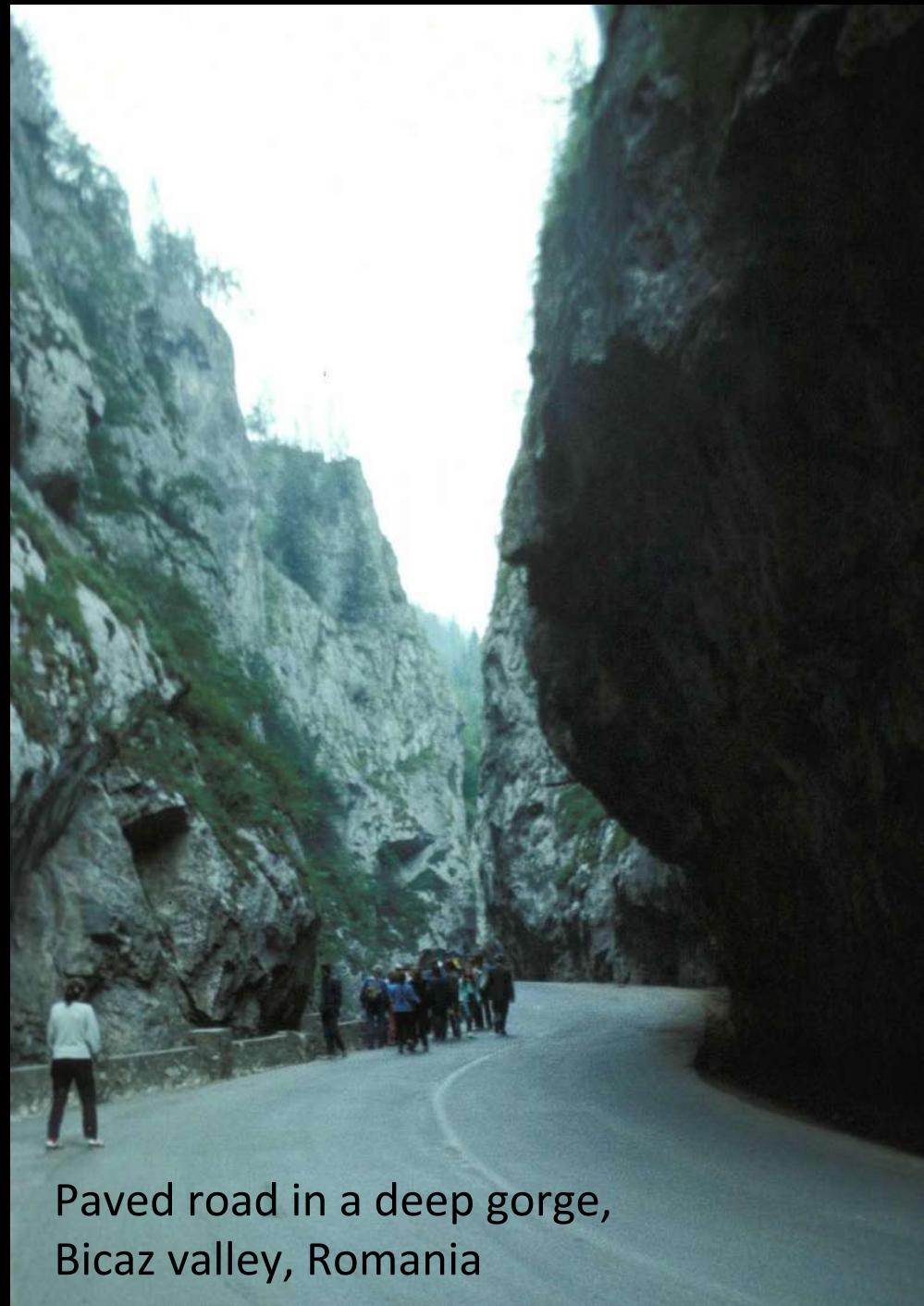


Paved road surface on a gorge floor,  
Slovakia



Paved road in a deep gorge, Bicaz valley, Romania





Paved road in a deep gorge,  
Bicaz valley, Romania



Roads in gorges:  
Paring Mountains and  
Almaj Mountains,  
Romania





Roads in gorges:  
Capatini Mountains,  
Romania

Roads on rockwalls:

Road carved into a rockwall (cca. 4000 m asl.), Western Himalaya, India

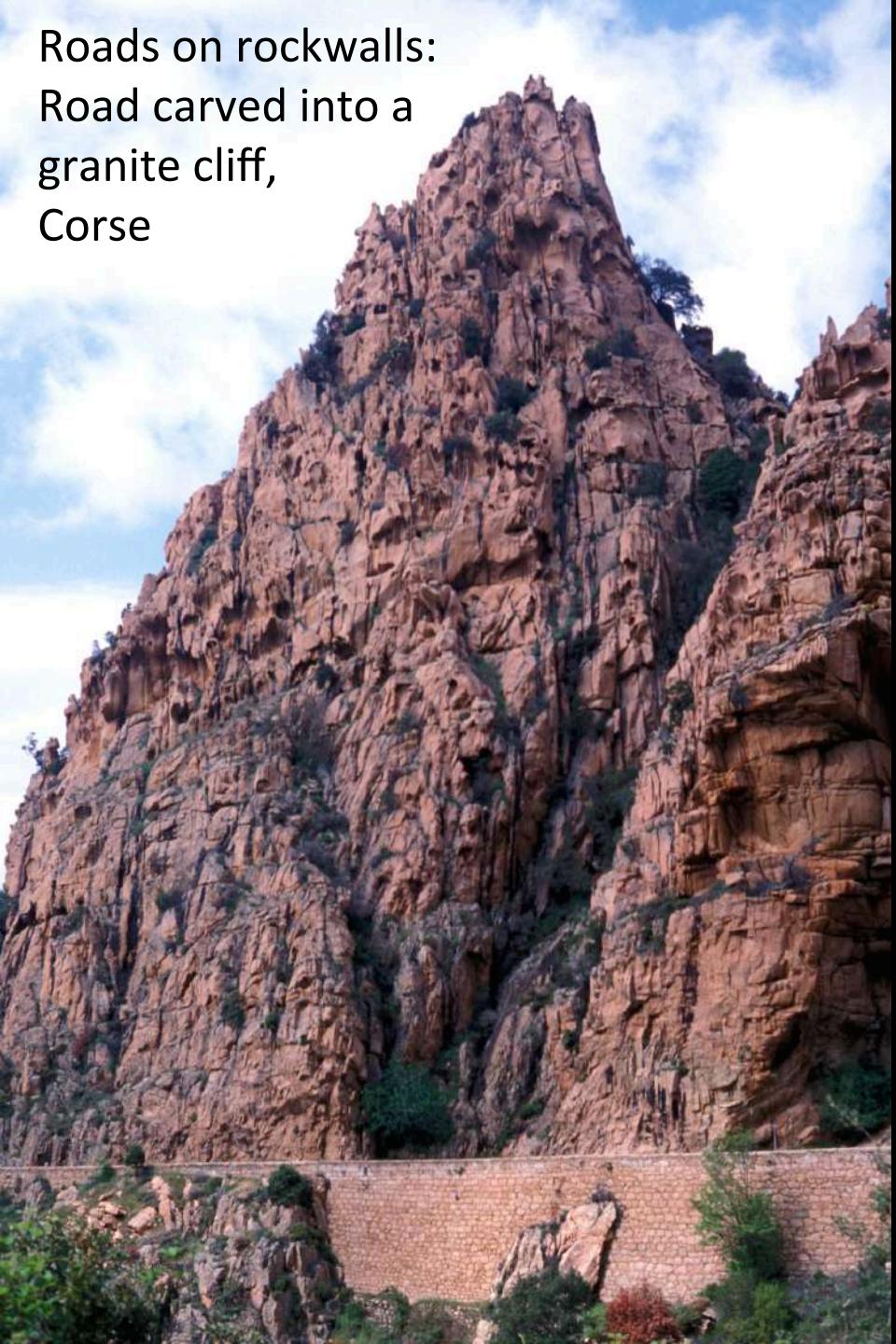


Roads on rockwalls:

Road carved into a granite slope, Corse



Roads on rockwalls:  
Road carved into a  
granite cliff,  
Corse



Roads on rockwalls:  
Road carved into a granite gorge, Corse





Roads on rockwalls:  
Road carved into a  
basaltic slope,  
Tenerife, Canary Islands

## Roads on the debris slopes: military roads, Zanskar, Himalaya, India





Roads on the debris slopes:  
military roads,  
Zanskar and Ladakh, Himalaya, India



# Roads on the debris slopes: Dry Andes, Mercedario, Argentina





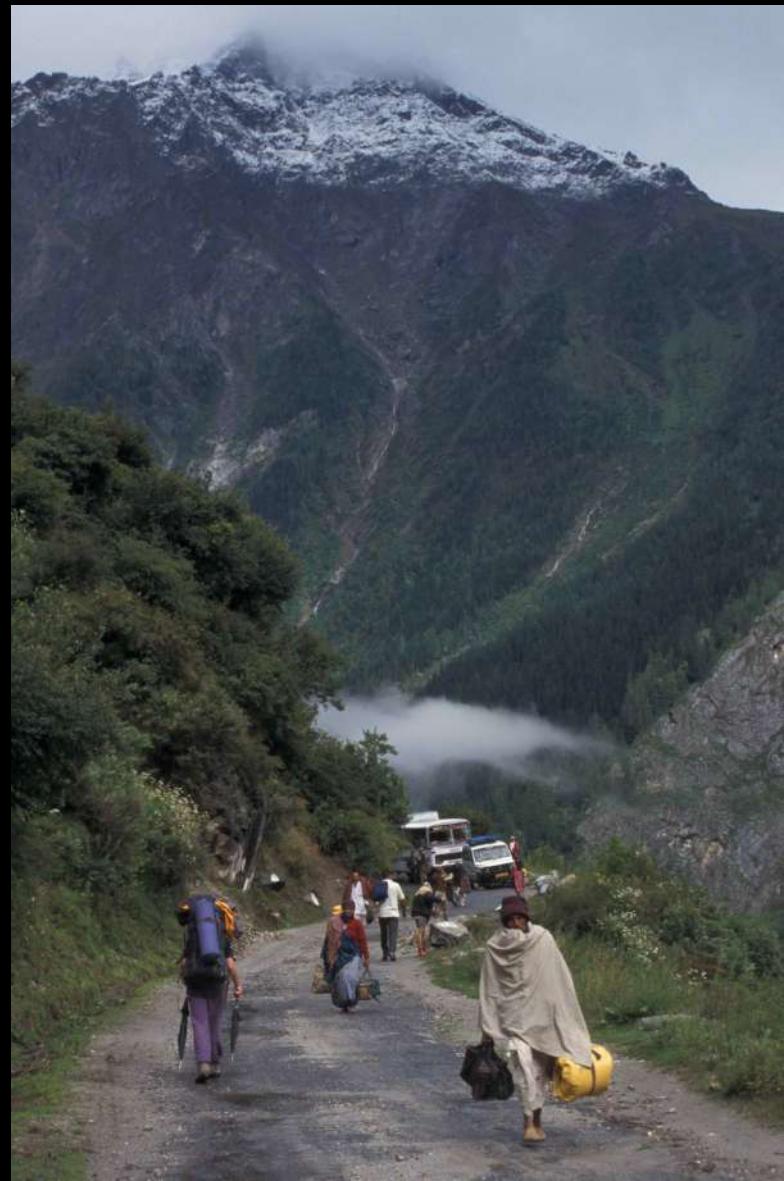
Roads on the debris slopes: Dry Andes,  
Mercedario, Argentina

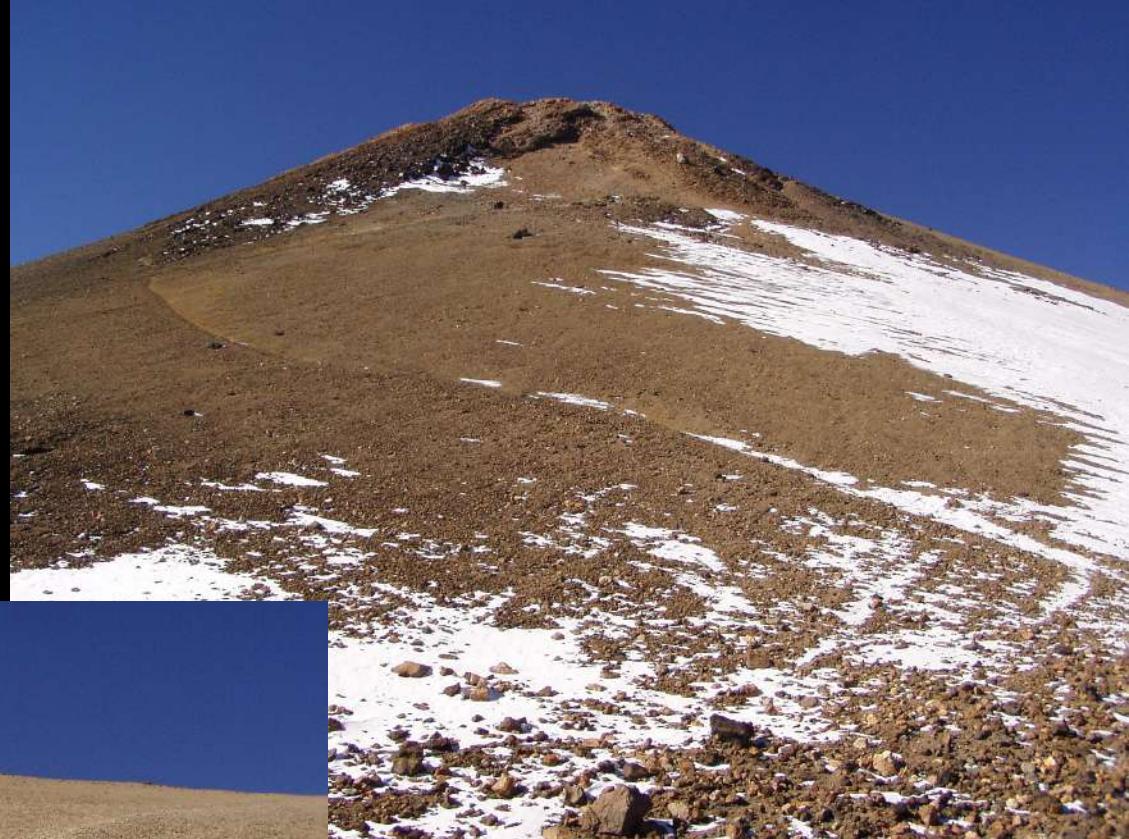
Roads on the debris slopes: Great Himalayan Range  
(cca. 5000 m asl), India



# Roads on the debris slopes: monsoon and landslides

## Garhwal Himalaya, India





Trails on the debris slopes:  
Teide volcano  
Tenerife, Canary Islands



Tourist trails:  
Steep slopes and avalanches,  
Rodna Mountains, Romania

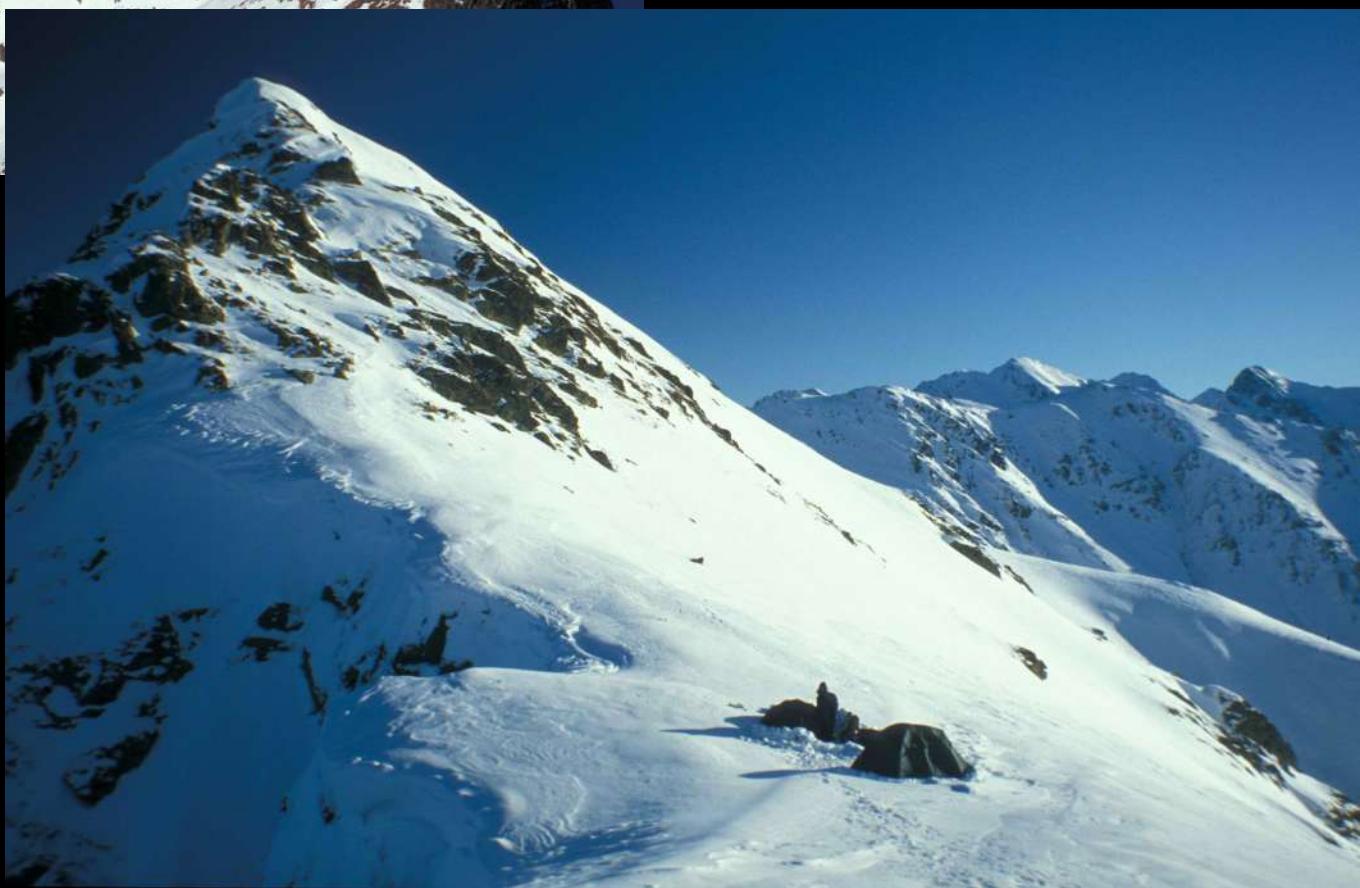


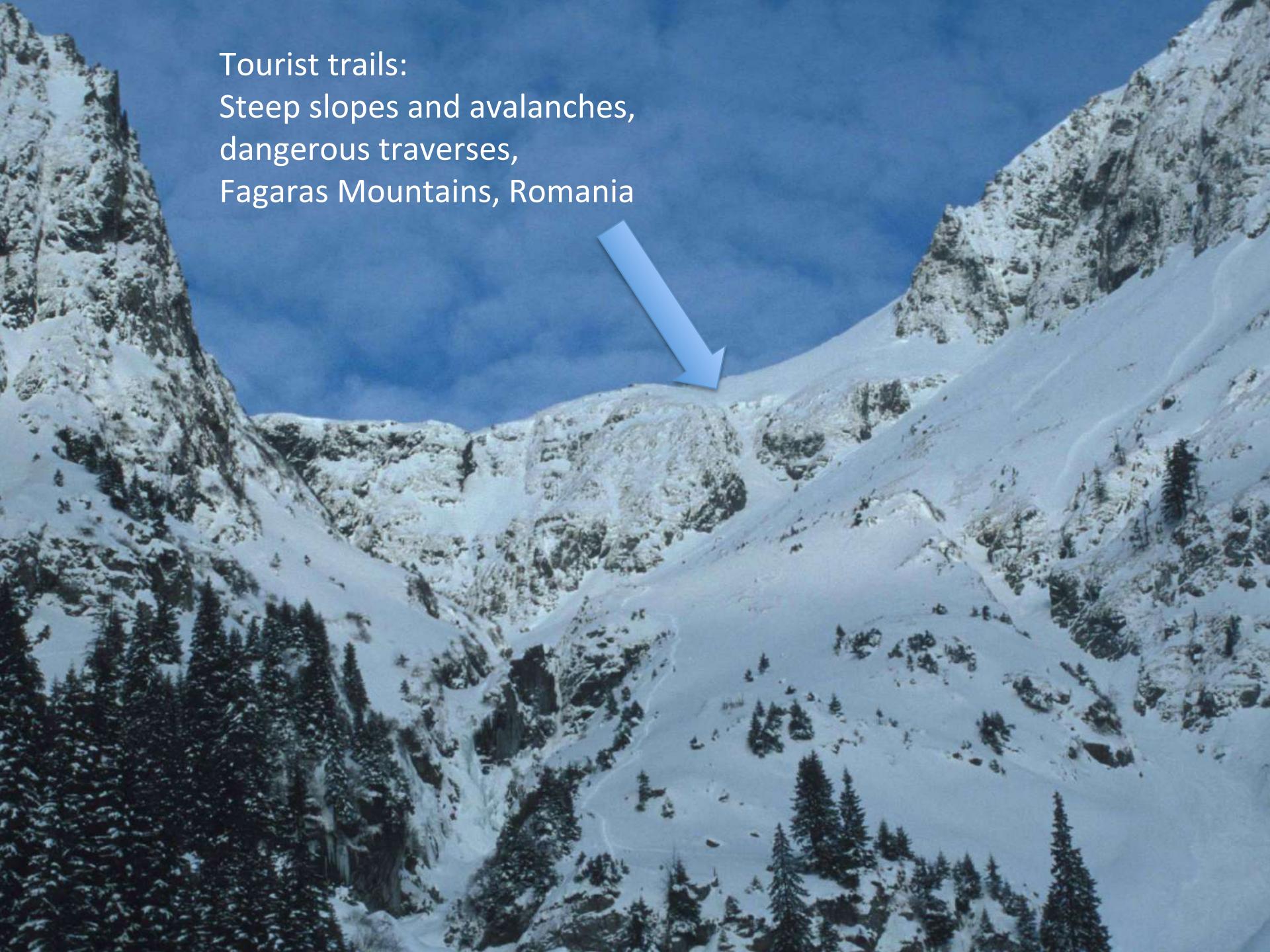
Tourist trails:  
Steep slopes and avalanches,  
dangerous traverses,  
Rodna Mountains, Romania





Tourist trails:  
Steep slopes and avalanches,  
dangerous traverses,  
Fagaras Mountains, Romania





Tourist trails:  
Steep slopes and avalanches,  
dangerous traverses,  
Fagaras Mountains, Romania





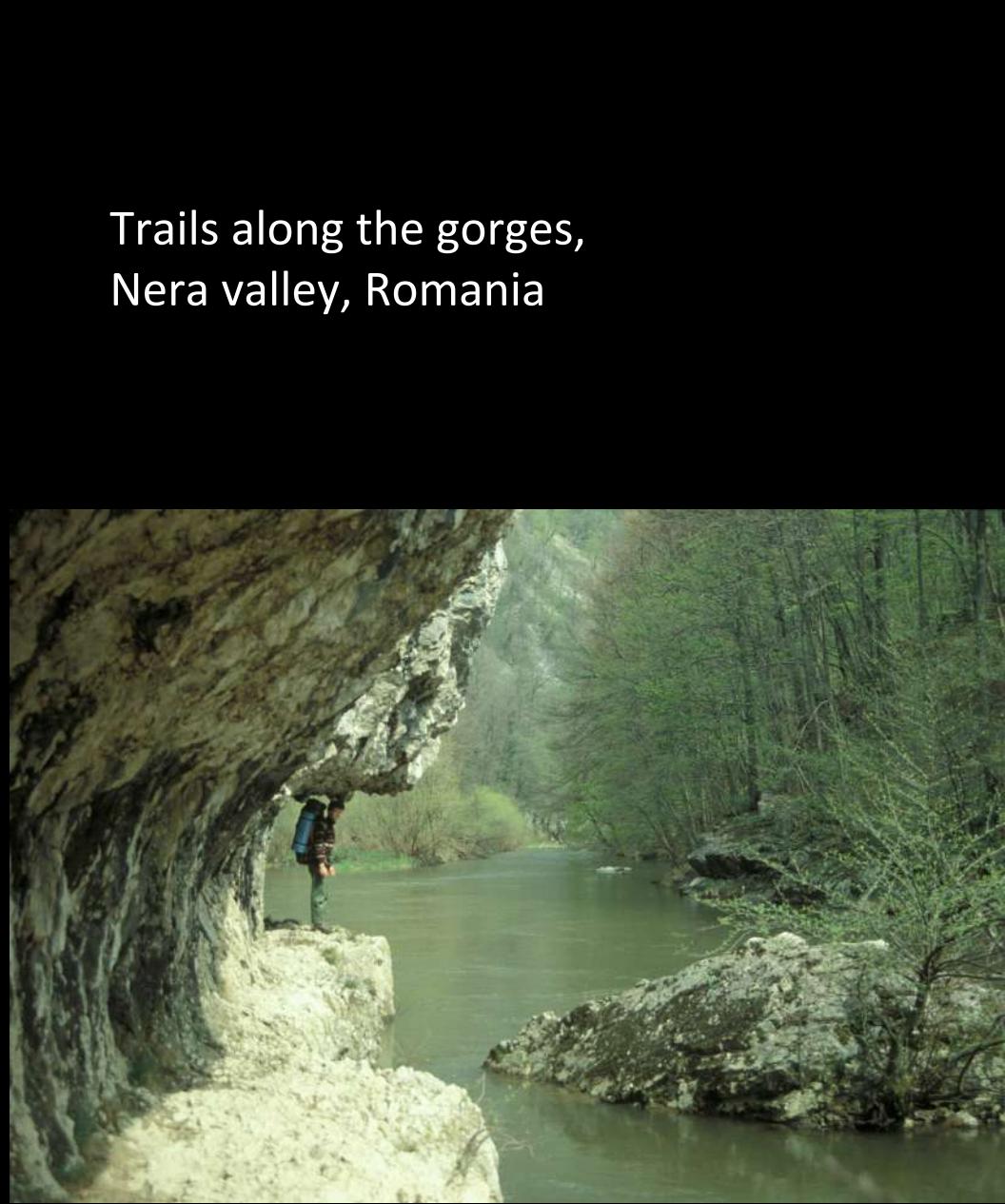
Trails along the gorges, Romania





Trails along the gorges,  
Nera valley, Romania





Trails along the gorges,  
Nera valley, Romania



Trails along the gorges,  
Dry Himalaya, Zanskar, India



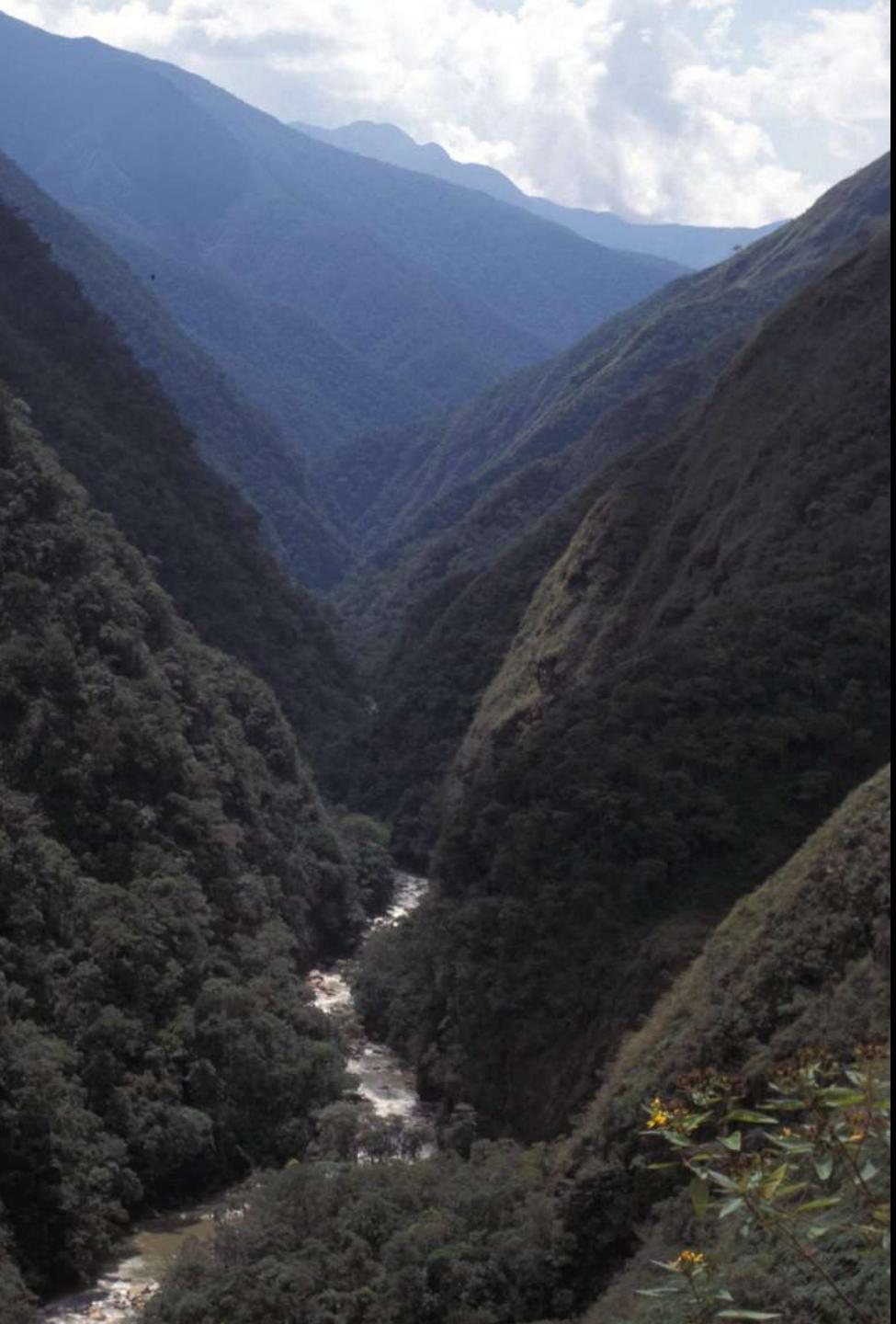


Trails along the gorges,  
Dry Himalaya, Zanskar, India

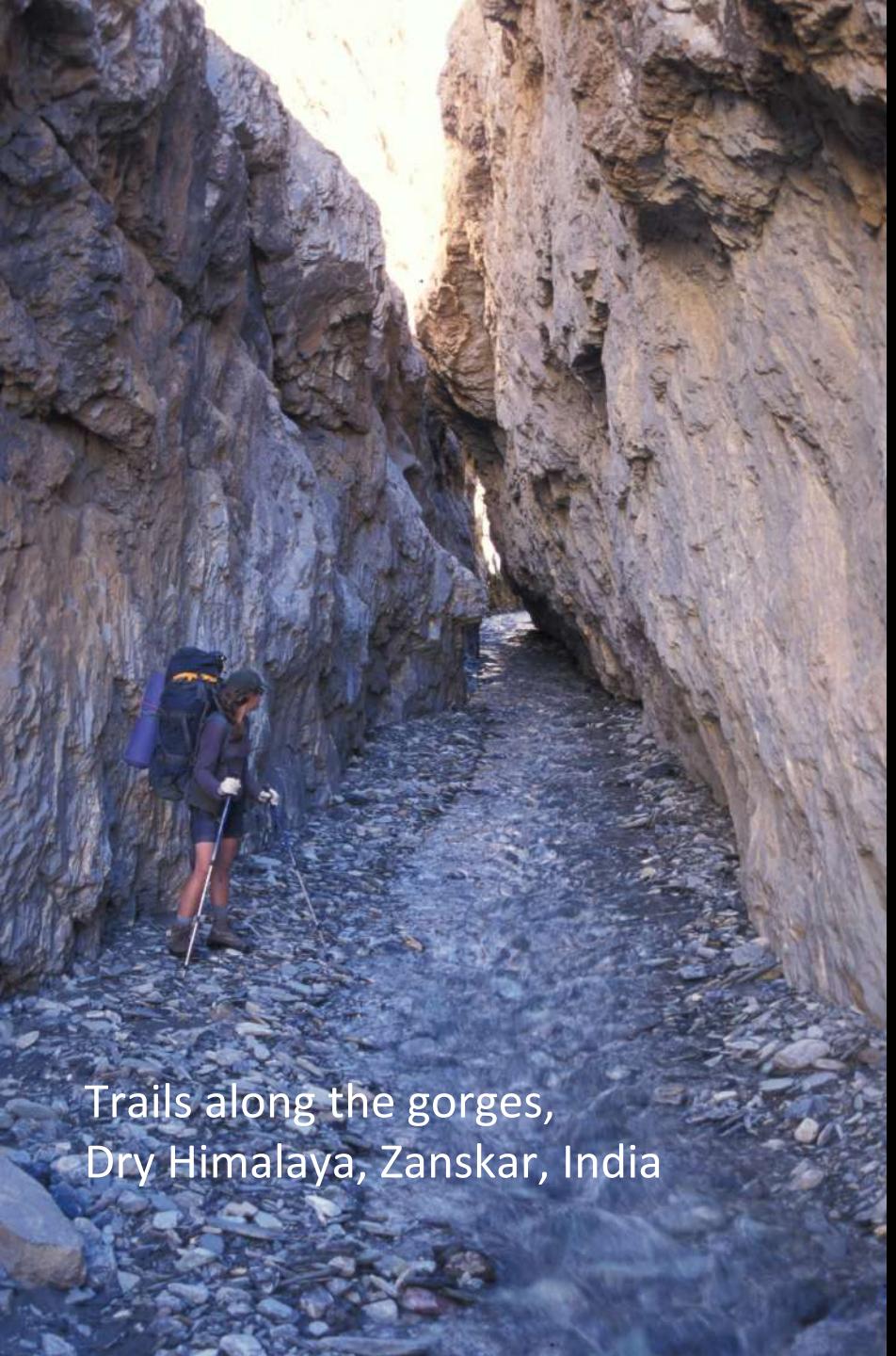


Trails along the gorges,  
Dry Himalaya, Ladakh, India





Trails along the gorges,  
ancient Inca trail  
Yungas, Bolivia



Trails along the gorges,  
Dry Himalaya, Zanskar, India



Trails along the gorges,  
Dry Himalaya, Zanskar, India



Trails along the gorges,  
Dry Himalaya, Zanskar, India



Trails across mountain passes,  
Dry Himalaya, Zanskar, India



Trails across mountain passes,  
Dry Himalaya, Zanskar, India



Trails across mountain passes,  
4000-4800 m asl  
Dry Himalaya, Zanskar, India





Trails across mountain passes,  
Dry Himalaya, Zanskar, India



Wooden trail across a peatbog,  
Romania



Tourist trail and  
rivercrossing,  
Tupungato,  
Chile





Mountain road along a gorge,  
Dry Himalaya, Zanskar, India



Flooded and destroyed mountain roads,  
Dry Himalaya, Ladakh, India





Flooded and destroyed  
mountain roads and bridges,  
Dry Himalaya, Ladakh, India



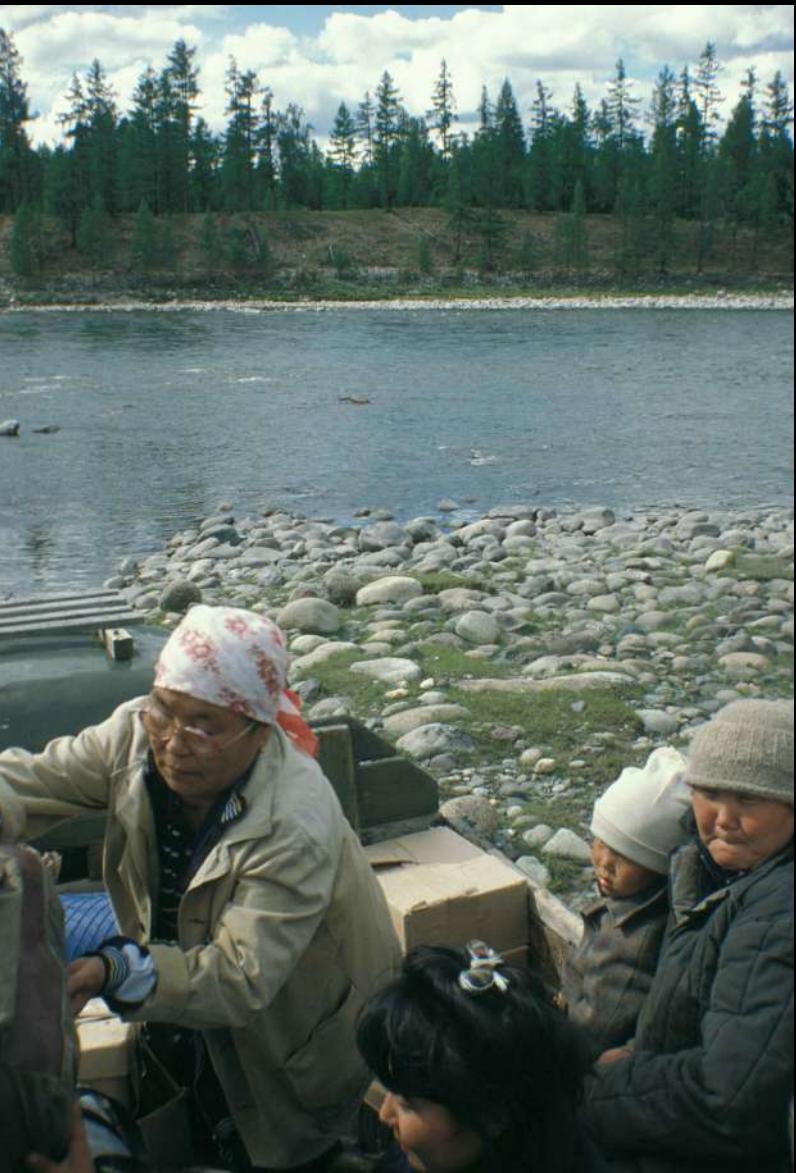


Mountain bridges,  
Corse

Highway across glacial meltwater creeks and the outwash plain, South Iceland



River crossing by truck,  
Oka River, Siberia, Russia





River crossing by truck,  
Oka River, Siberia, Russia





River crossing by truck,  
Oka River, Siberia, Russia



Desert roads:  
across a flooded waadi,  
Sahara, Maroc





Desert roads:  
Signs of the tire tracks in the  
desert pavement,  
Sahara, Maroc



Desert roads:  
across the Highland,  
Central Iceland



Desert surface:  
new trails in the  
desert pavement





Desert roads:  
across the Altiplano,  
(cca. 5000 m asl)  
Bolivia



Desert roads:

Salt highway across the Namib Desert (Skeleton Coast), Namibia





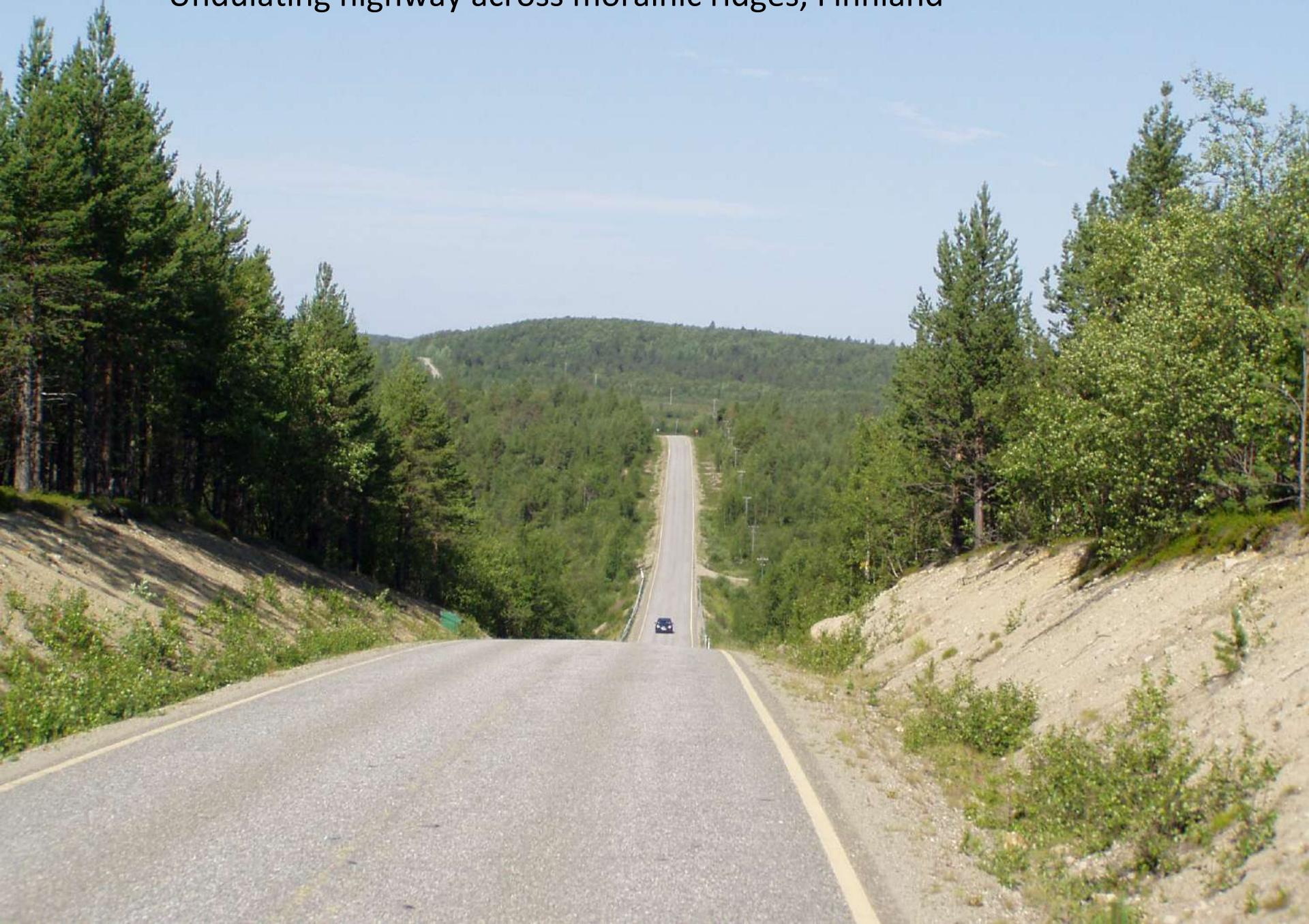
Roads in the dry savanna,  
Namibia





Road in the savanna, Namibia

Undulating highway across morainic ridges, Finnland



A Trans-Amazon road, dry season, Bolivia



Trail on the floodplain, Caprivi area, Namibia





High mountain flatlands  
and plateaus:  
trails and roads in the  
Pamir Mountains,  
Tajikistan



High mountain flatlands and plateaus:  
trails and roads in the Pamir Mountains,  
Tajikistan



High mountain flatlands and plateaus:  
across the Salar de Uyuni,  
Altiplano, Bolivia

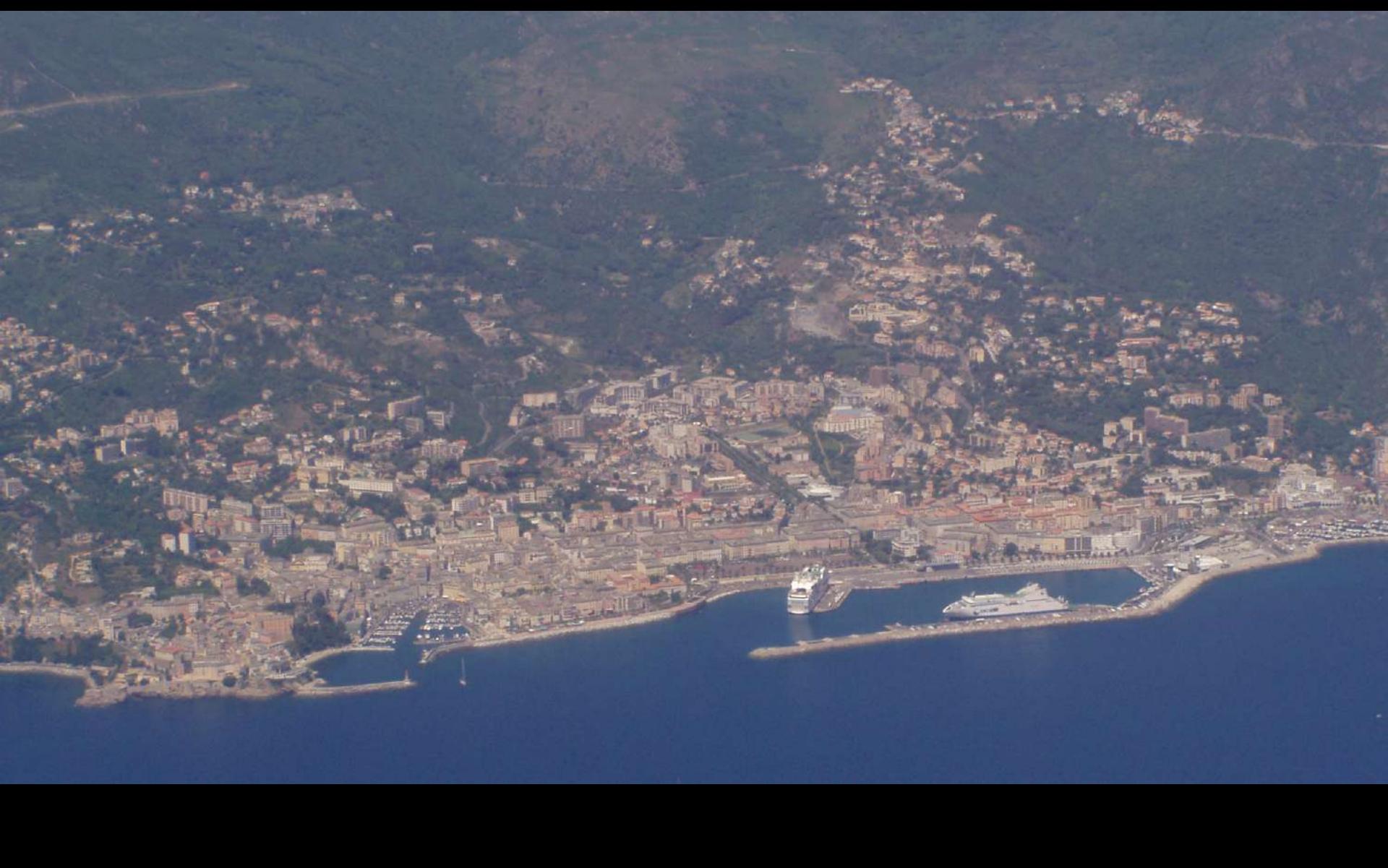




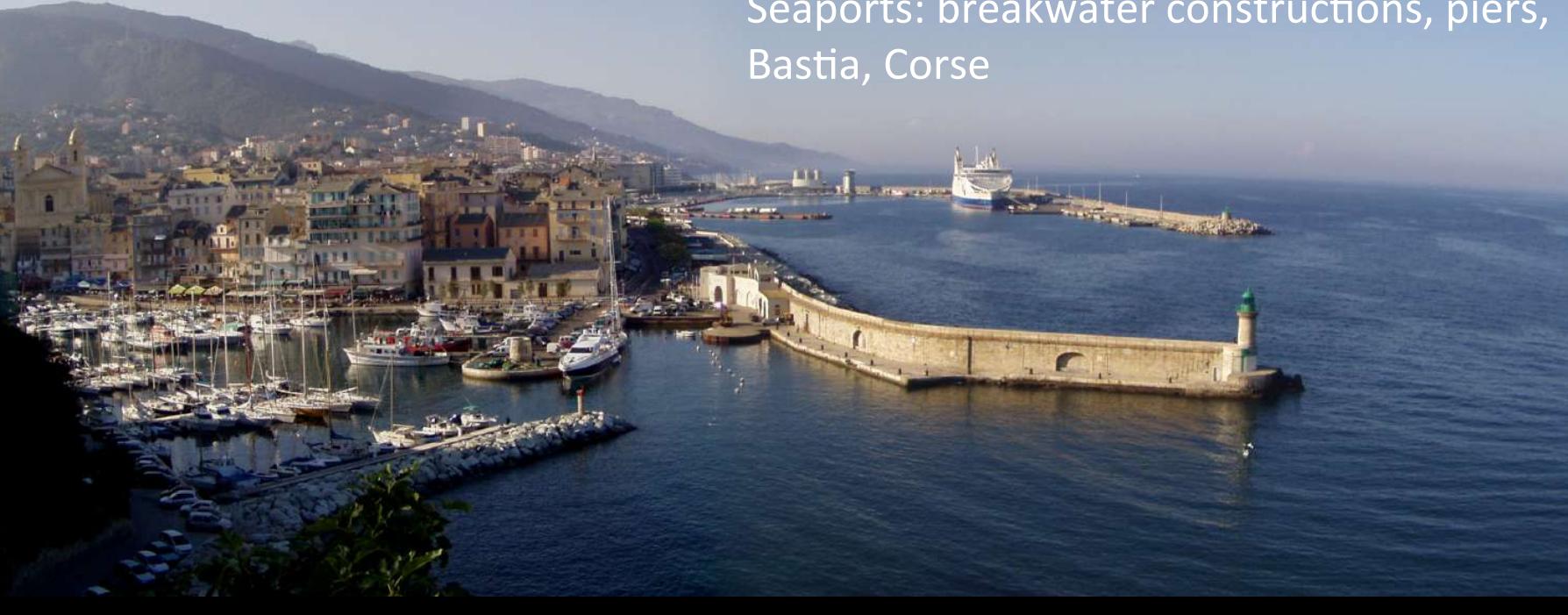
Polar tracks:  
heavy machine trails,  
King George Island,  
Antarctica



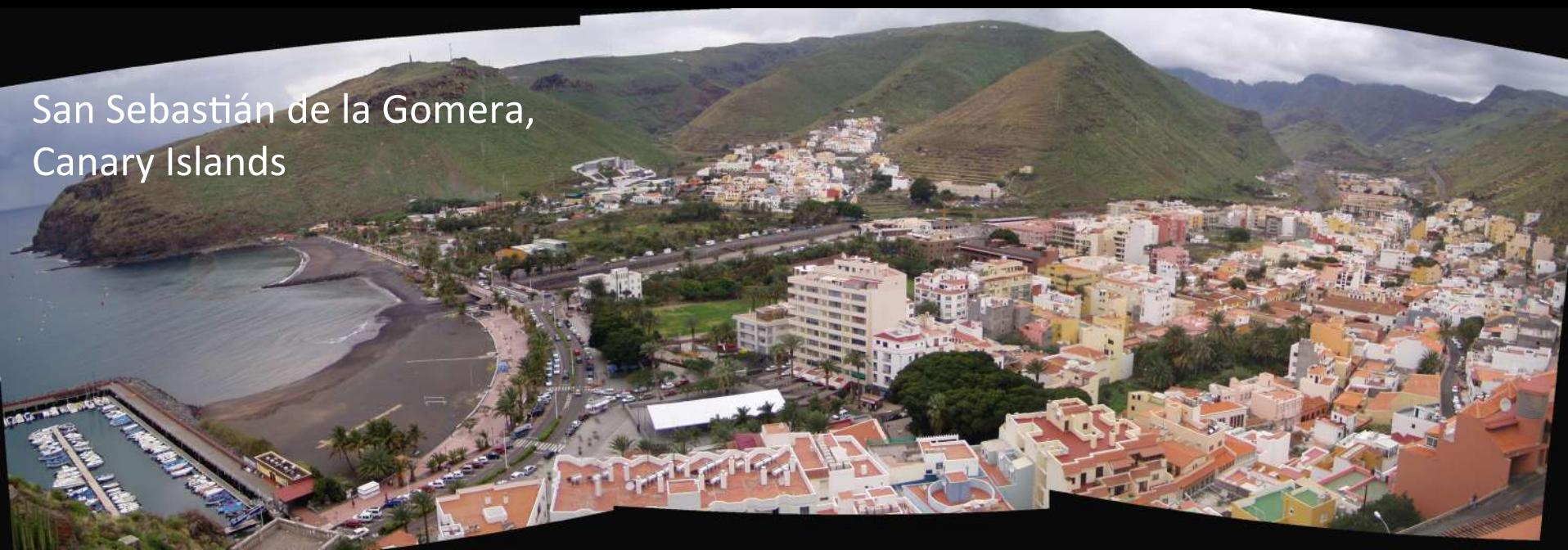
Seaports: breakwater constructions, piers,  
Bastia, Corse



Seaports: breakwater constructions, piers,  
Bastia, Corse



San Sebastián de la Gomera,  
Canary Islands

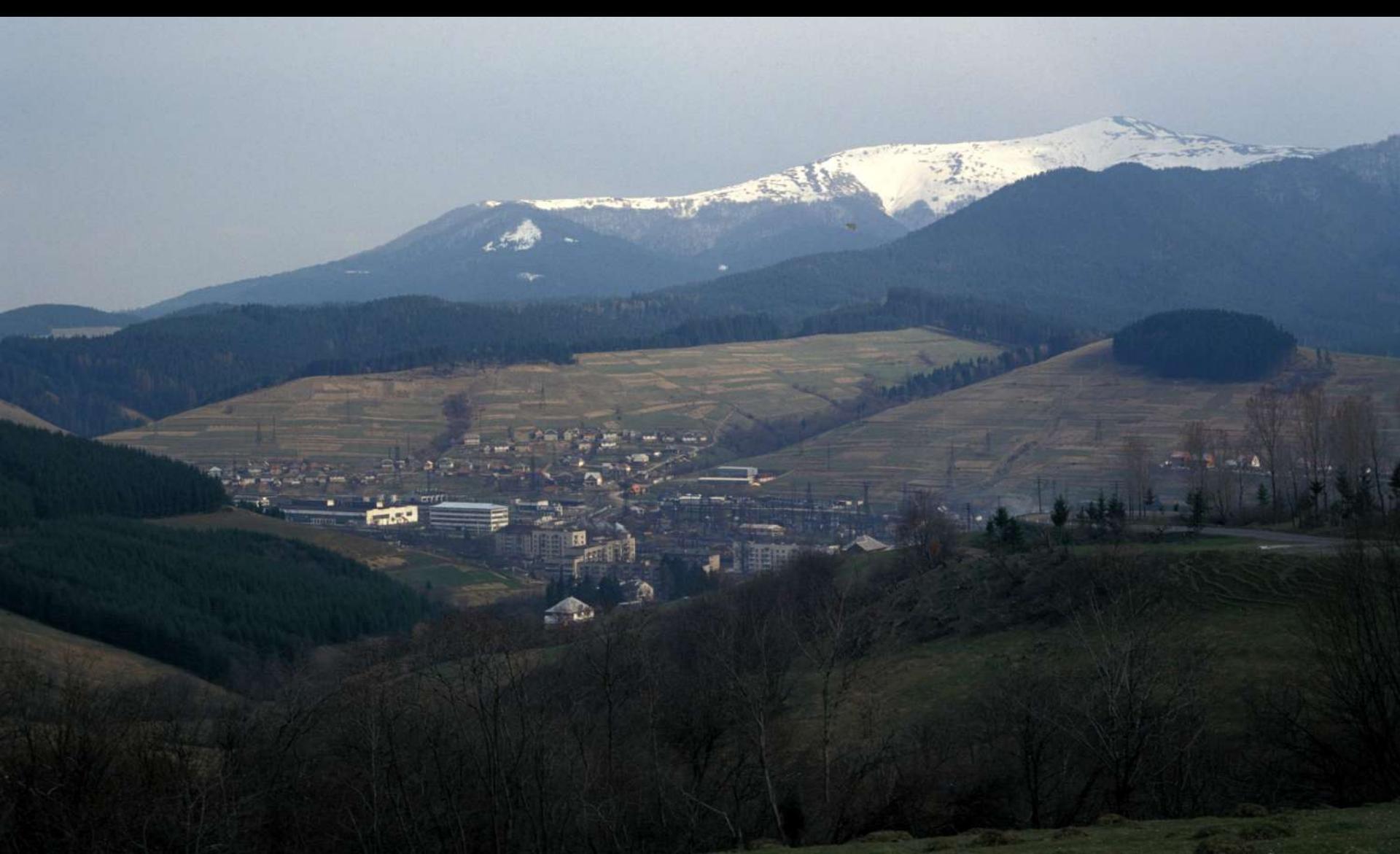


Abandoned railway  
line in the Dry Andes,  
Aconcagua,  
Argentina



# **LAND USE**

Mountain deforestation: man-made subalpine grasslands (1200-1500 m asl)  
anthropogenic pasture area  
NE-Carpathians, Ukraine



Mountain deforestation: man-made subalpine grasslands (1200 m asl)  
anthropogenic pasture area  
Eastern Carpathians, Romania



Mountain deforestation: man-made subalpine grasslands (1400-1800 m asl)  
anthropogenic pasture area  
Farcau Massif, NE-Carpathians, Romania



Pasture, Ireland





Mountain hayfield  
Eastern Carpathians, Romania

Deforestation: man-made mountain hayfield  
Apuseni Mountains, Romania





Deforestation:  
man-made mountain hayfield  
Apuseni Mountains, Romania





Deforestation: man-made mountain  
hayfield and pasture  
Southern Carpathians, Romania



Deforestation: island-like mountain coca plantation

Yungas, Bolivia





Deforestation:  
man-made hayfields  
Eastern Carpathians,  
Romania





Deforestation:  
man-made hayfields  
Eastern Carpathians,  
Romania



# Deforestation, landslides: man-made hayfields, Eastern Carpathians, Romania



Deforestation, landslides, creep:  
man-made hayfields,  
Eastern Carpathians, Romania





## Deforestation, landslides: man-made hayfields and pasture, Romania



Barren karr-surface, Kaisergebirge, Austria





Cleaning the hayfields:  
limestone mounds  
Kaisergebirge, Austria



Cleaning the agro-fields: limestone mounds

Southern Spain



Cleaning the agro-fields: limestone mounds  
Southern Spain





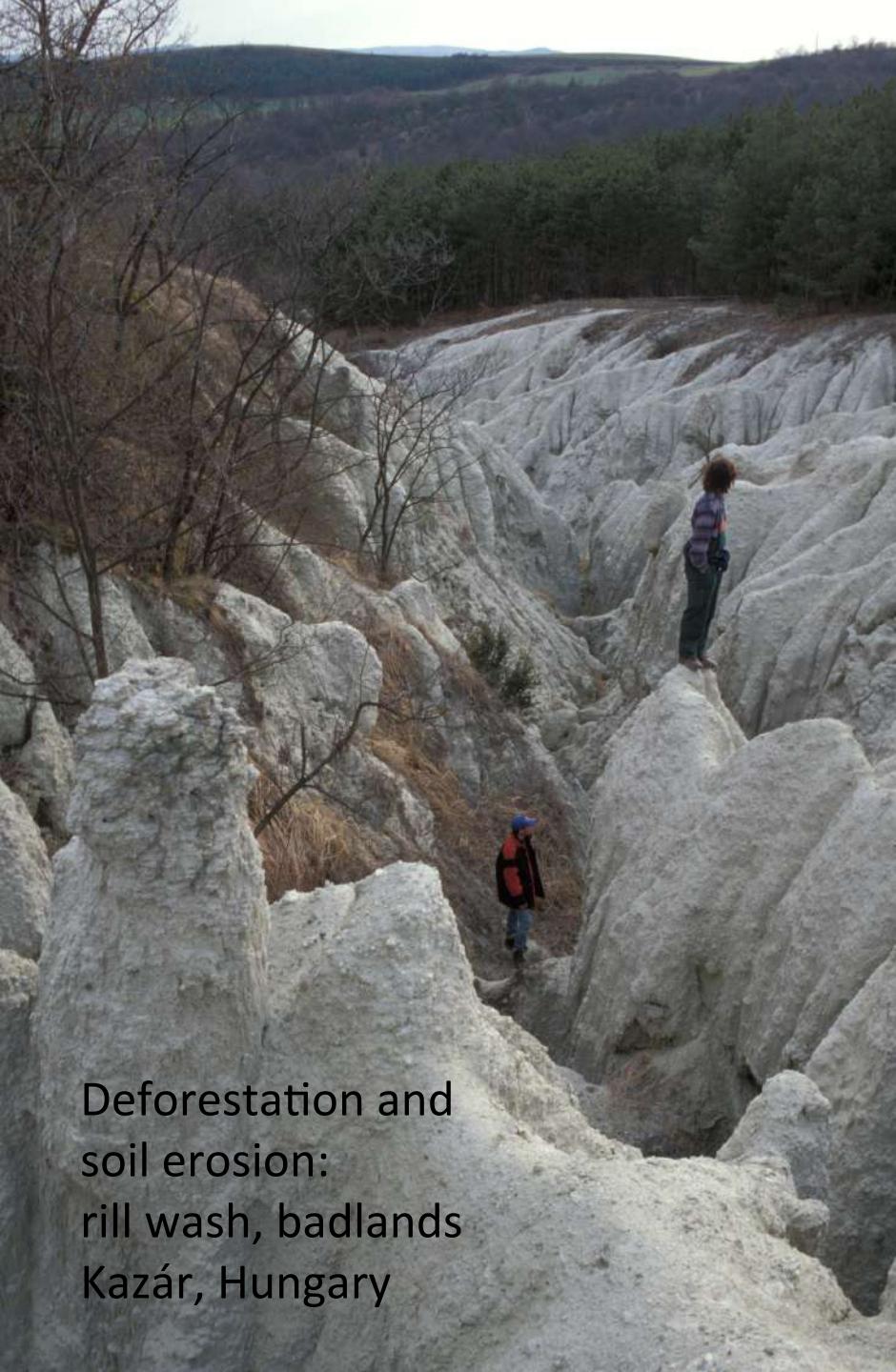
## Cleaning the agro-fields: landslides Southern Spain



# Deforestation and soil erosion on karstic surface

## Central Albania



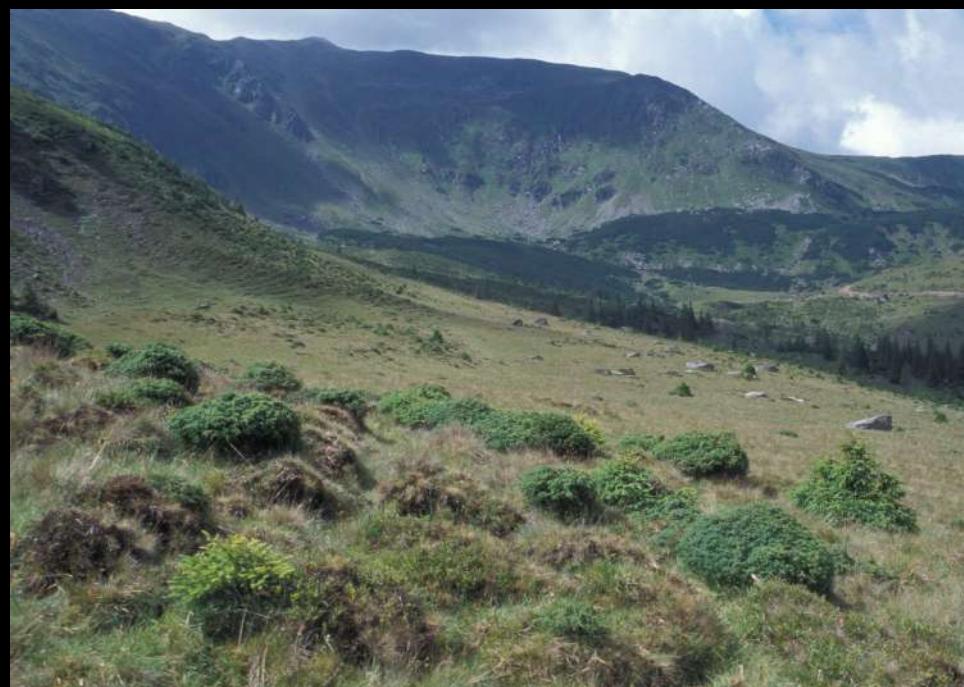


Deforestation and  
soil erosion:  
rill wash, badlands  
Kazár, Hungary





High mountain animal  
treading, shepherding:  
hummocks, animal trails  
Rodna Mountains, Romania



Stone carving:  
hollows for beehives  
Southern Bükk Mountains  
Hungary



Barren karstic plateau: man-made soils for agriculture, Croatia



Barren karstic plateau, Northern Syria



Agro-fields in the deserted mountain valleyfloor, High Atlas Mountains, Maroc



# Moraine based agricultural fields, Yding Skovhøj, Danmark





Large, contiguous agricultural fields, Northern Hungary



Springtime dust storm, Northern Hungary



Springtime dust storm: sand blankets,  
Central Hungary

Monocultural citrus plantation, Spain





Monocultural citrus plantation, Spain

Ready for monocultural citrus plantation, Spain





Hillslope terraces  
Albania, China



# Abandoned foothill terraces, Székelykő, Romania



Foothill and slope terraces around Torockó village, Romania





Vineyard terraces,  
Southern Carpathians,  
Romania

High mountain anthropogenic valley terraces for barley,  
Zangla village, Zanskar, Dry Himalaya, India





High mountain anthropogenic  
valley terraces for barley  
Padum and Karsha villages  
Zanskar, Dry Himalaya, India



River- and man-made terraces  
Zanskar, Dry Himalaya, India



An aerial photograph capturing the intricate patterns of agricultural terracing on a series of steep, sunlit hills. The terraces are carved into the earth, creating a grid-like texture across the landscape. Sparse green vegetation and small clusters of buildings are visible at the bases of the hills and along the paths between them.

Rugged terrain:  
steep terrace systems, Spain

An aerial photograph of a rugged mountainous landscape in Spain. The terrain is characterized by steep, terraced slopes covered in dense green vegetation. A winding road or path follows the contours of one of the ridges. In the upper left, there is a cluster of buildings and a small, bright blue reservoir or lake. The lighting creates strong shadows, emphasizing the three-dimensional nature of the hills and valleys.

Rugged terrain:  
steep terrace systems,  
Spain



Rugged terrain:  
steep terrace systems,  
Spain





Rugged terrain:  
steep terrace systems,  
Spain

# **TOURISM, SPORT AND RECREATION**

Hiking trail and avalanche path, Rodna Mountains, Romania





Hiking trail and avalanche path  
Rodna Mountains, Romania



Skislope landslides  
Kaisergebirge, Austria



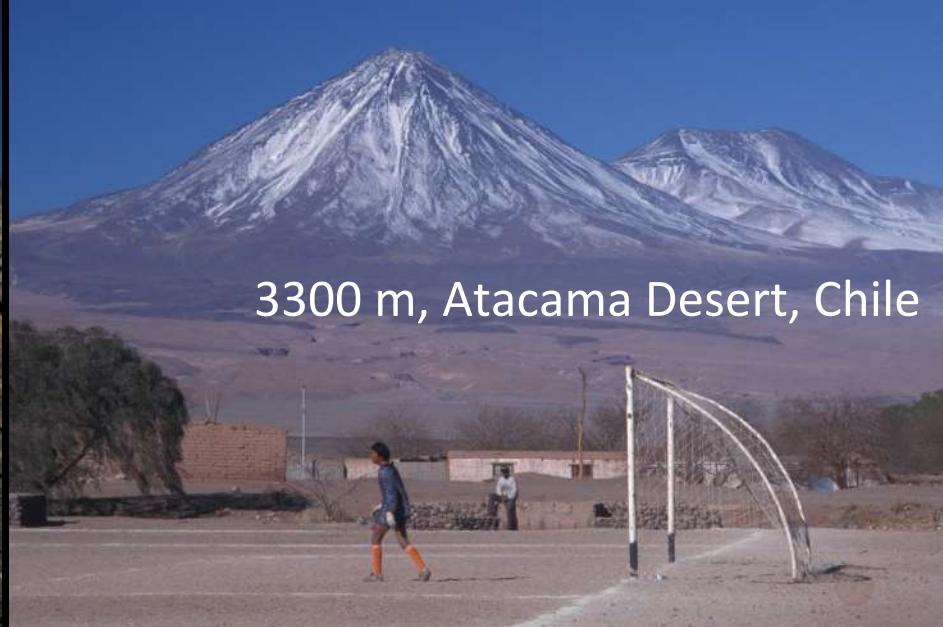
Mountain hut-terrace, 6400 m, Aconcagua, Argentina



4200 m, Altiplano, Bolivia



3300 m, Atacama Desert, Chile



Football fields



1000 m, Yungas, Bolivia



Pamukkale, Turkey



Pamukkale, Turkey

anthropogenic (concrete) ponds, Pamukkale, Turkey



Sulphur caves, Torja, Romania



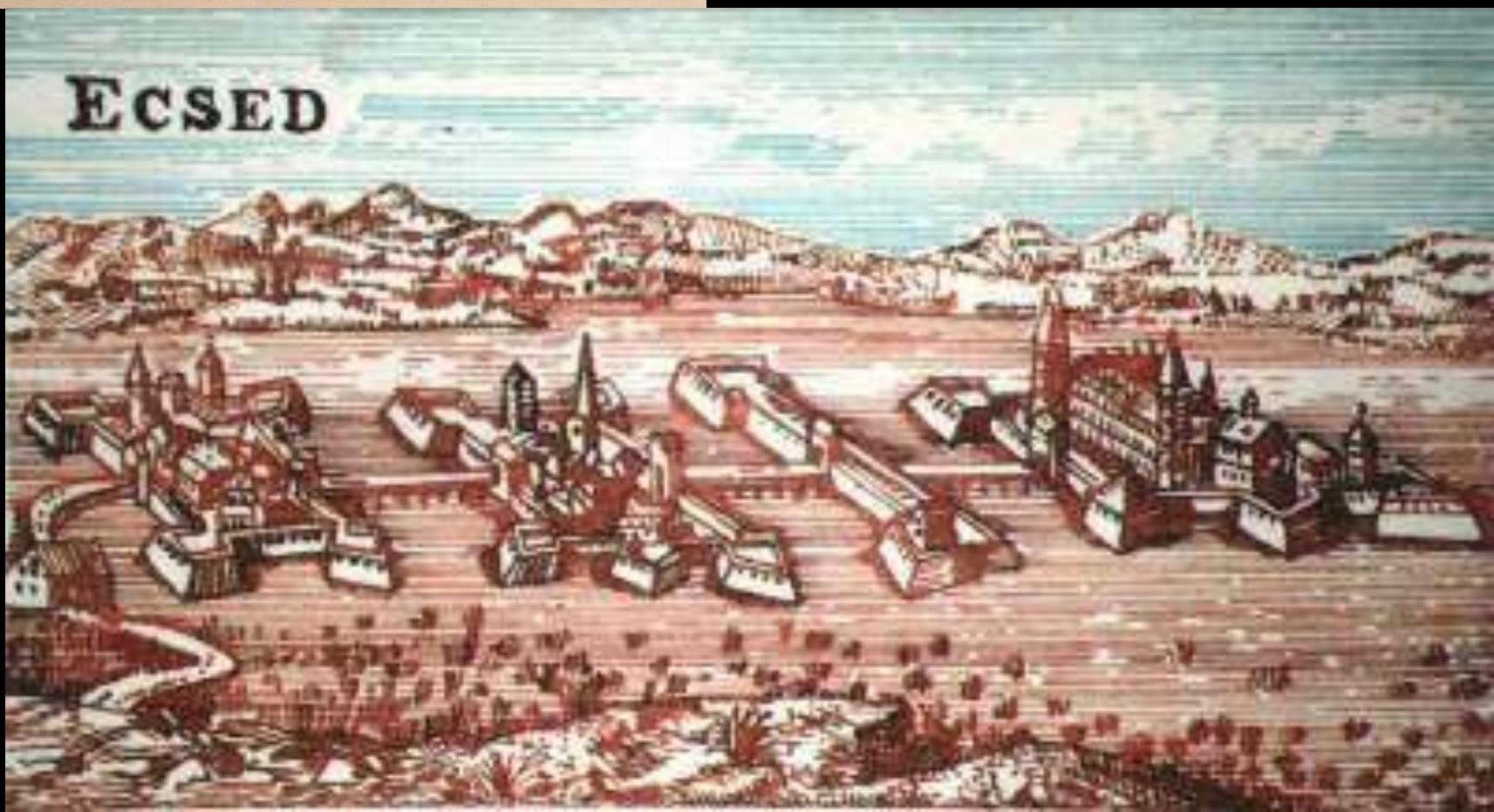
# **MILITARY ACTIVITY**

**ECZET.**

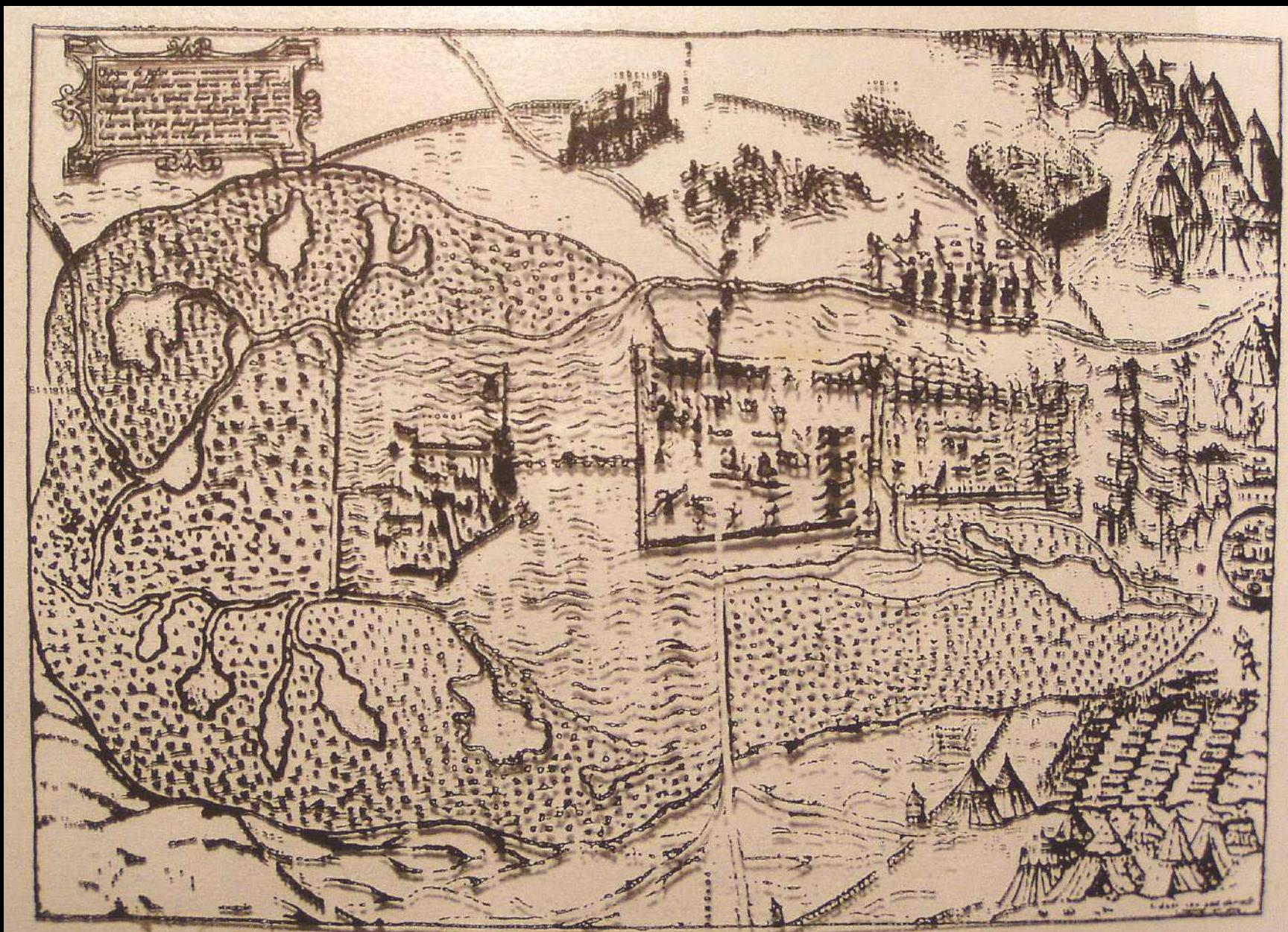


The Ecsed-fortress and the  
dammed Kraszna River, Hungary  
(Late Middle Age)

**ECSED**



The siege of the Szigetvár-fortress surrounded by dammed water (1566)  
Hungary



Water castle, surrounded by  
a dammed creek, Switzerland





The Diósgyőr Castle, surrounded by  
dammed creeks from the Bükk Mountains  
Hungary



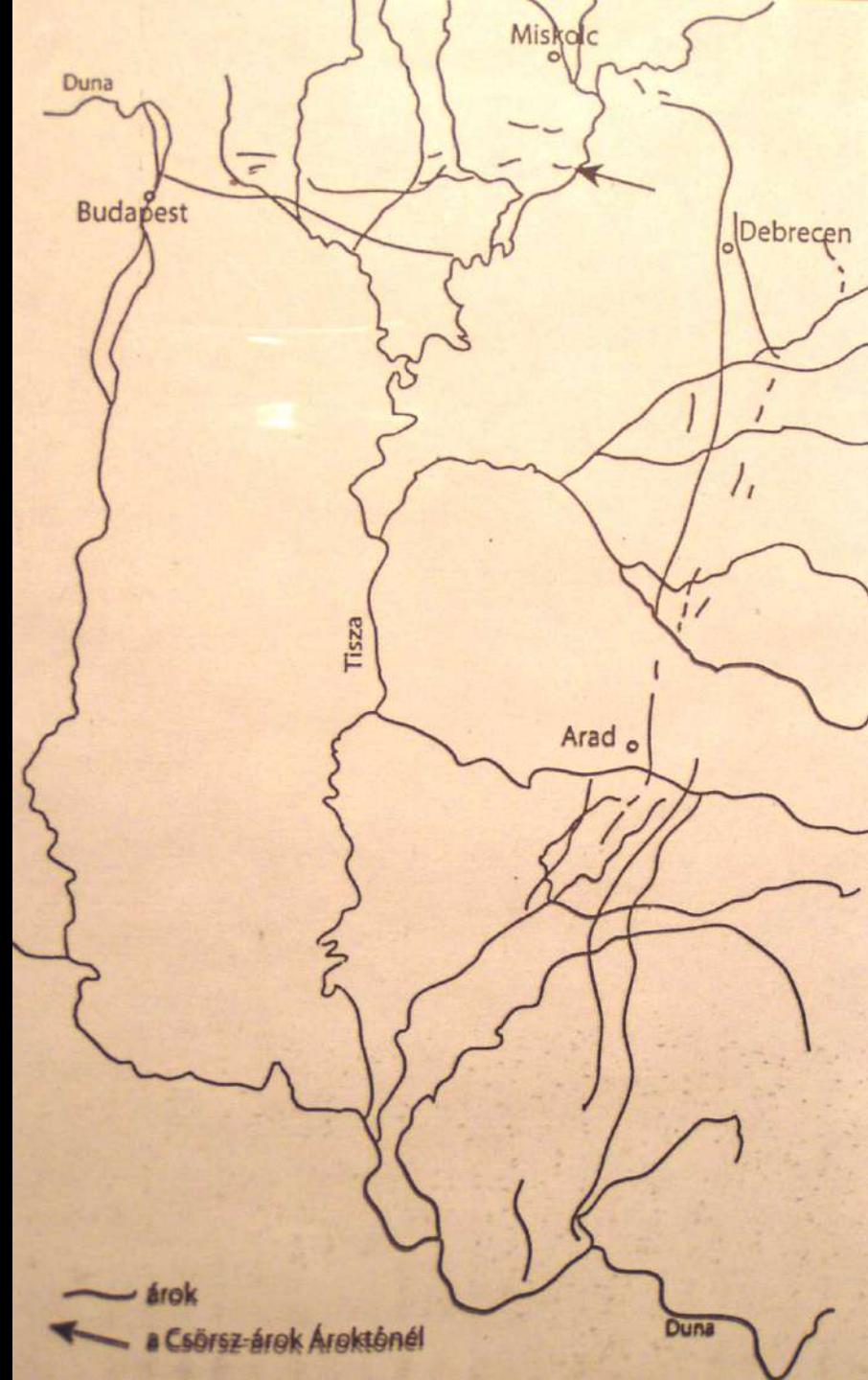


The Diósgyőr Castle,  
surrounded by dammed creeks  
from the Bükk Mountains  
Hungary



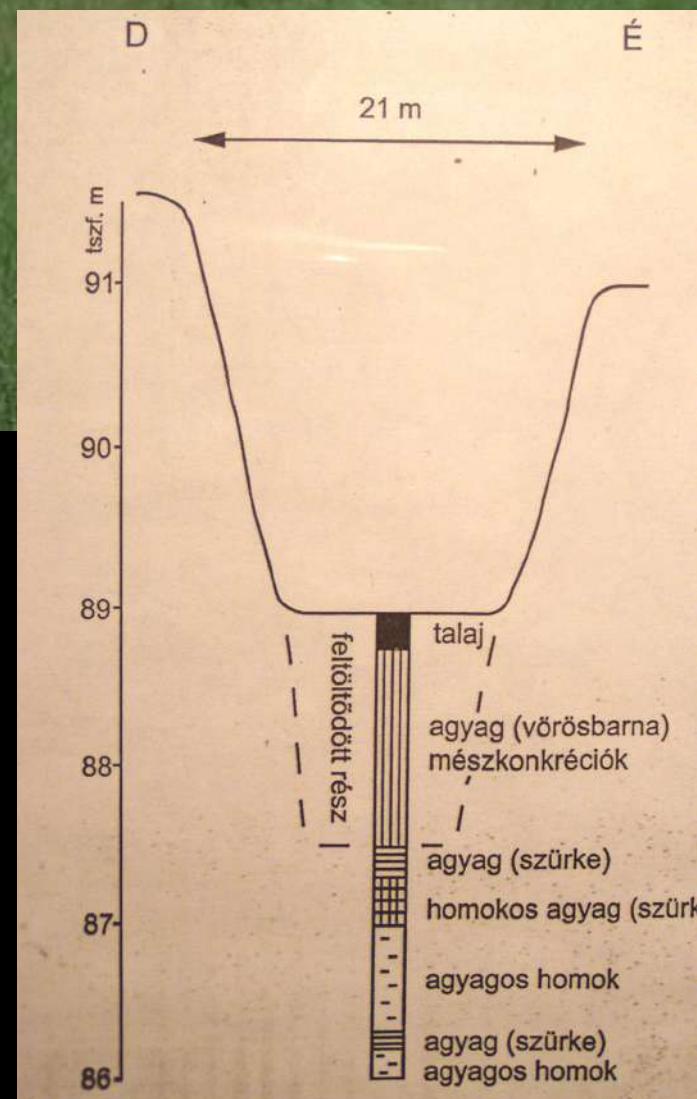
# Csörsz-trench:

## defensive trench system from the Roman period on the Great Hungarian Plain





The Csörsz-trench near Árokto village:  
defensive trench system from the Roman  
period on the Great Hungarian Plain



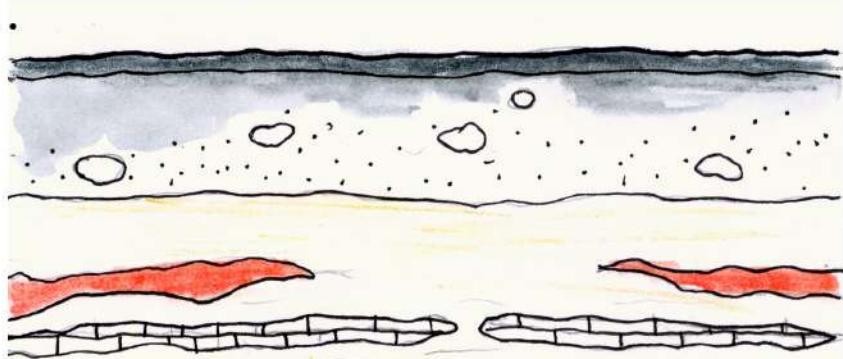
## Former trenches, walls, building-remnants: the Tétel Hill plateau on the Great Hungarian Plain



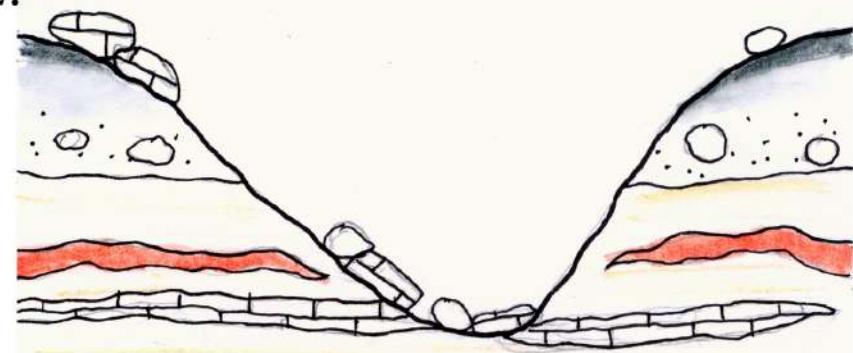
# Former trenches, walls, building-remnants: the Tétel Hill plateau on the Great Hungarian Plain



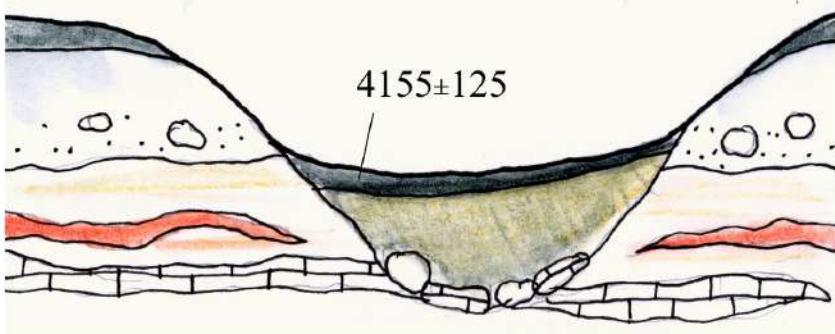
1.



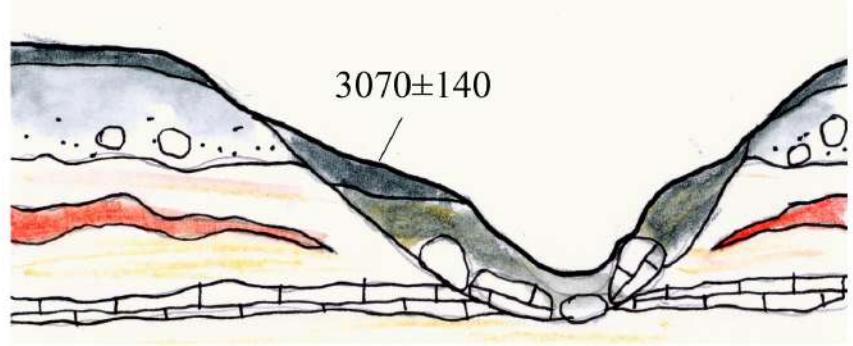
2.



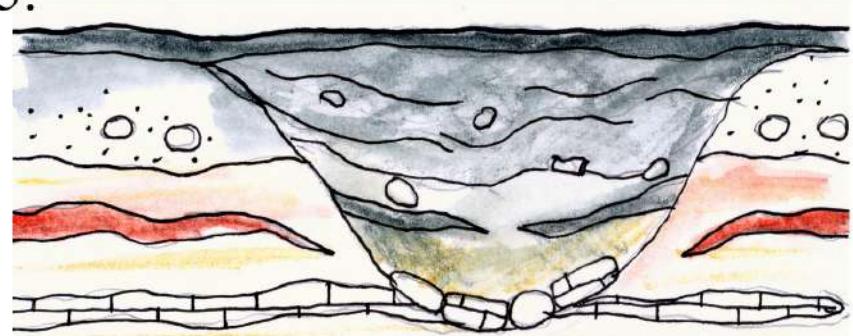
3.



4.

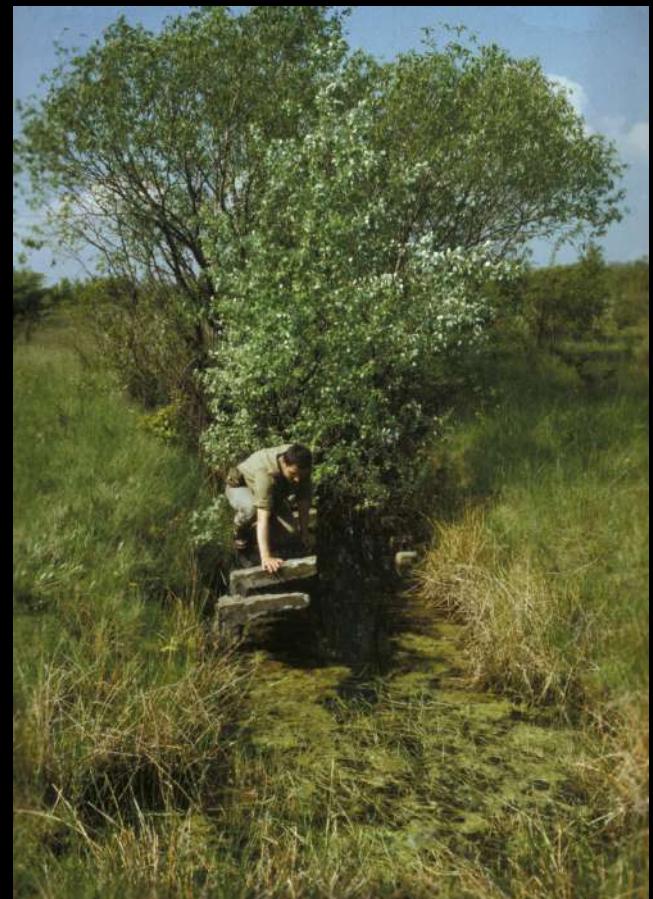
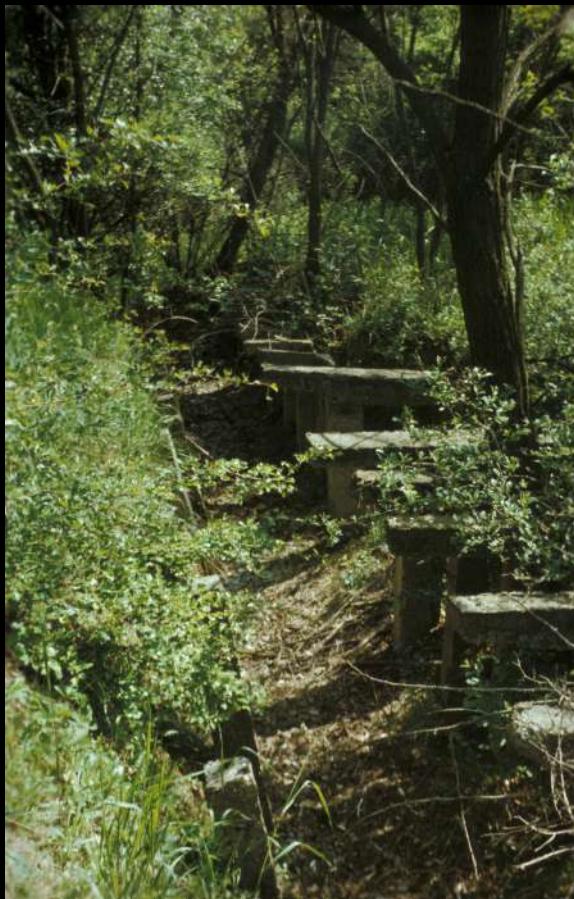


5.



Defensive trench-evolution in  
the Tétel Hill plateau  
on the Great Hungarian Plain

# Former military training field, Bükk Mountains, Hungary



Military trench-system from the 1940's



Remnants of military trench-system,  
20 th Century  
Gyimes Pass, Romania

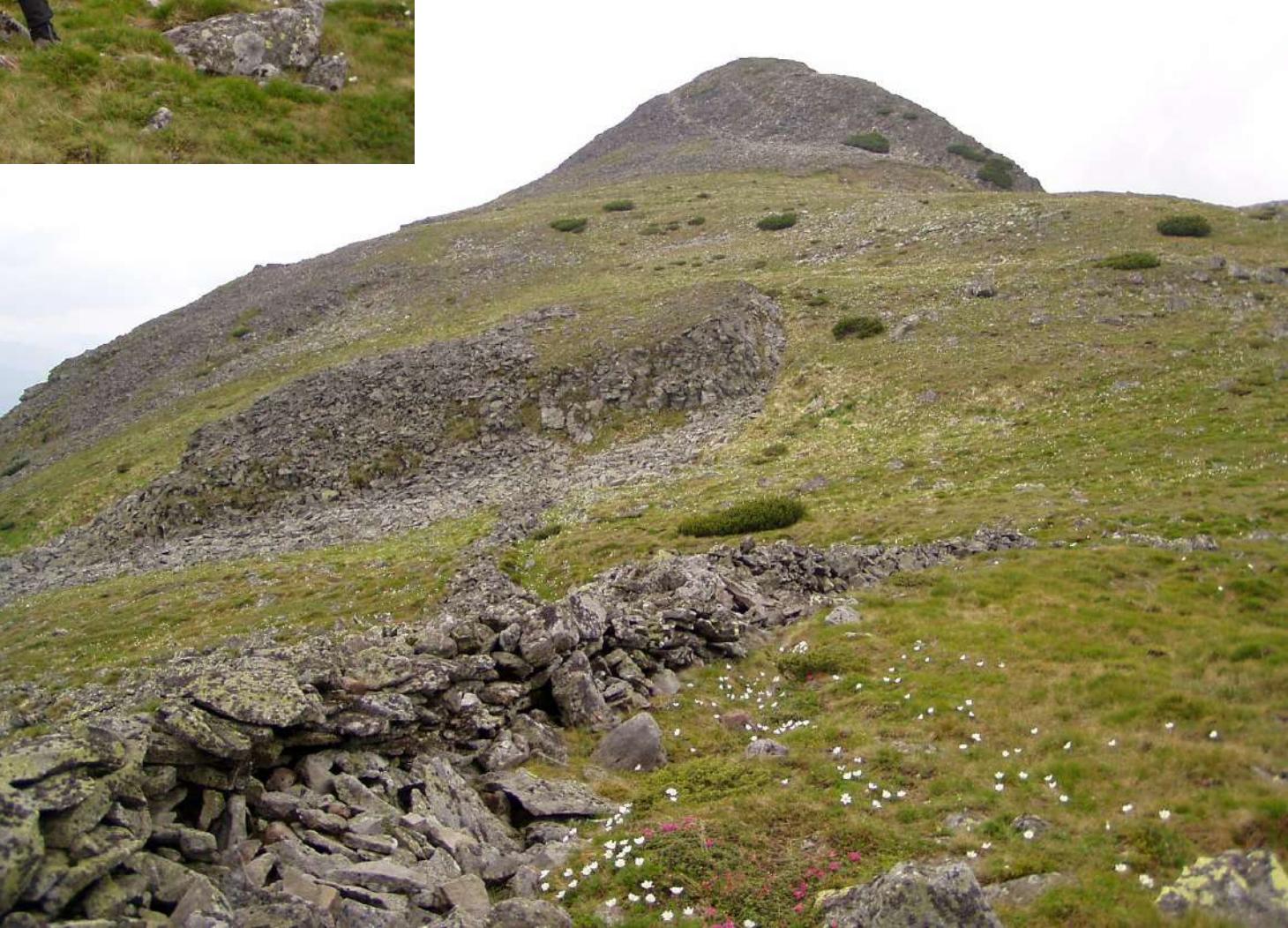


The fortificated Calimani Mountains (Romania): trenches, stonewalls from the 2<sup>nd</sup> World War (cca. 2000 m asl)





The fortificated Calimani Mountains (Romania): trenches, stonewalls from the 2<sup>nd</sup> World War (cca. 2000 m asl)



The fortified Calimani Mountains (Romania):  
trenches, stonewalls  
from the 2<sup>nd</sup> World War  
(cca. 2000 m asl)





Maramures Mountains  
(Romania):  
defensive trenches from the  
2<sup>nd</sup> World War  
(cca. 1500-1800 m asl)



The fortificated Dolomites (Italy):  
trenches, caverns, High mountain fortresses, stonewalls, military routes  
from the 1<sup>st</sup> World War (cca. 1000-3000 m asl)



# Medieval desert fortress of Palmyra, Syria



Medieval desert fortress of Palmyra, Syria – the almost invisible (from the hillfoot) defensive trench



Medieval desert fortress of Palmyra, Syria – the defensive trench





Medieval desert fortress of  
Palmyra, Syria – the defensive trench  
in the limestone hilltop

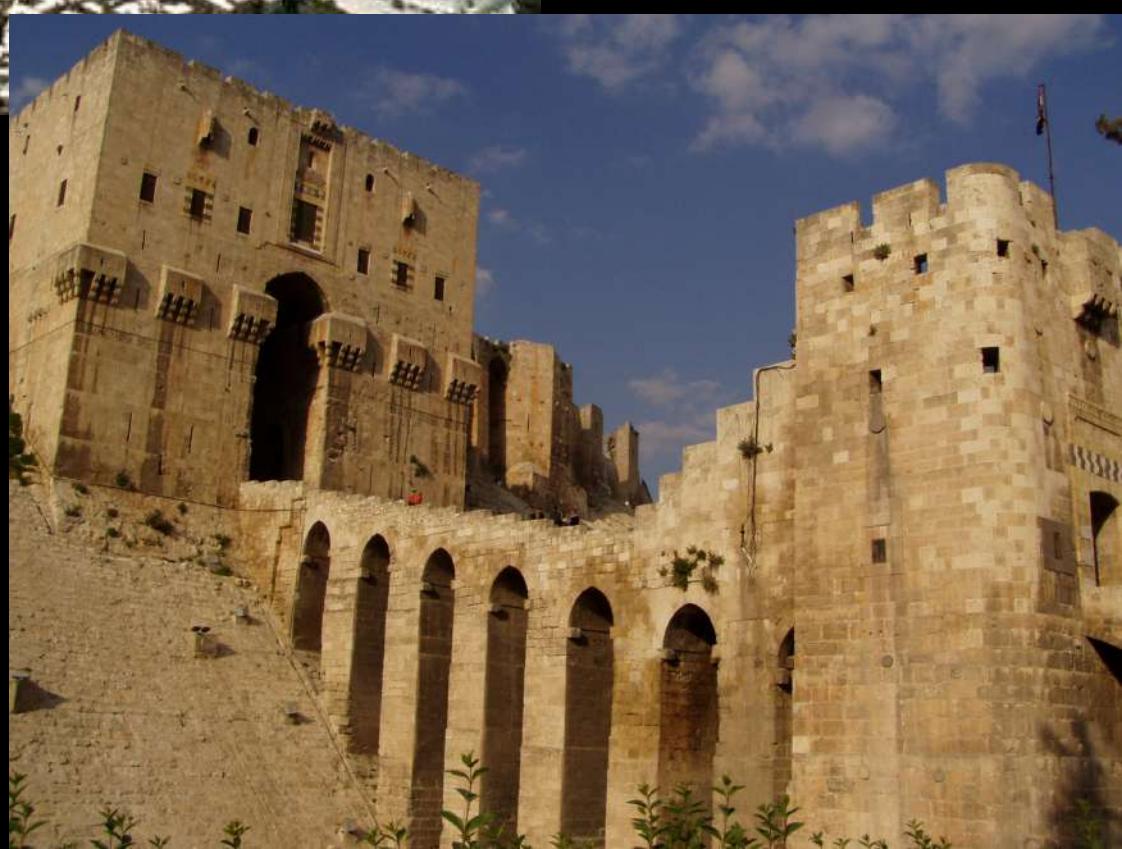


Medieval fortress on a limestone plateau, Crac des Chevaliers, Syria





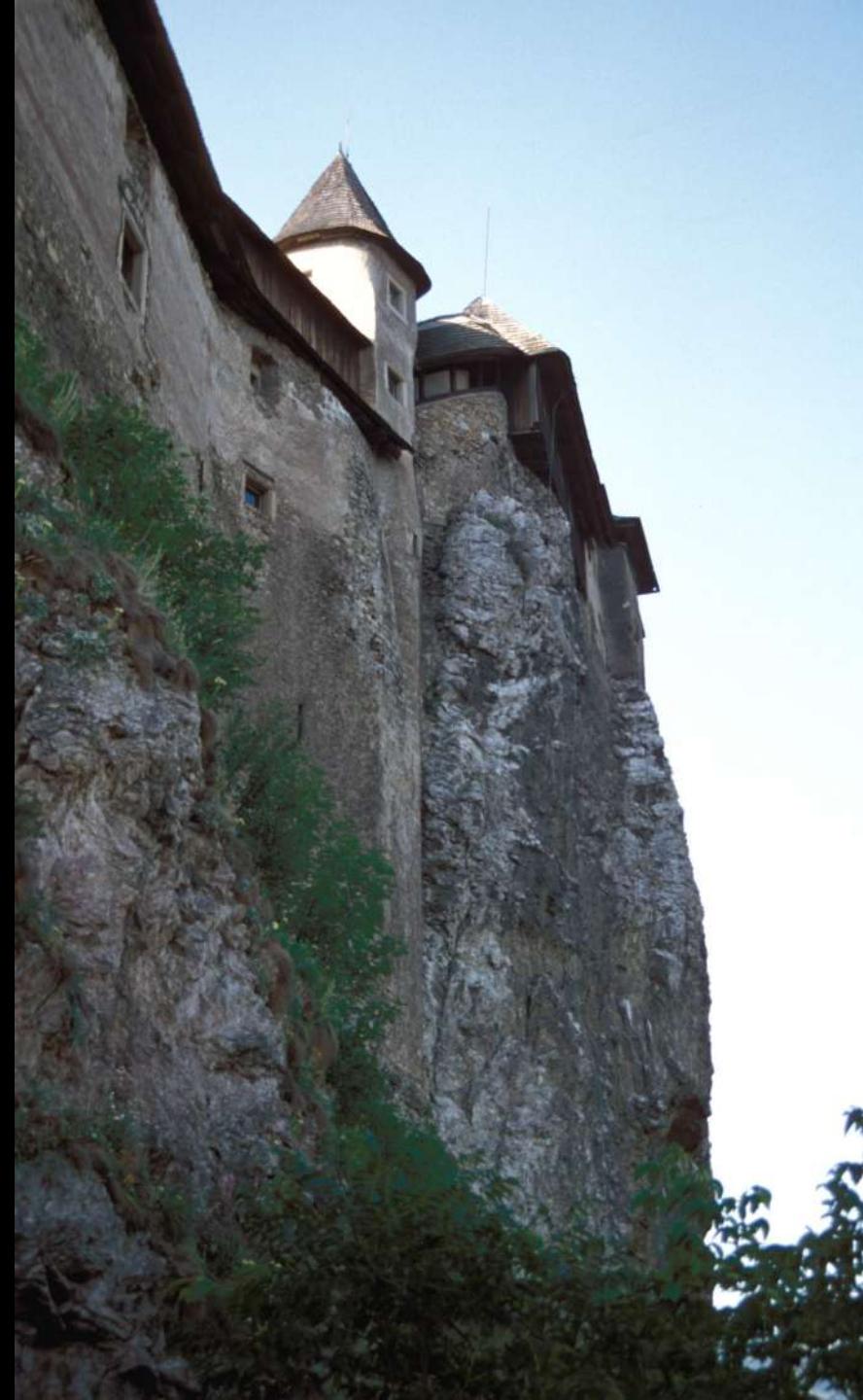
Artificial, paved fortress hill  
in the centre of Aleppo, Syria



On the top of a limestone cliff, bordered by the Vah River: the Sztrecsno Castle (Slovakia)



On the top of a limestone cliff, bordered by the Arva River: the Arva Castle (Slovakia)



A Scottish hilltop castle, surrounded by stonewalls



On the plateau of the broad summit (1825 m asl): military base  
in the Apuseni Mountains, Romania



The narrow Torda Gorge – a shelter place for the local people during the medieval wars, Romania

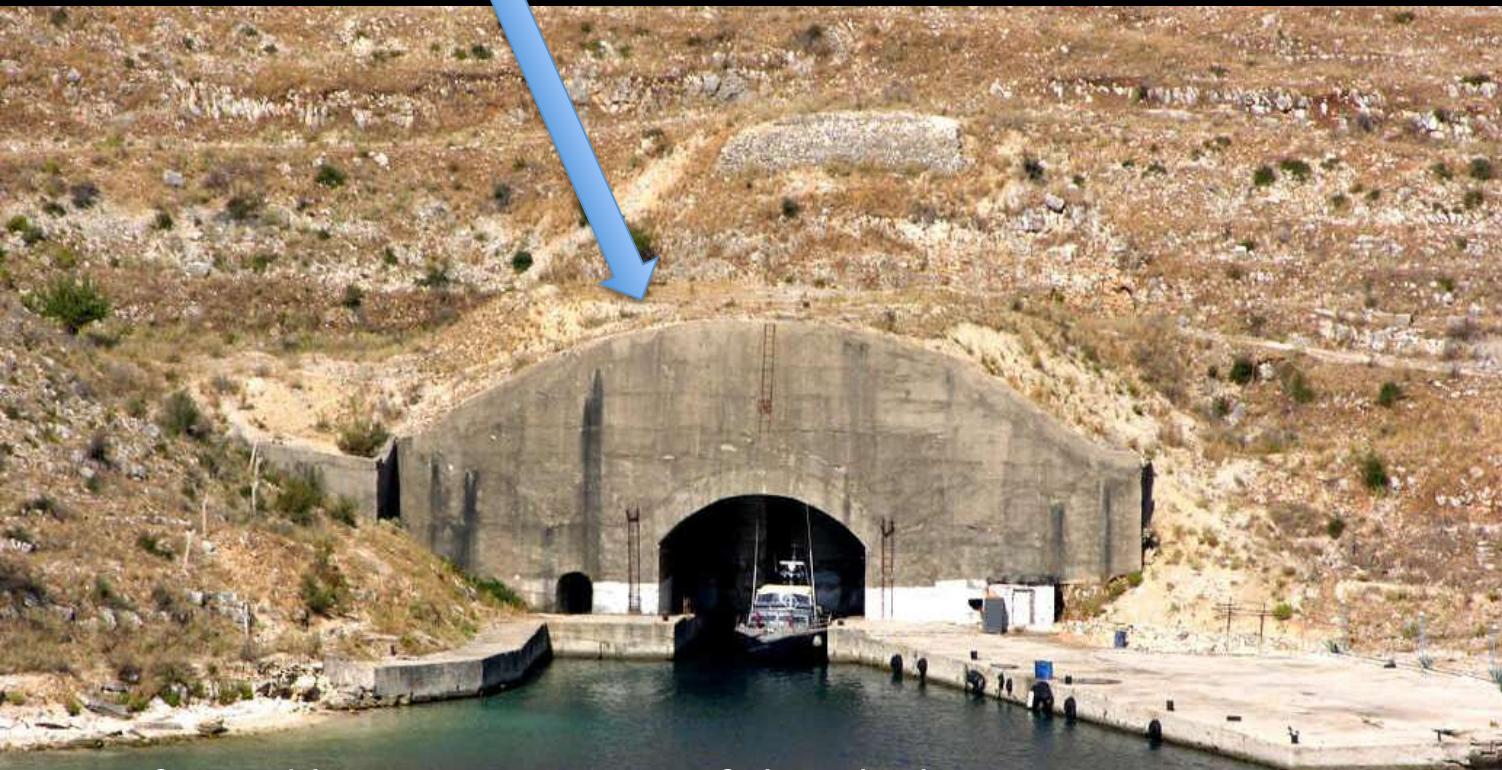




Fortified limestone cave entrances in the walls of the Torda Gorge, Romania

Fortified limestone cave entrance  
Predjamski Castle, Slovenia





Fortified limestone region of the Black Sea coast  
Balaclava, Crimea

Water filled bomb  
crater series (late 60's)  
Vietnam





Water filled bomb craters  
(nowadays)  
Vietnam



Giant bomb craters (after underground explosions)  
nuclear test field, Nevada, USA

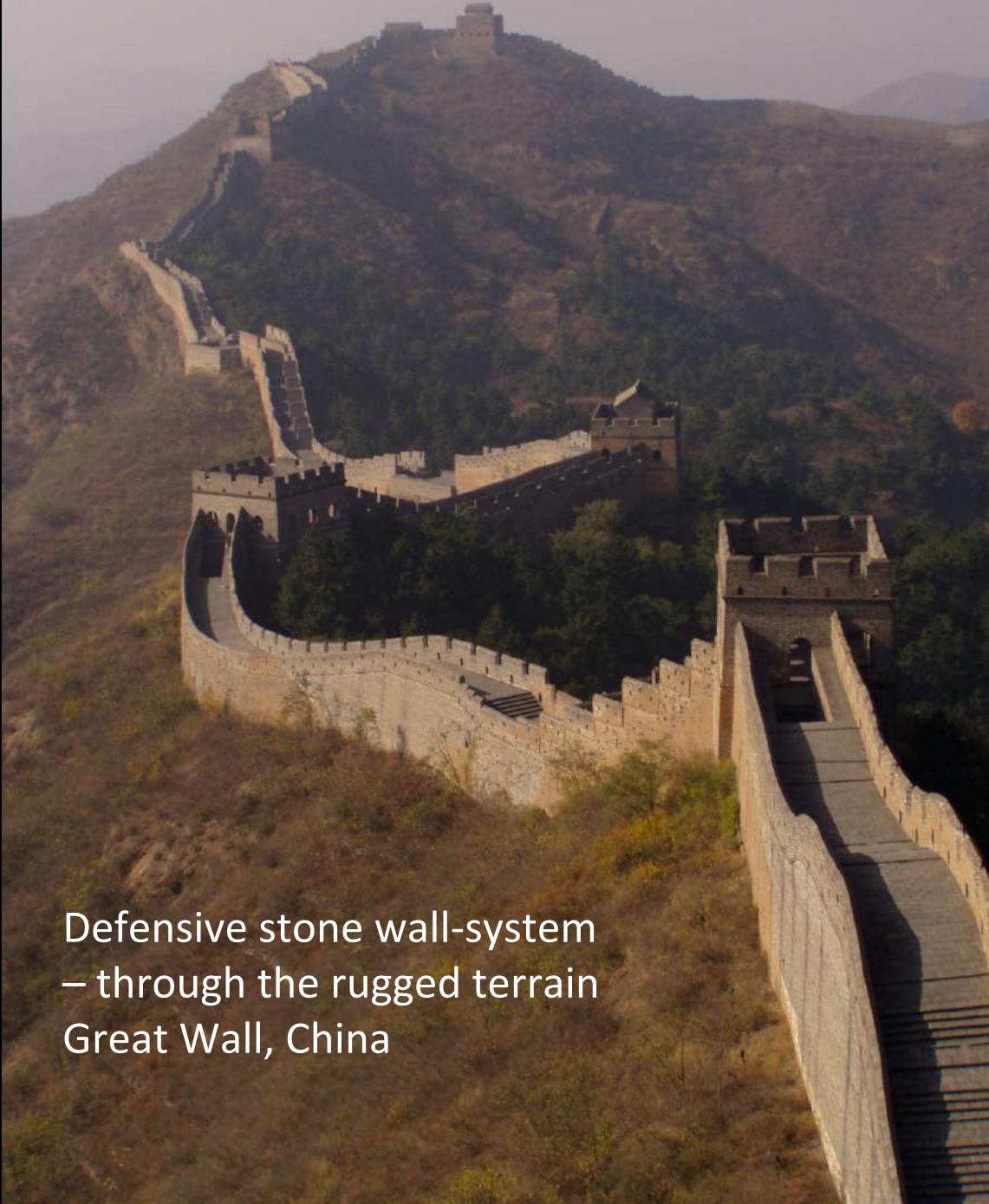


Artificial hill – as a war-monument and a military observation point  
Waterloo Field



Defensive stone wall-system – through the rugged terrain  
Great Wall, China





Defensive stone wall-system  
– through the rugged terrain  
Great Wall, China

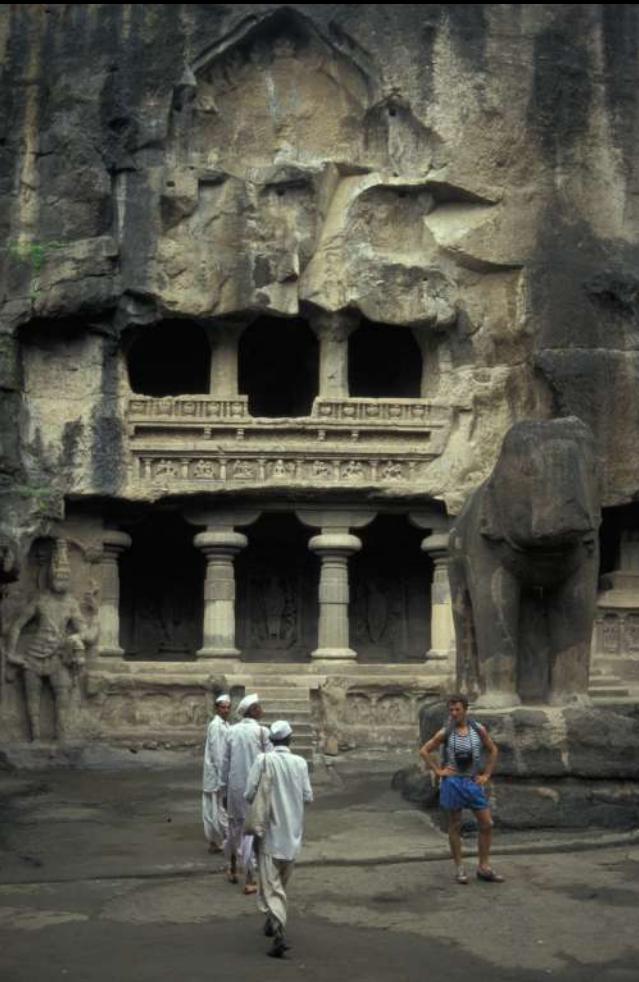
# **RELIGIOUS ACTIVITY**



Horizontal basalt caves  
Ellora, Deccan Plateau, India

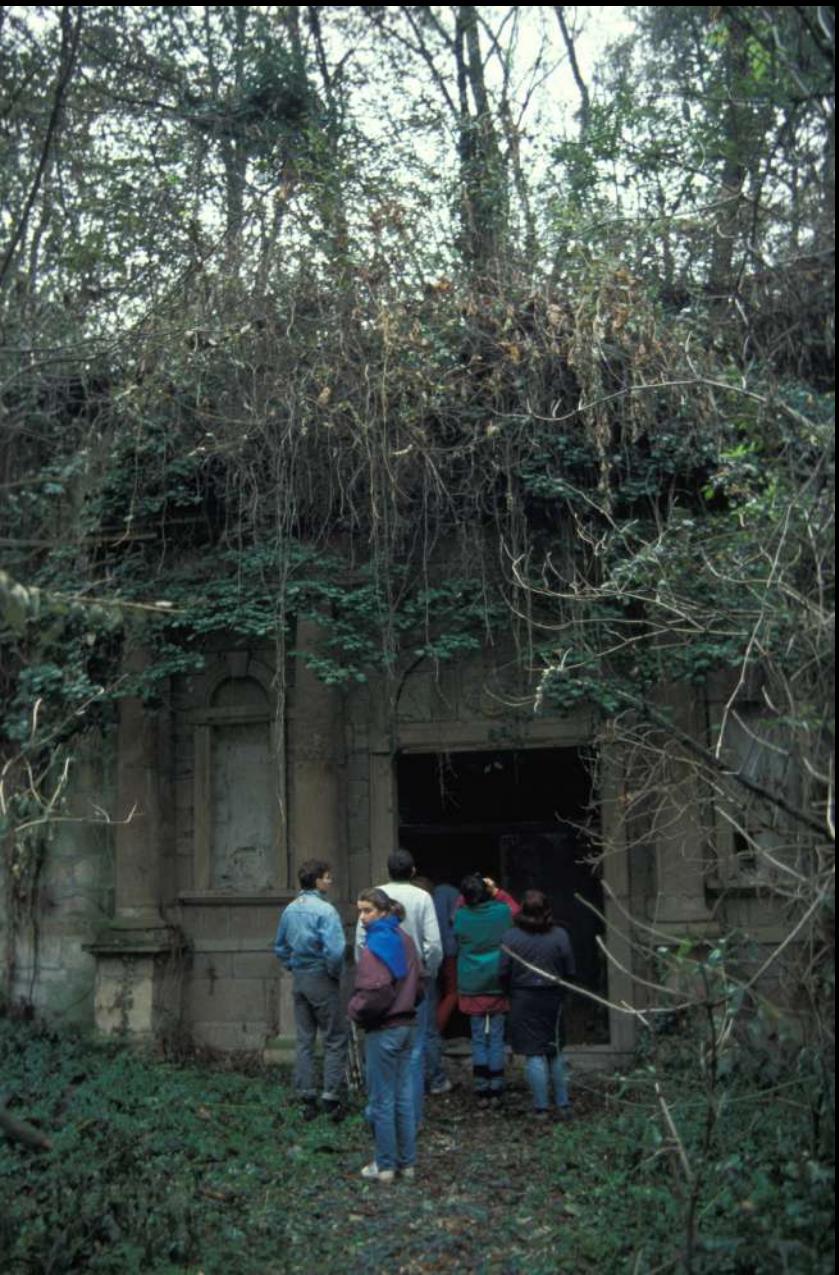


Deep, hollowed courtyards, carved basaltic temples  
Ellora, Deccan Plateau, India



Hermit-cavern, sandstone  
Cozia Mountains, Romania





Crypts in ignimbrite (19<sup>th</sup> Century)  
Bükk Mountains, Hungary





Sacred summit cave  
for Zoroastrians  
Erciyes Volcano, Turkey





Sacred summit cave  
for Zoroastrians  
Erciyes Volcano, Turkey



Hilltop funeral place, zoroastrianism  
“Tower of Silence”  
Yazd, Iran





Hilltop funeral place  
“Tower of Silence”  
zoroastrianism  
Yazd, Iran





Hilltop funeral place  
“Tower of Silence”  
zoroastrianism  
Yazd, Iran



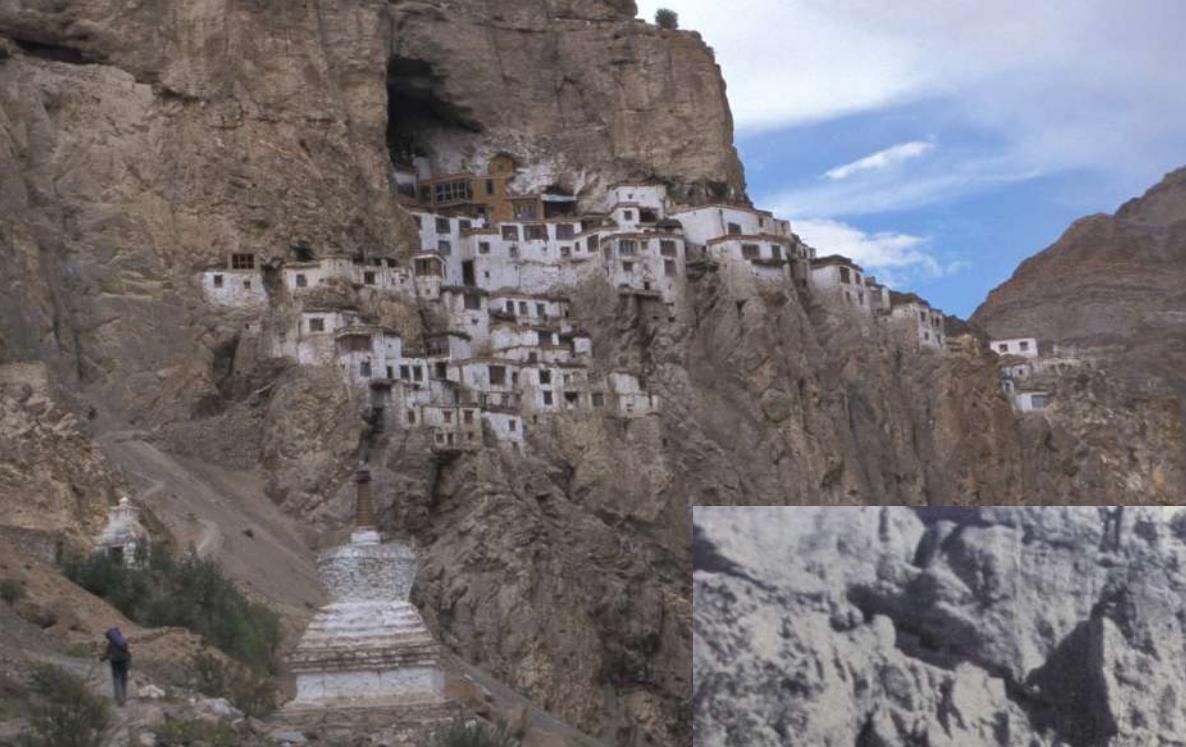


Altar, shamanism, sandstone,  
Ivág, Hungary



## Crypts, tomb-caverns, funeral towers – Palmyra, Syria





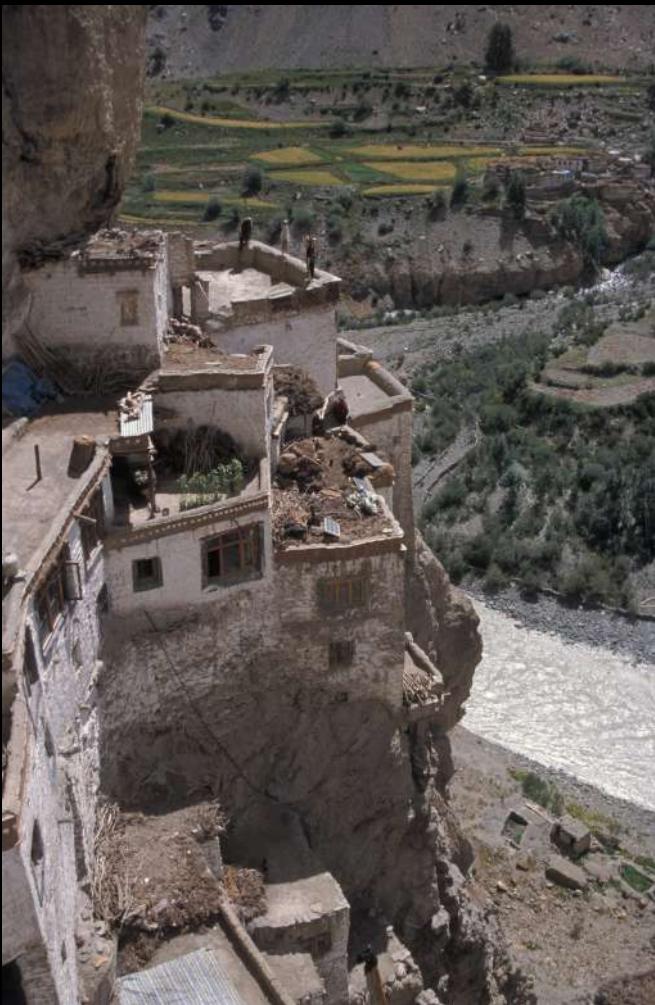
2004

Limestone cave and rockwall:  
Himalayan buddhist  
monastery  
Phuktal, Zanskar, India



1920's

Limestone cave and rockwall: Himalayan buddhist monastery  
Phuktal, Zanskar, India





Remote, sharp ridges (3500 m asl)  
Himalayan buddhist monastery  
Karsha, Zanskar, India





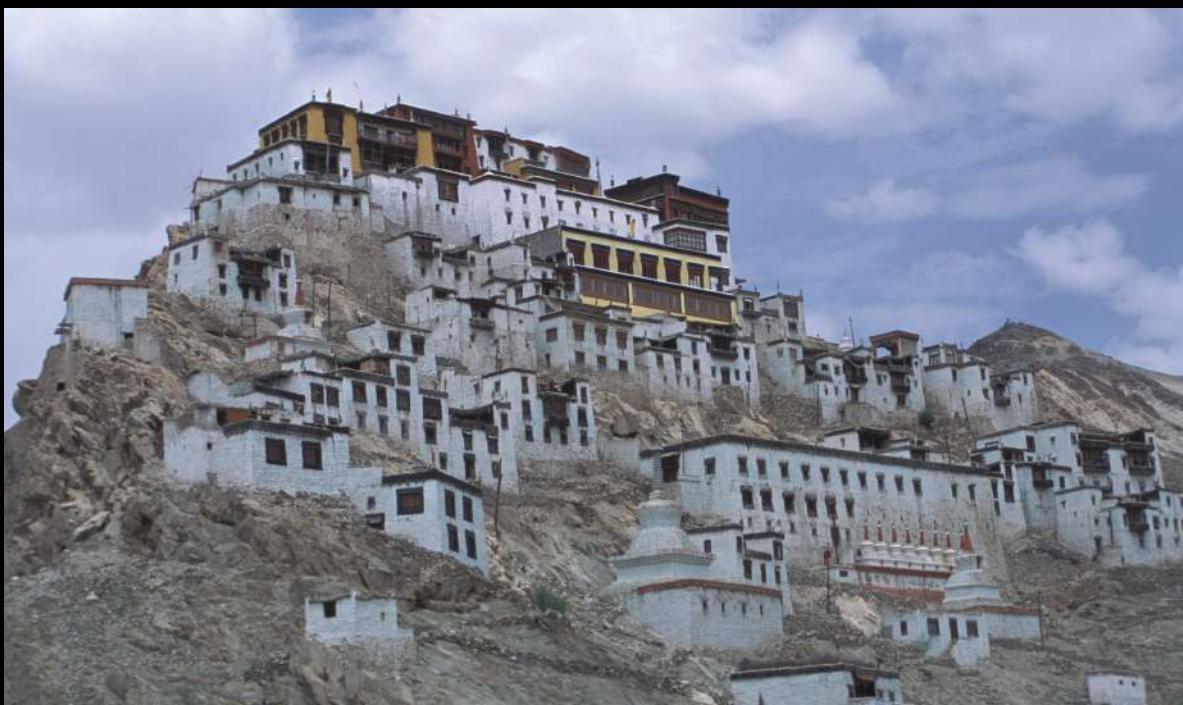
Remote, sharp ridges  
(3500 m asl)  
Himalayan buddhist monastery  
Karsha, Zanskar, India





Remote, sharp ridges  
(3500 m asl)  
Himalayan buddhist monastery  
Karsha, Zanskar, India

Hilltop  
(3300 m asl)  
Himalayan buddhist monastery  
Tikse, Ladakh, India





Artificial hill, totem poles  
shamanism  
Siberia, Russia



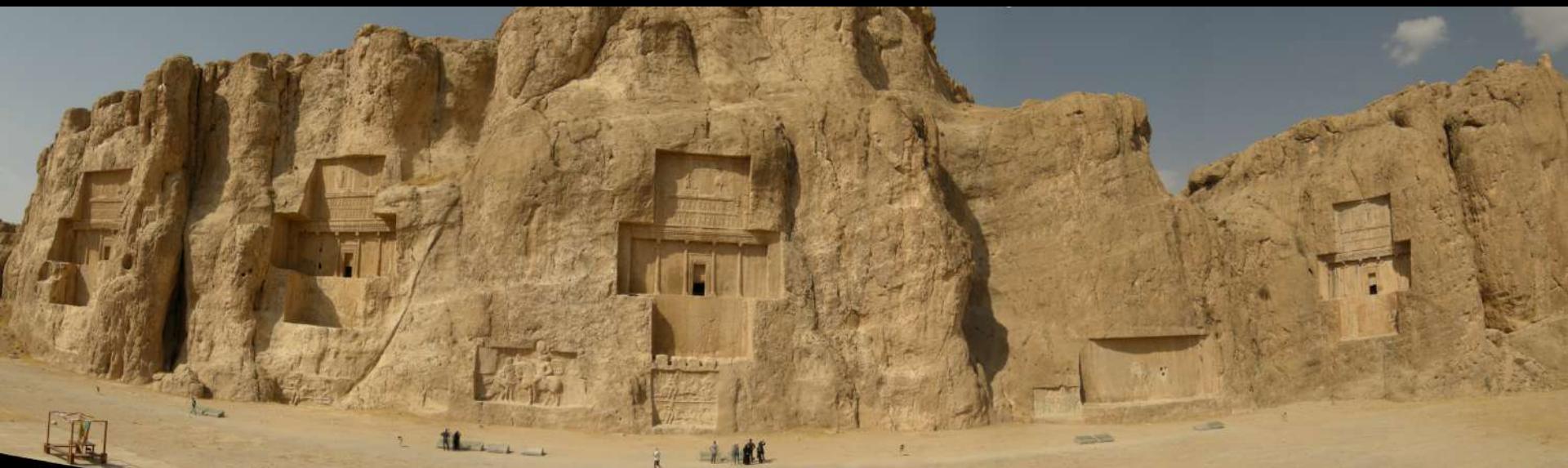
Limestone quarry,  
ancient limestone  
basilica,  
Northern Syria



Limestone quarry, ancient limestone basilica  
Northern Syria



Ancient limestone tombs  
Persepolis  
Iran



# **SCIENTIFIC ACTIVITY**

Airfield on the stony tundra, King George Island, Antarctica



Permanent bases on the stony tundra  
(T.A. Marsh – Chile, Bellingshausen - Russia)  
King George Island, Antarctica



Fuel storage on the stony tundra, King George Island, Antarctica



The buildings of the Jubany Station (Argentina) on the stony tundra  
King George Island, Antarctica





The buildings of the H. Arctowski Station  
(Poland) on the stony tundra  
King George Island, Antarctica



The remnants of an Italian summer base  
(from the late 70's) on the stony tundra  
King George Island, Antarctica

Buildings on the flat summit of the Omul Peak (2503 m asl)  
Tourist hut and meteorological station  
Bucegi Mountains, Romania



Buildings on the wet meadows (meteorological station)  
Rarau Mountains, Romania



Former (now abandoned) Polish astronomical and meteorological station  
on the broad summit of Pop Ivan, (2020 m asl)  
Maramures Mountains, Ukraine





Former (now abandoned) Polish  
astronomical and meteorological  
Station on the broad summit  
of Pop Ivan, (2020 m asl)  
Maramures Mountains, Ukraine



Meteorological station and its extremely high ladder for reaching the peak-instruments, Ceahlau Mountains, Romania



Ancient, organic astronomical “observatory” from the aymara-period (3900 m asl)  
Copacabana, Lake Titicaca, Bolivia



Ancient, organic astronomical  
“observatory” on vollcanic rocks from the  
aymara-period (3900 m asl)  
Copacabana, Lake Titicaca, Bolivia



