

# **3 zemlje, 3 mlinice, 3 tipi, 3 × 3 problema: Popovo Polje**



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**ICOMOS BiH**

**2018**

**1**

**teorija vode**

**2**

**snaga**

**3**

**krš**

**4**

**mlinice**

**5**

**današnja upotreba**

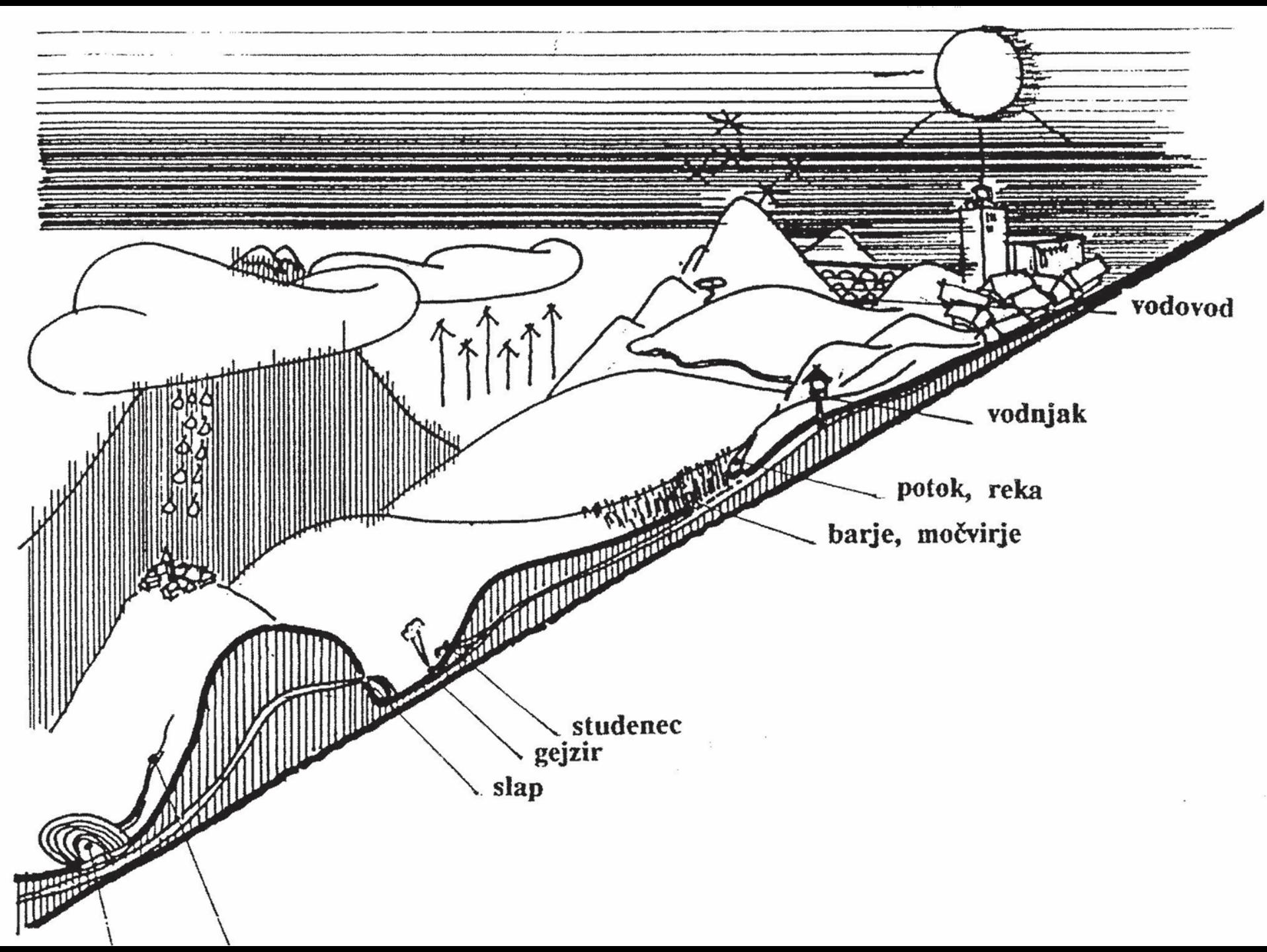
**6**

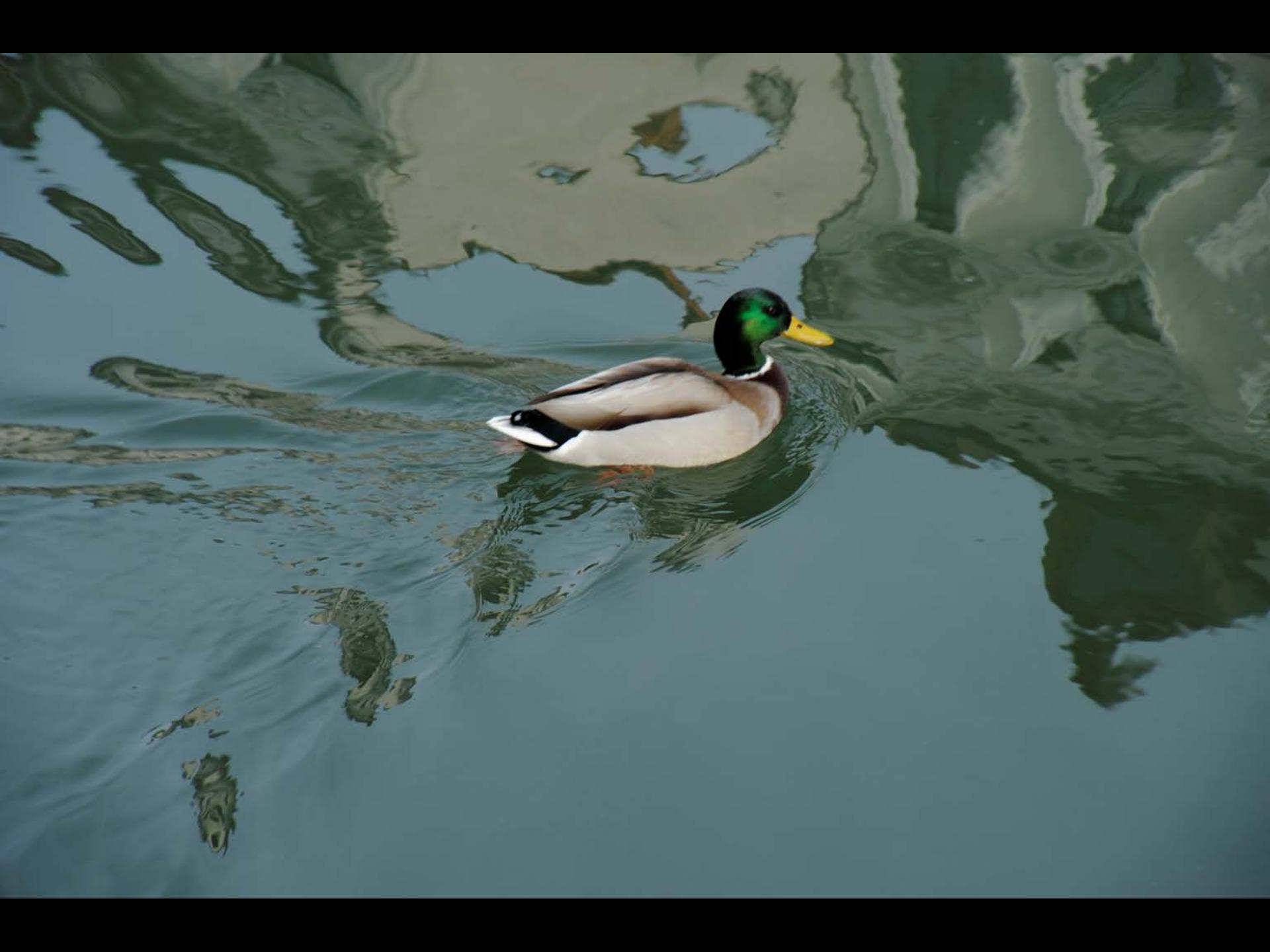
**mogućnosti**



1

# teorija vode























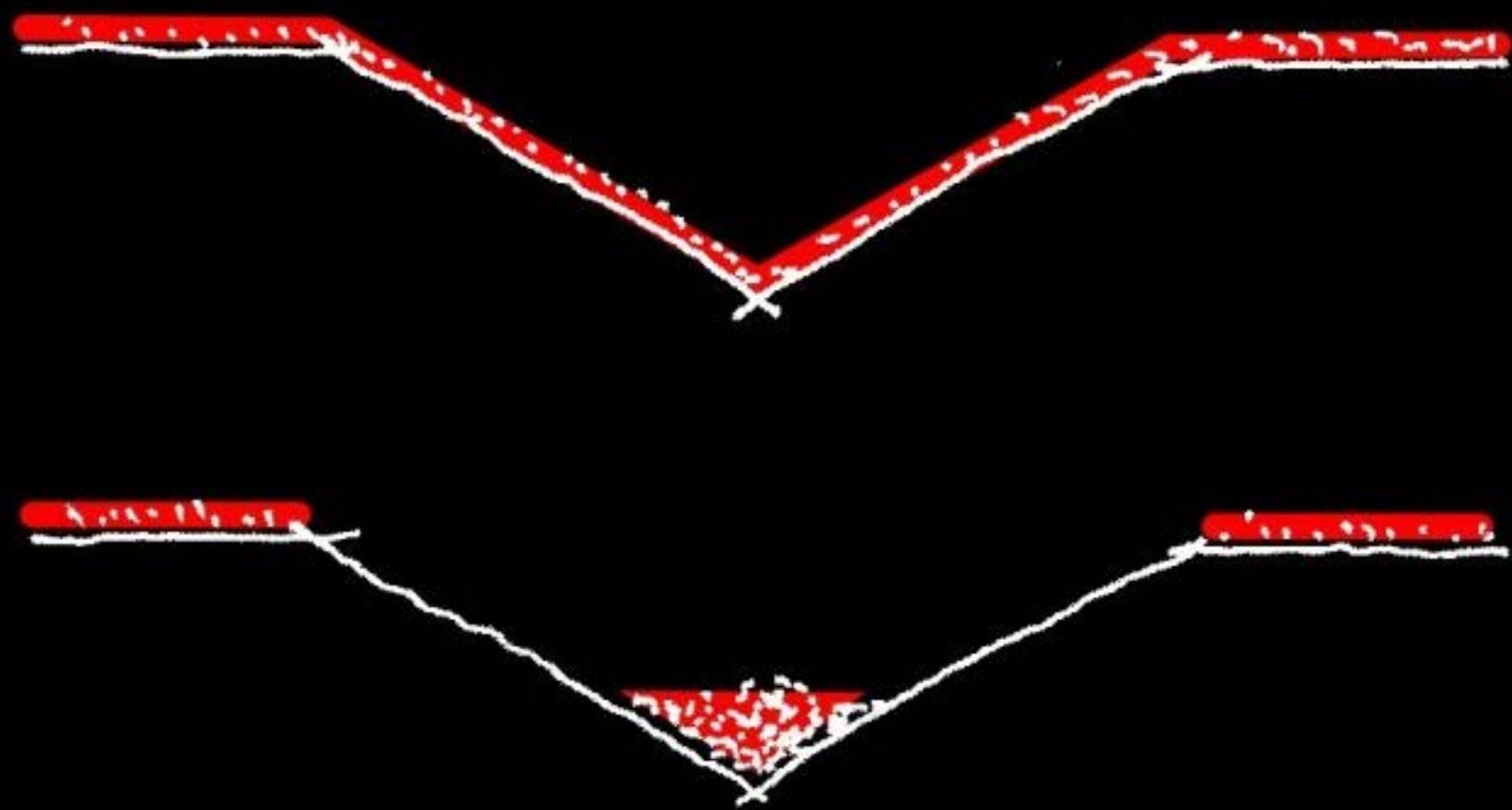


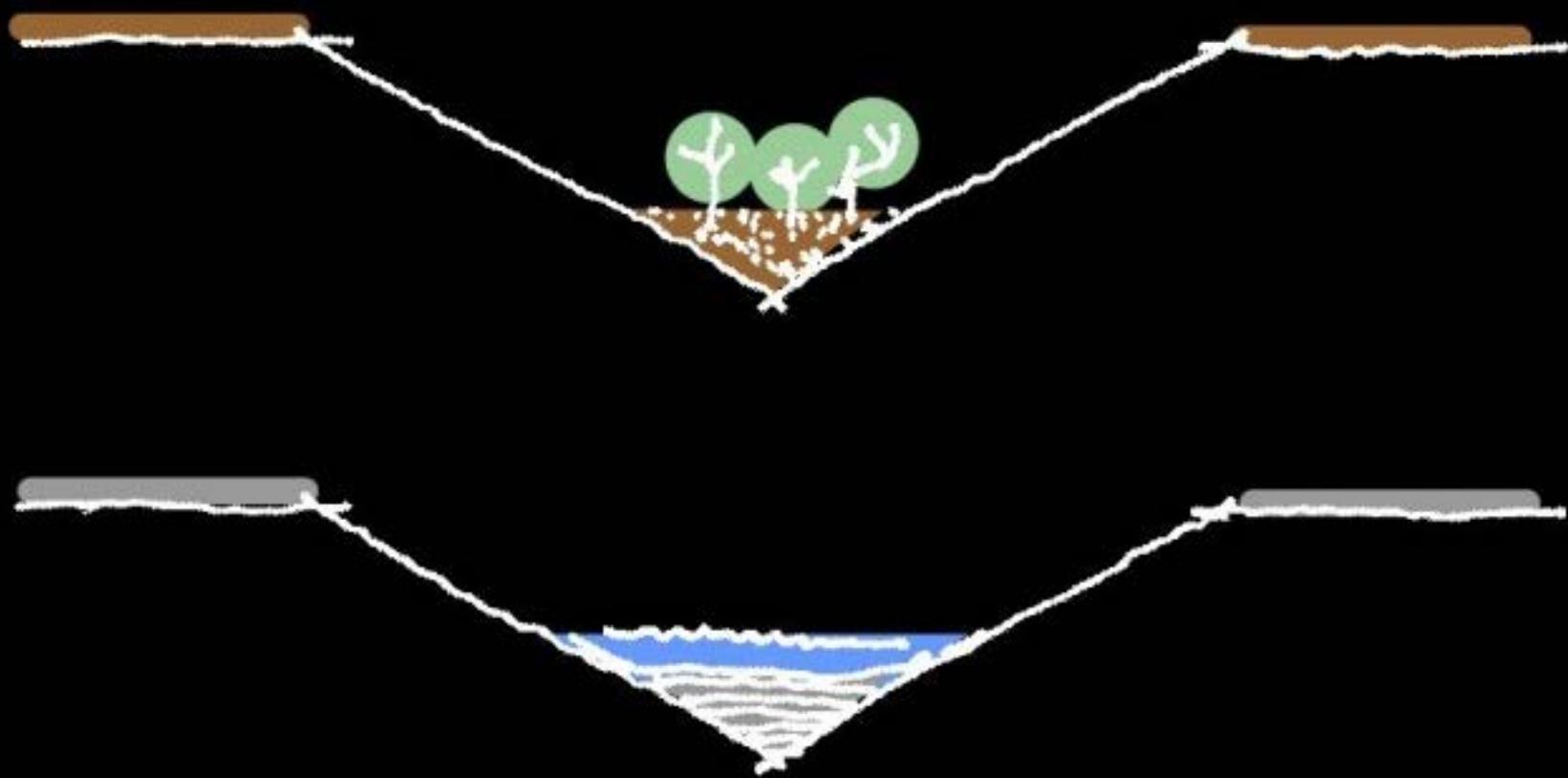


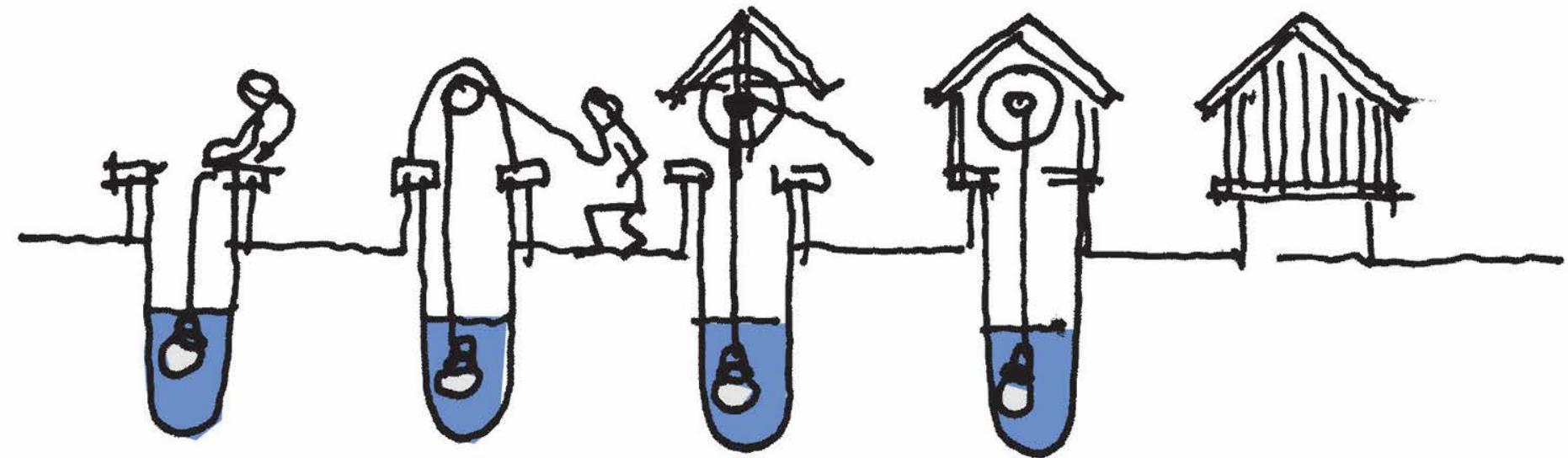


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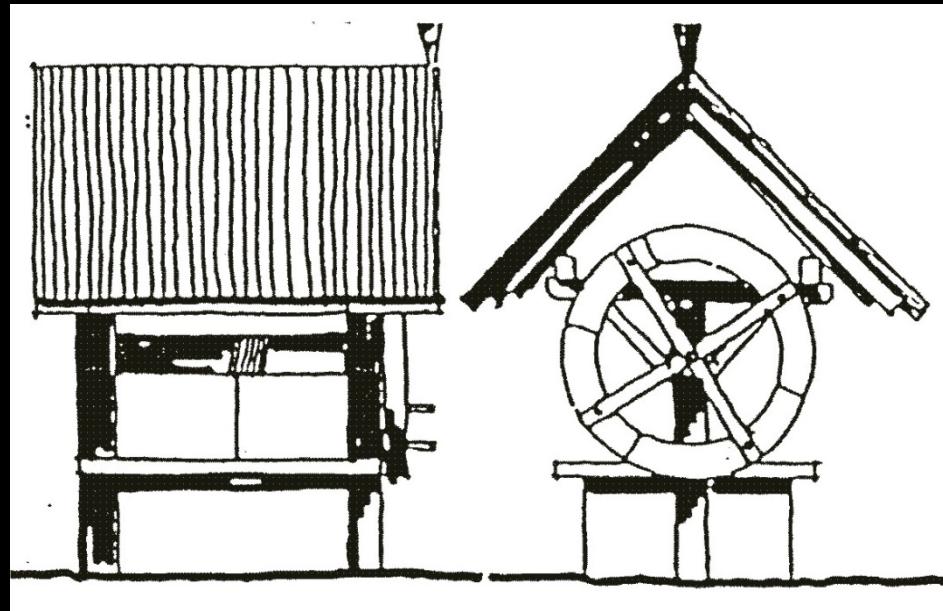




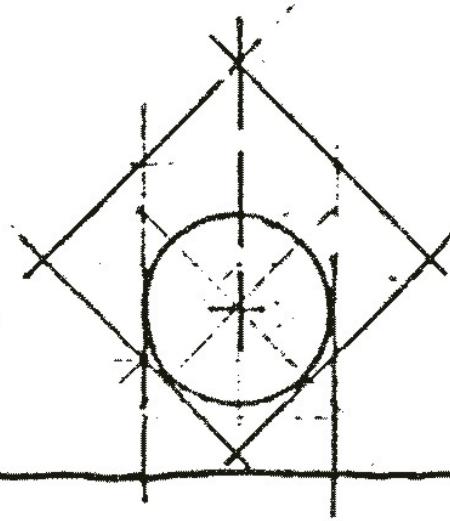
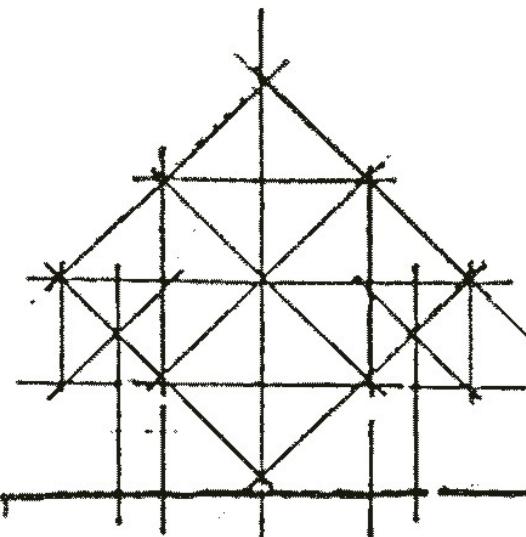
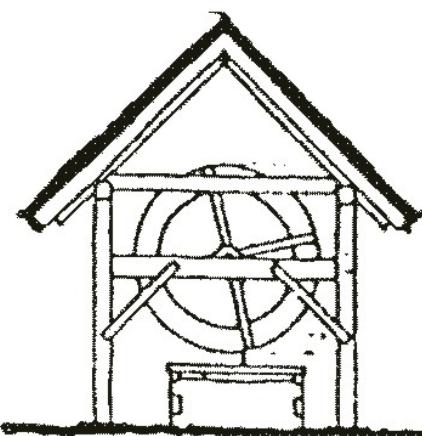
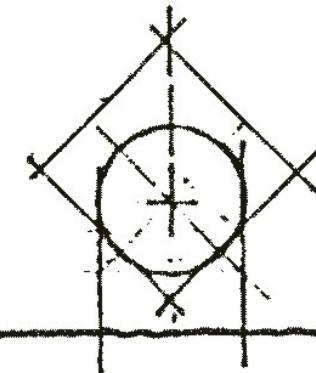
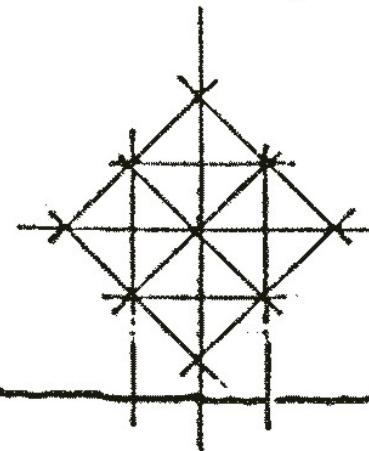
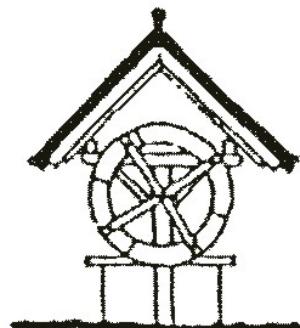




# 2 wells in slovenia principle:

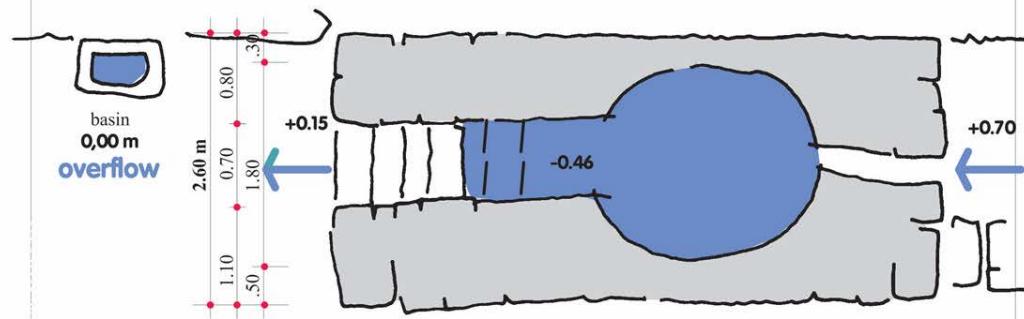






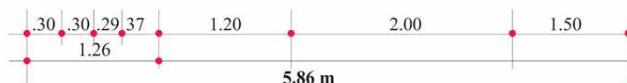


**El Pinar (Casas Bajas)**



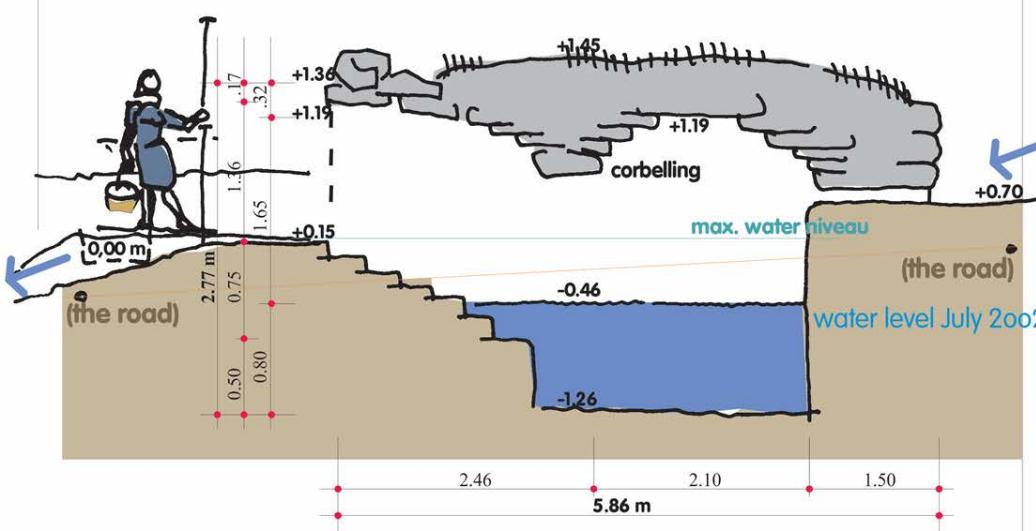
North

Scale 1 : 50

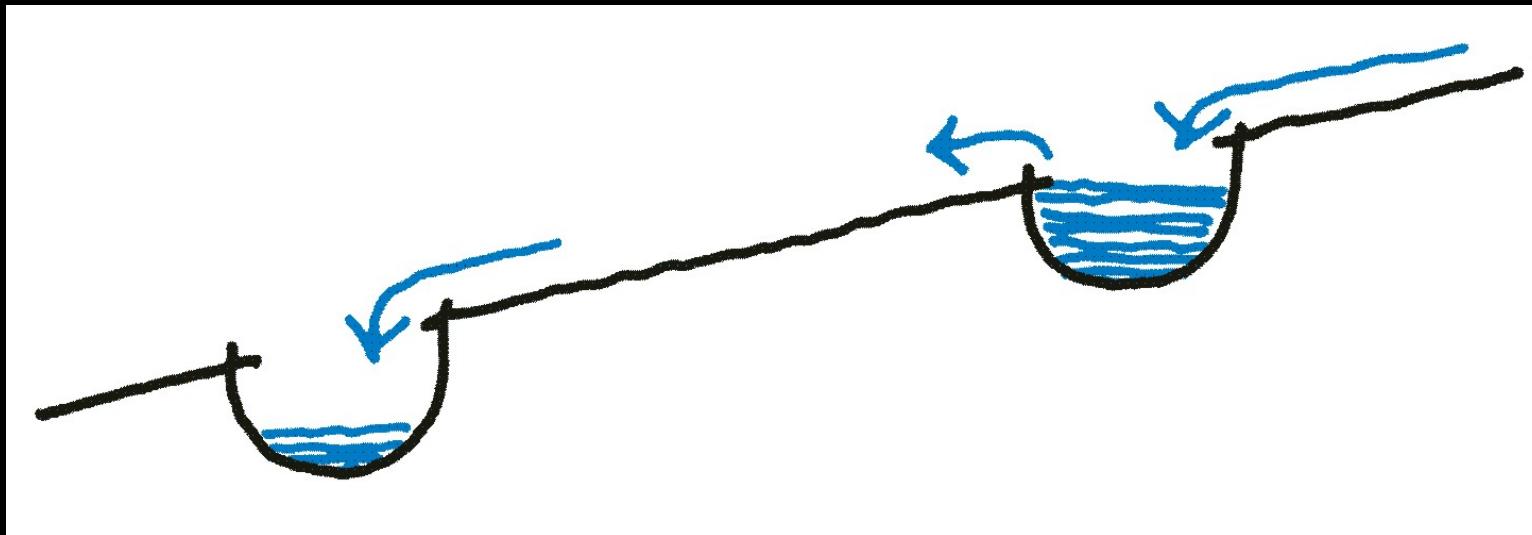


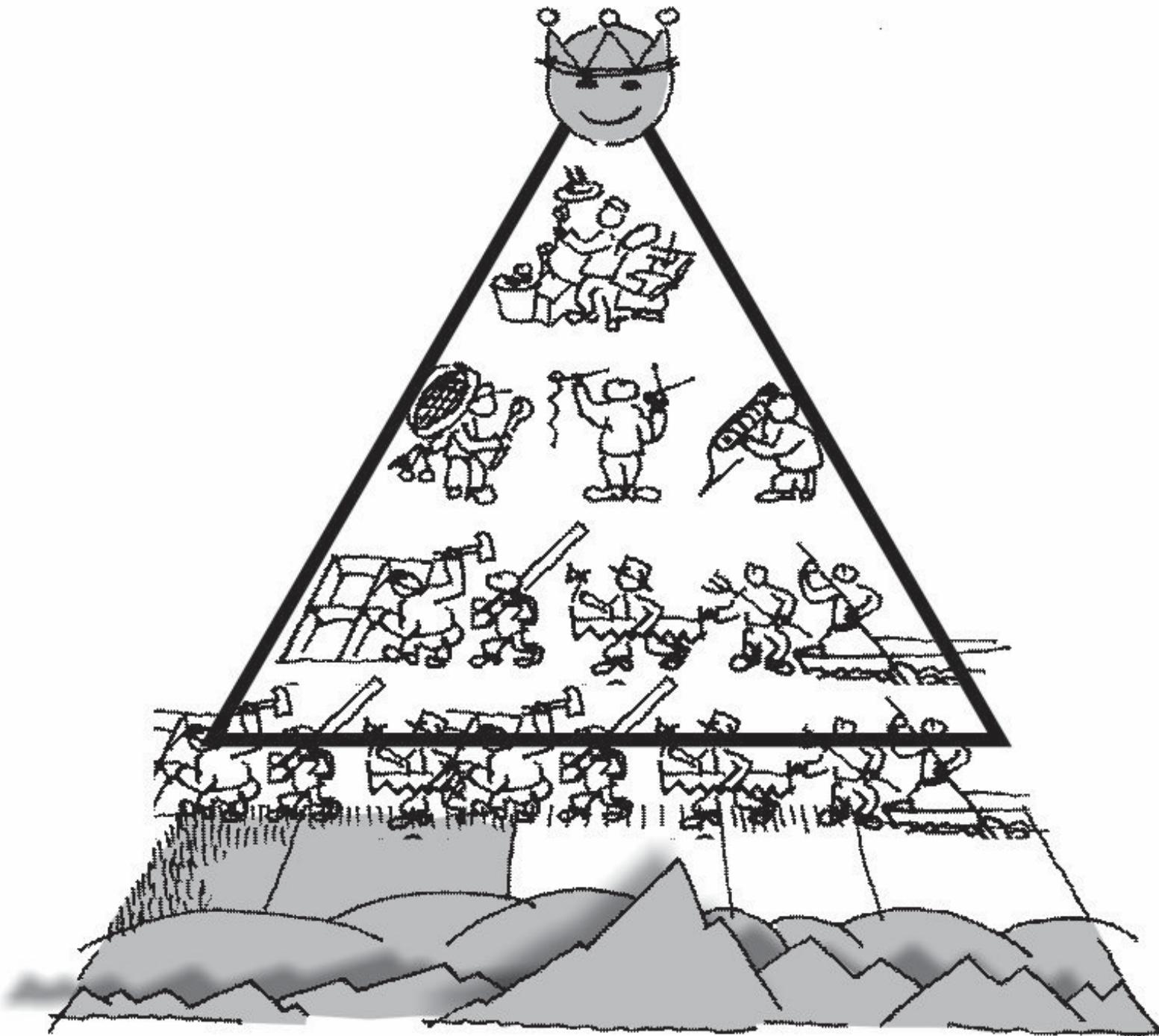
groundplan

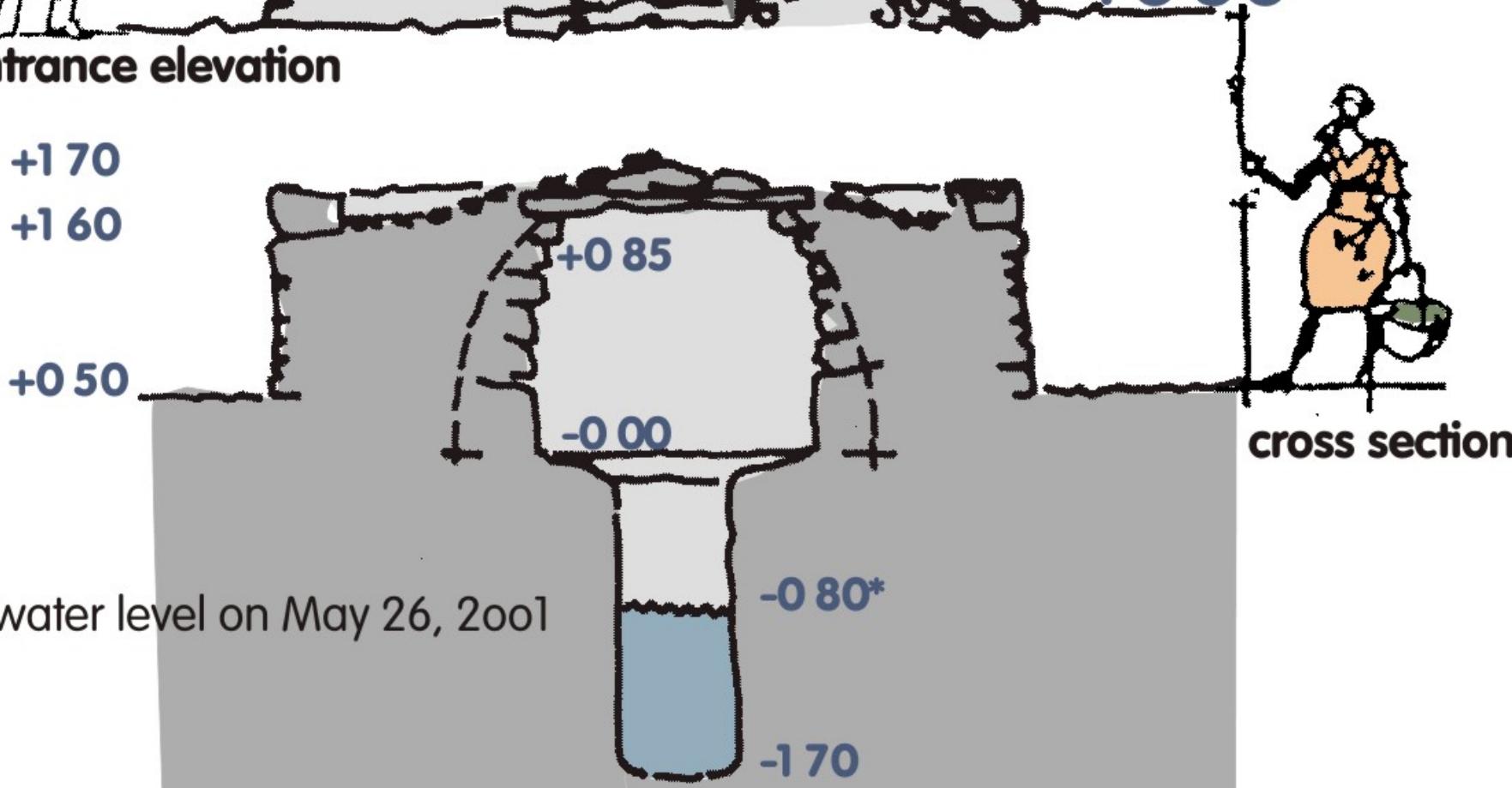
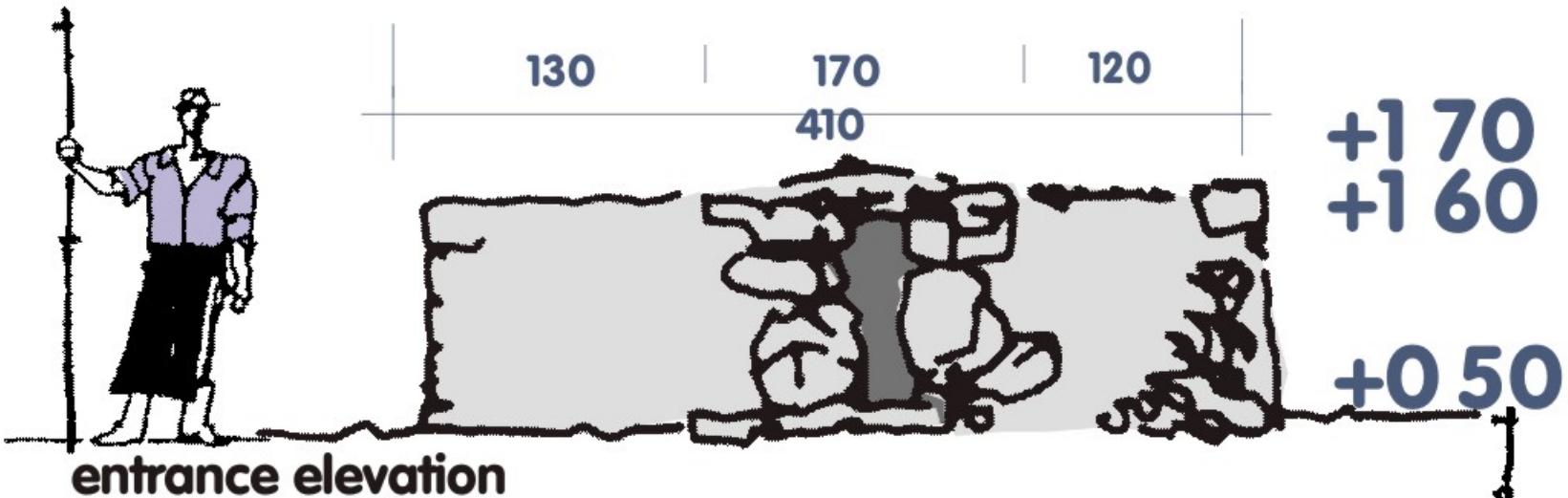
## (the road



# 6 retaining principle:









# Marfa Ridge (Red Tower)



8

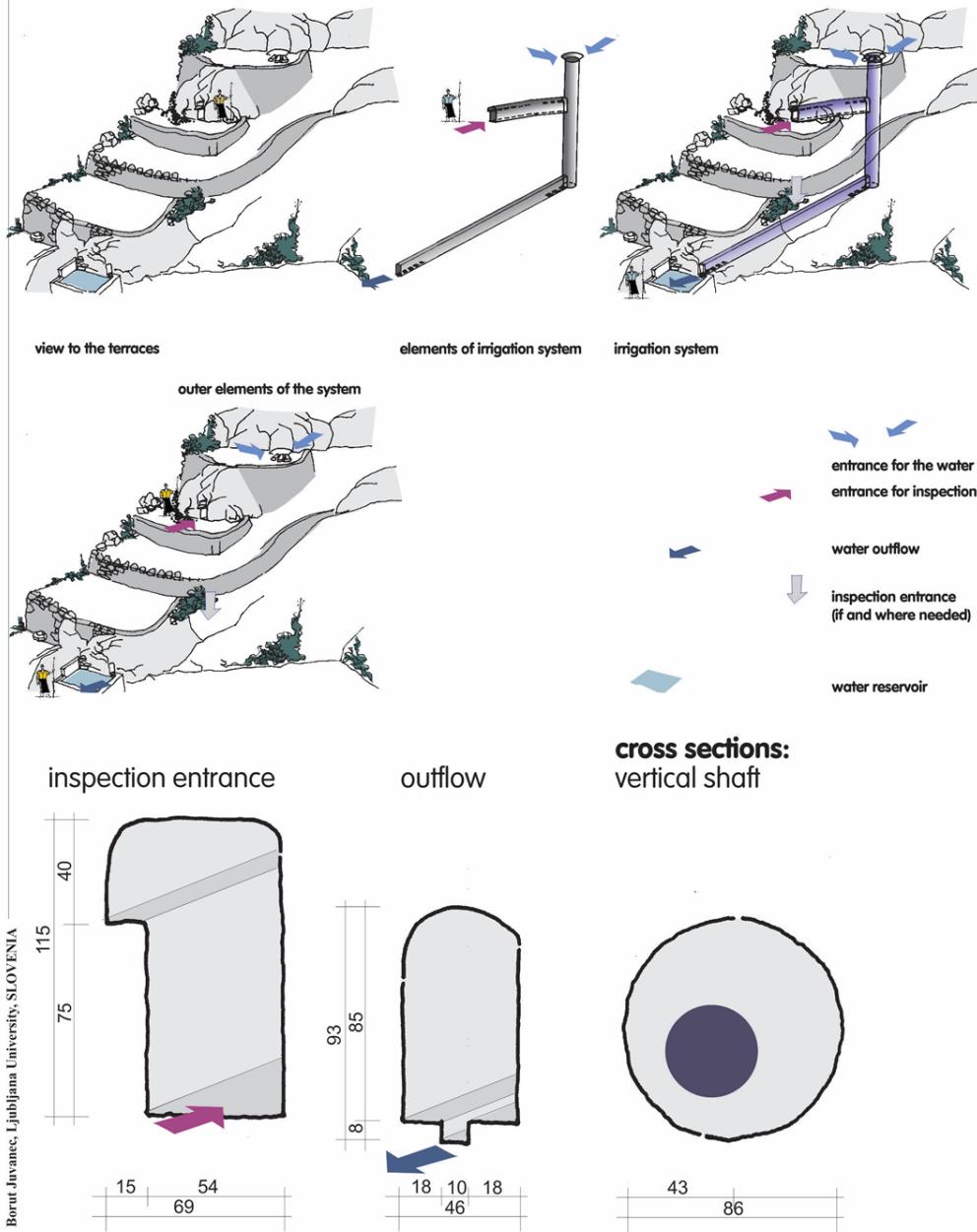
if needed:

inspection shaft for achieving horizontal tunnel, for clearing.

It is urgent to clear the water-ways of clay and dirt: if they are stopped, water flows to another system and the field without water can not be of any use.



# Marfa Ridge (Red Tower)







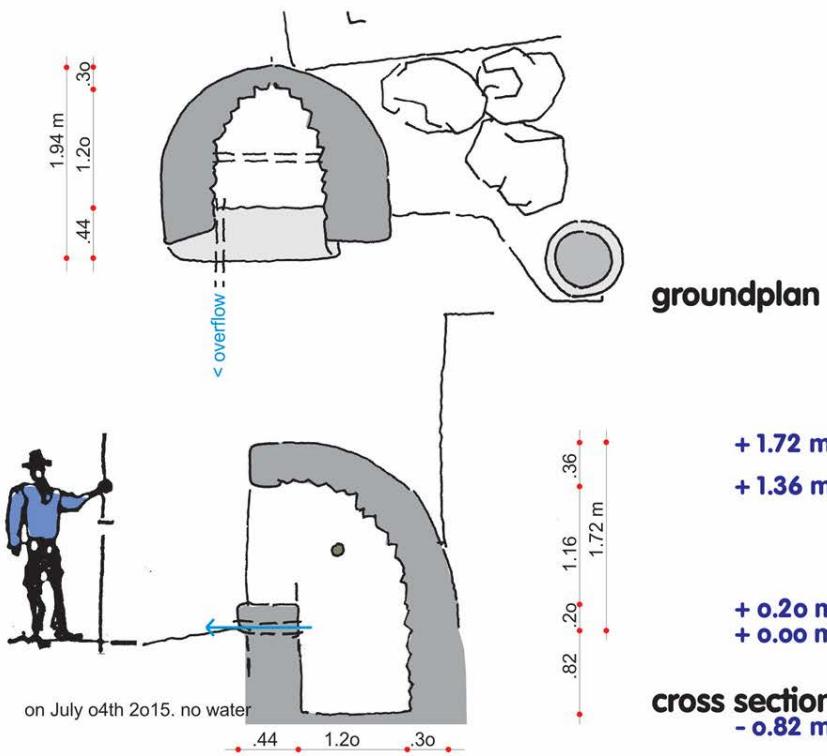
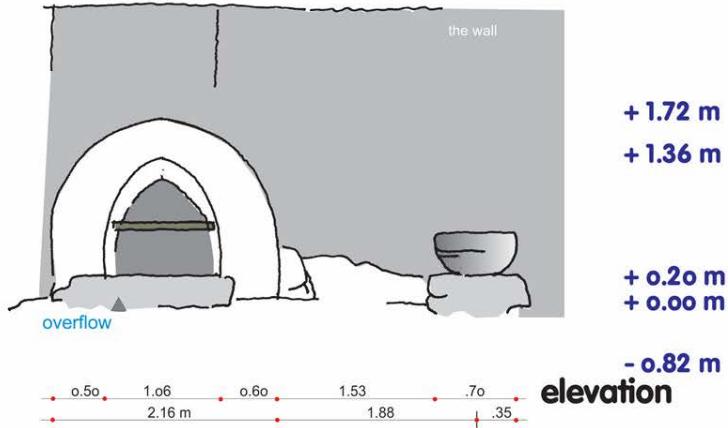








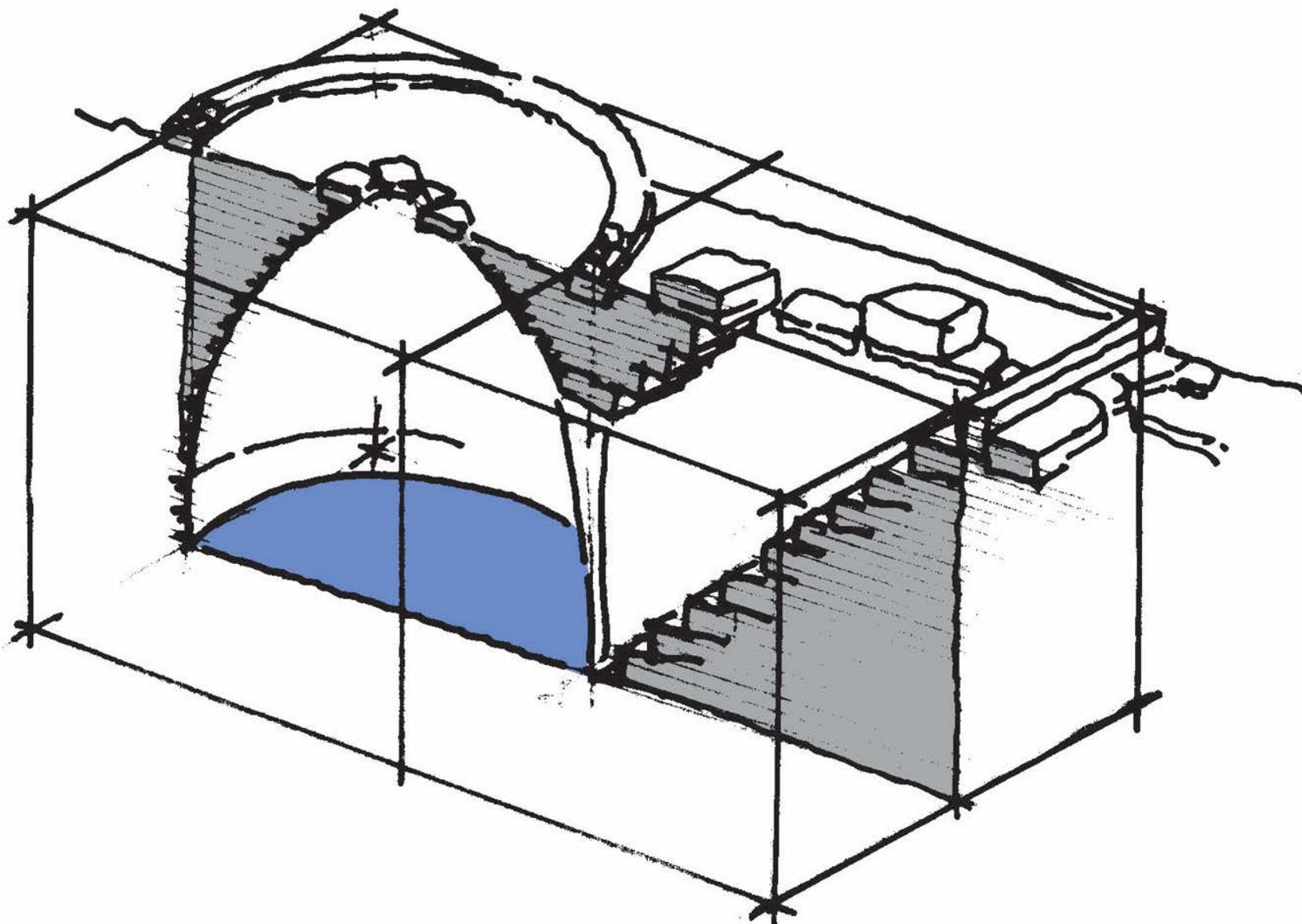
# font des Vergers







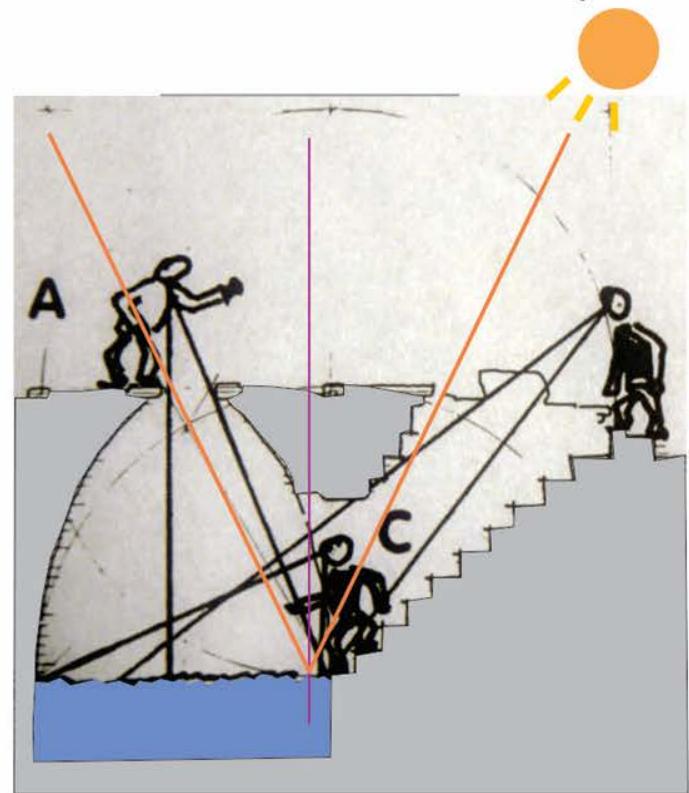




izstop: ČUDEŽ



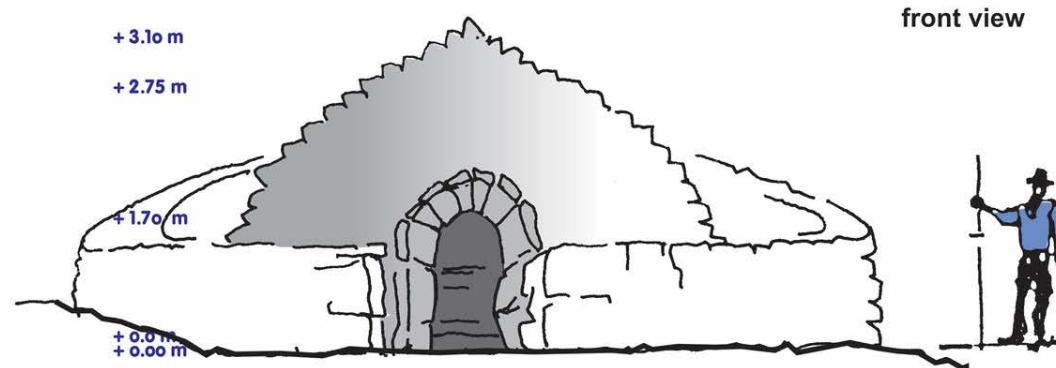
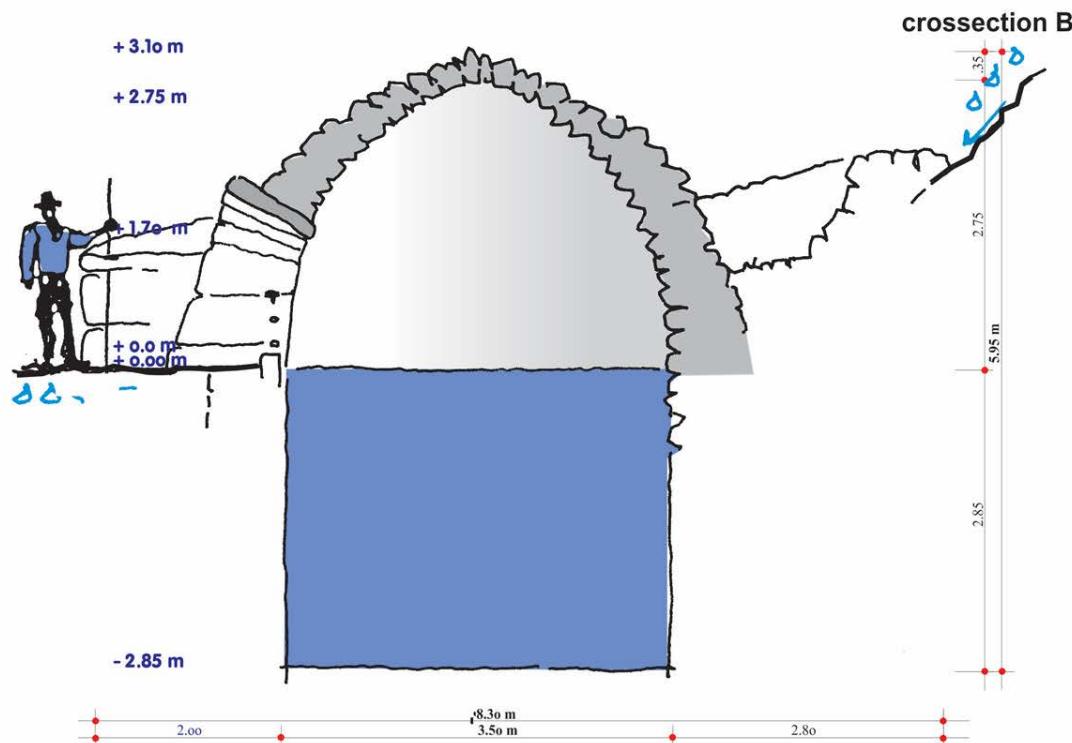
vstop: SONCE



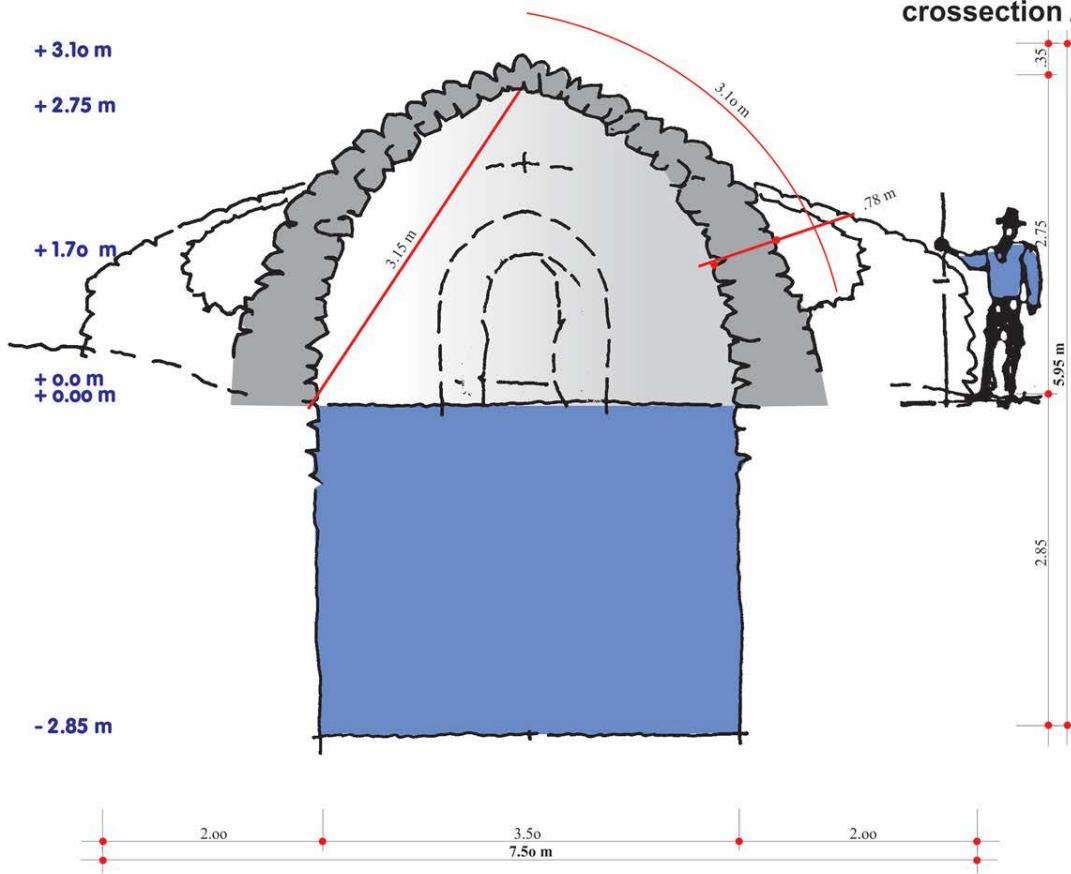








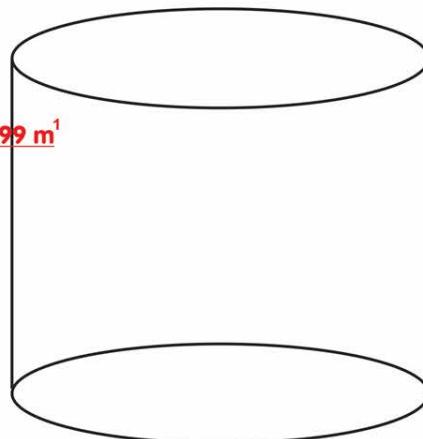
crossection A



length:  
 $2r\pi = 2 \times 1.75 \times 3.14$   
inner circumference = 10.99 m<sup>1</sup>

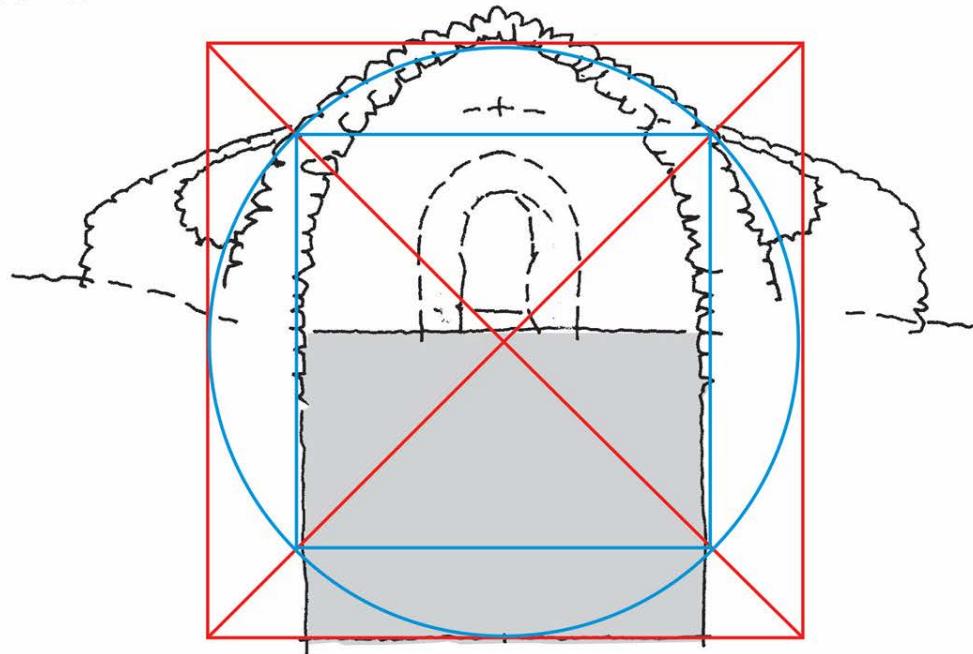
surface:  
 $r^2\pi = 9.62 \text{ m}^2$

contain:  
surface x depth  
 $9.62 \times 2.85 = 27.41 \text{ m}^3$

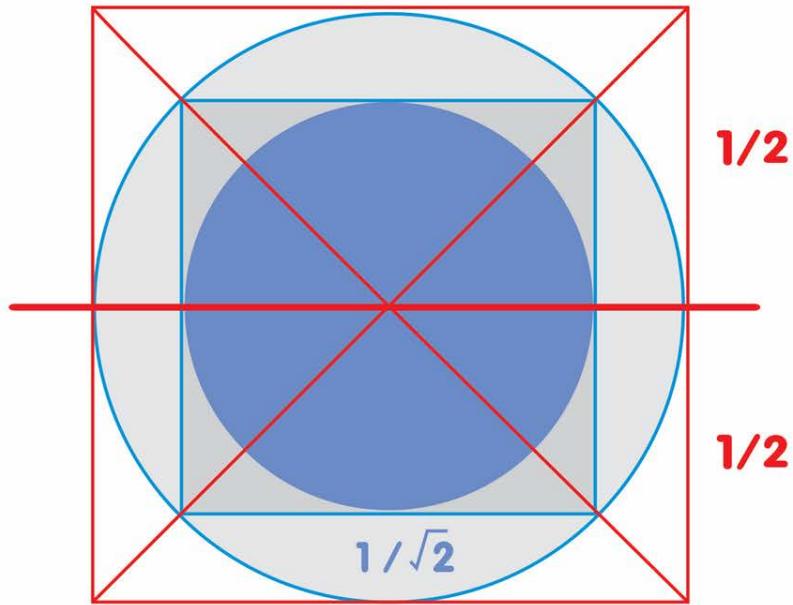


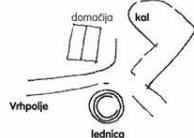
$1/\sqrt{2}$ 

crossection A



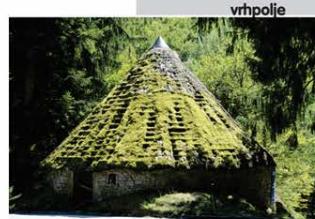
1





Lednica (Slovene 'icehouse', with reduced and accentuated, 'c') is situated at the far end of the village, under the homestead of family Osterc and at the 'kal', the pond. It is built as a round building in dry stone, as inverted truncated cone. Its diameter is about 7 metres and half, with 4.66 m depth (at April 2017), but by testimony of the owner Ms Dalija Osterc it can be two metres deeper. The same source speaks of wooden staircase to the bottom and wooden carpentry for the roof, thatched by straw. This is the unique situation in Slovenia as well as in Italian side of the region. The only possible inclination of the thatched roof in straw is one to one or 45 degrees, and this the only evidence of that prime system of the roof, well known only in Italy, near Pistoia, at the La Madonnina icehouse on the river Reno.

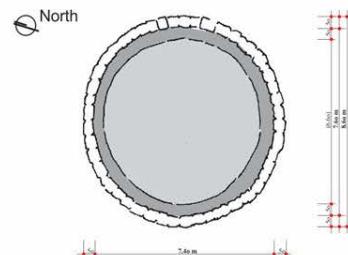
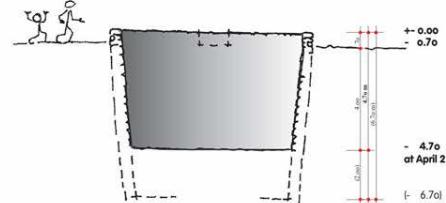
76 borut juvanec, ljubljana university SLOVENIA



source for the reconstruction:  
La Madonnina, Pistoia

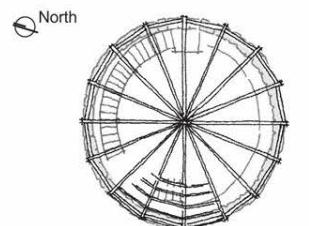
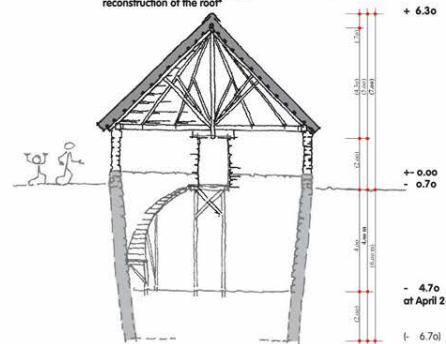


**vrhpolje**  
situation at April 2017



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**vrhpolje**  
reconstruction of the roof



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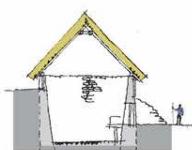
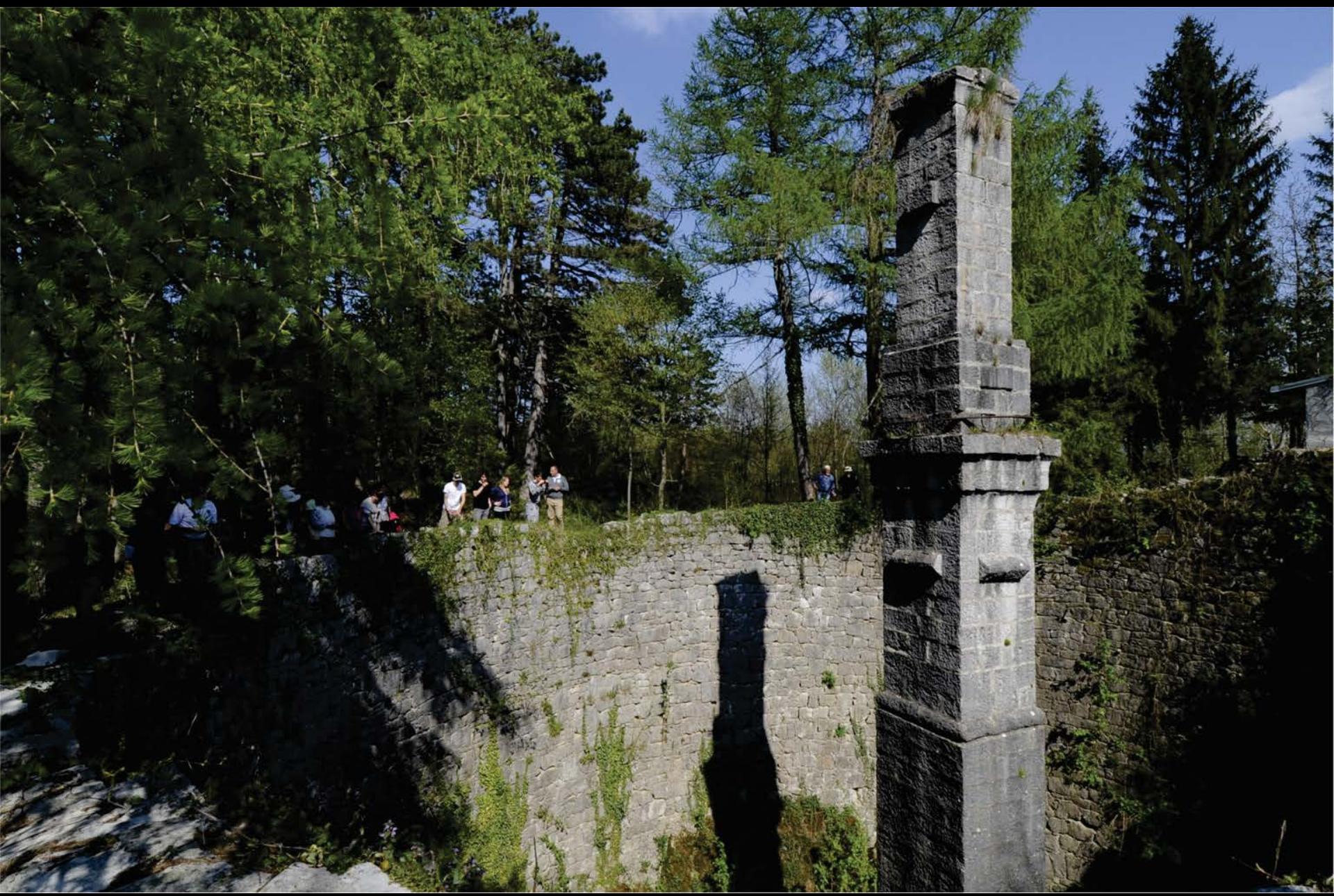


photo September 2013

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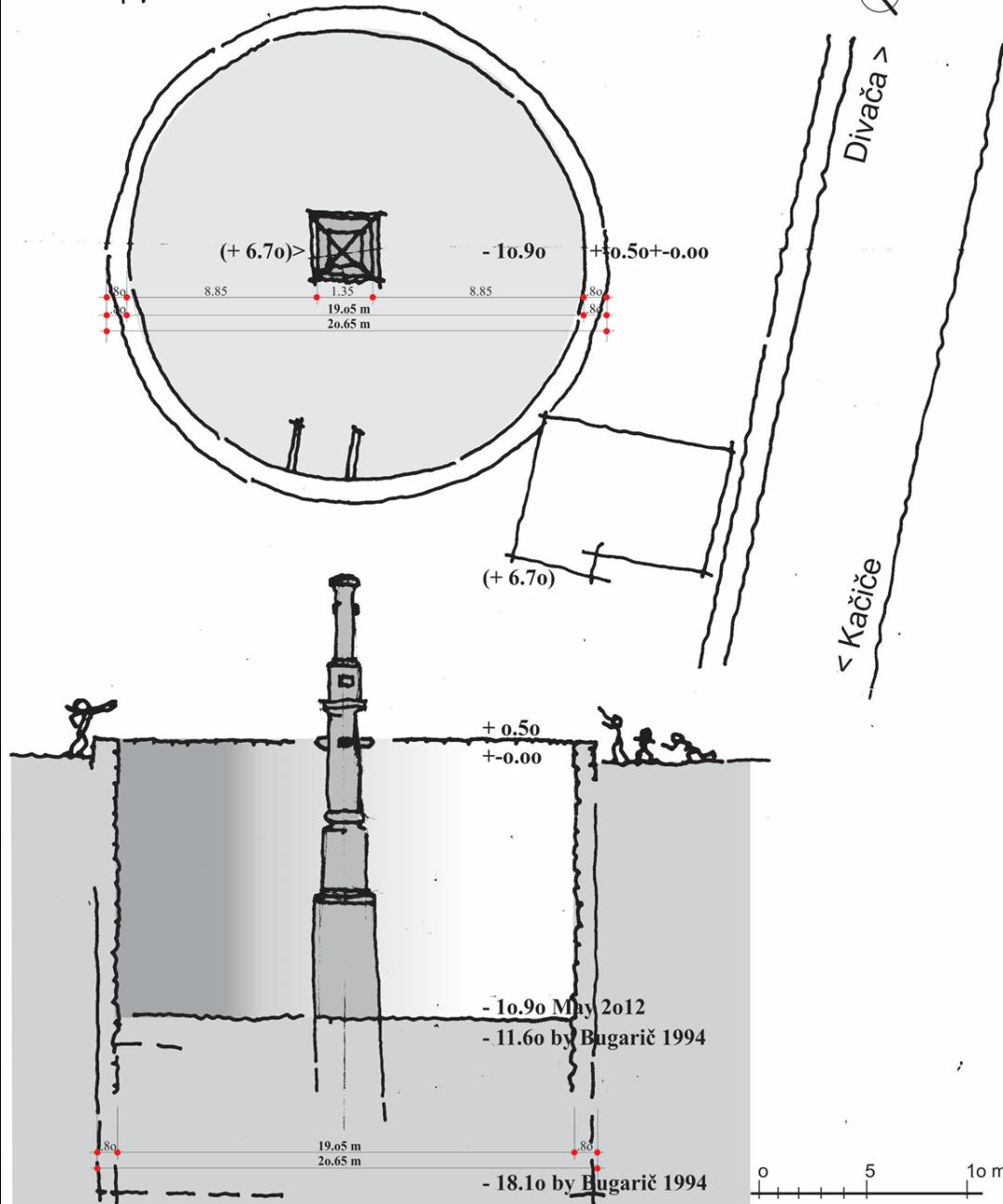
\*source: Ms Dalija Osterc, Vrhpolje



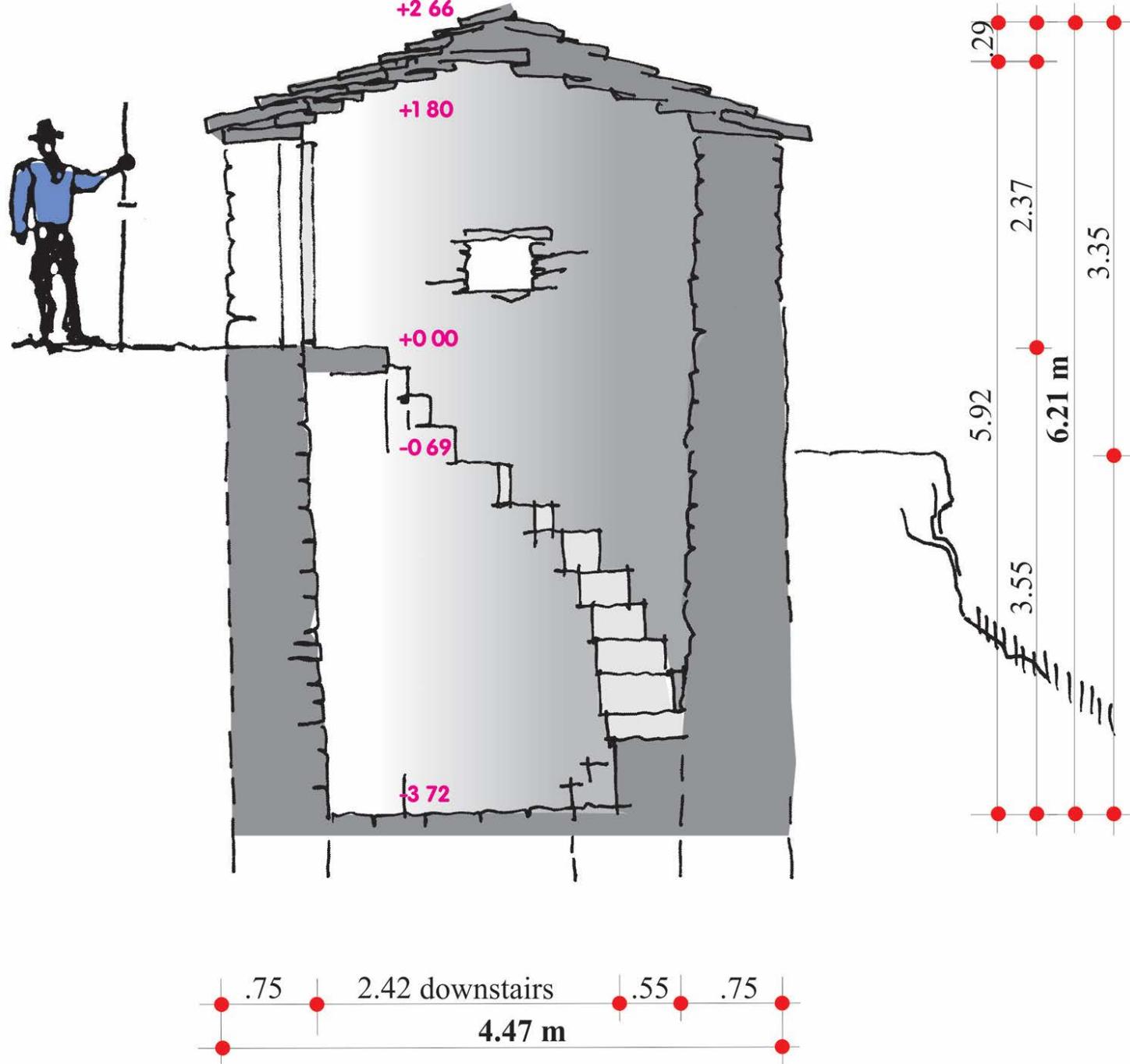
existing object  
on april 2012

kačice

North

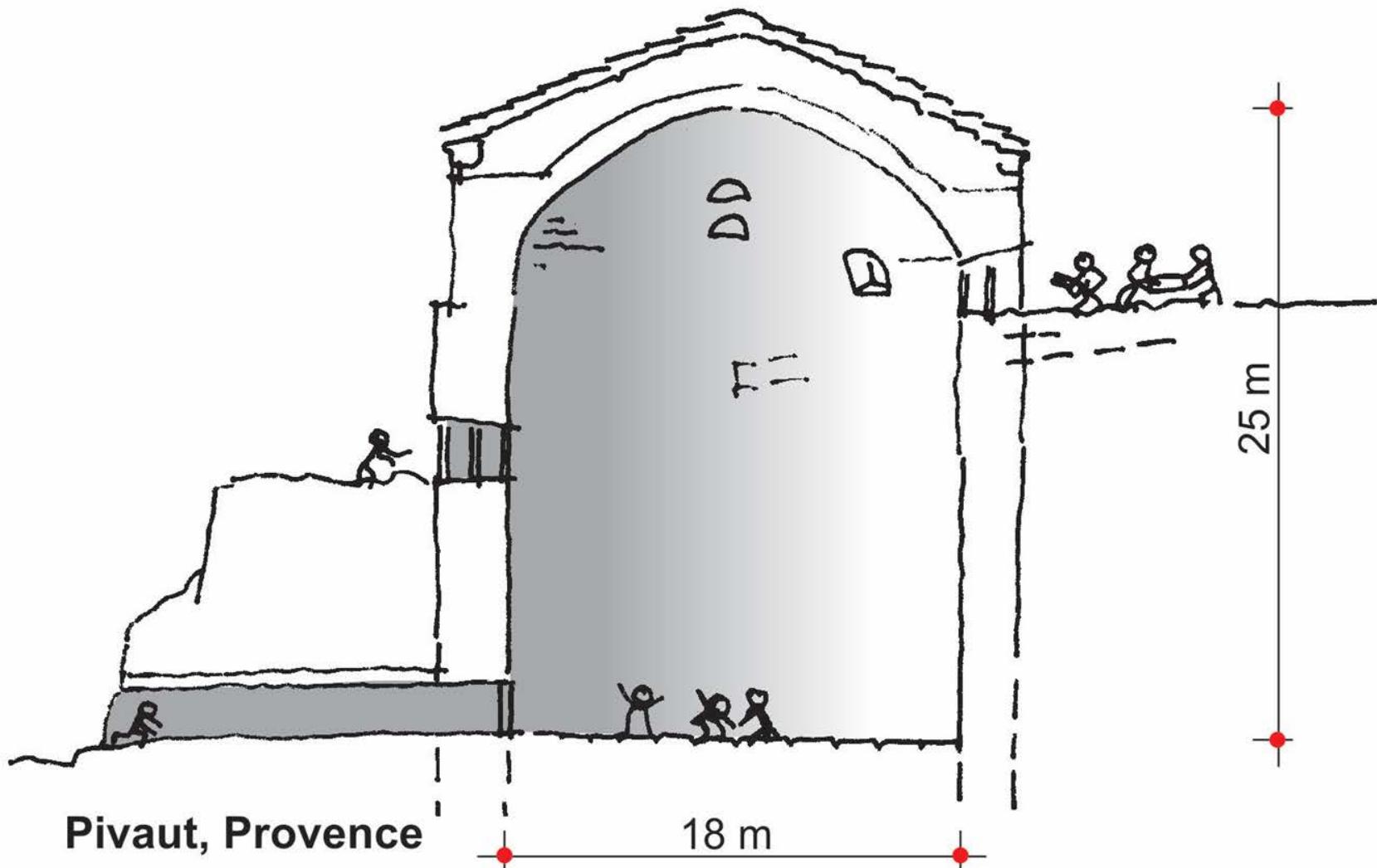






2000 m above sea level







2

power





1



2



3





3  
krš



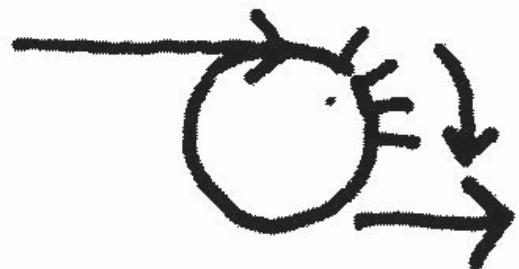




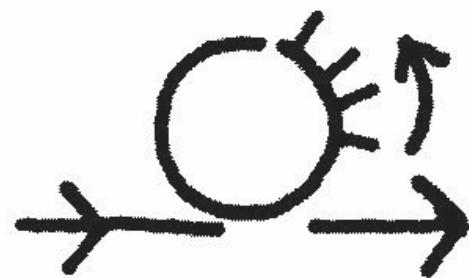


4

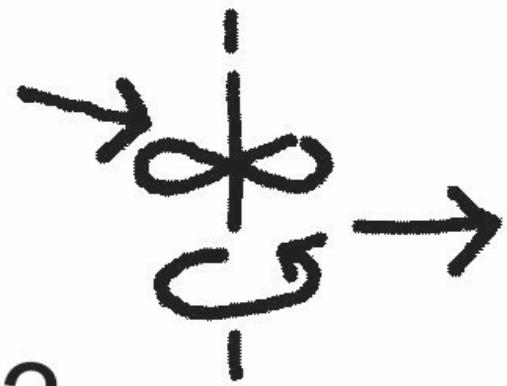
mlinice



1 overshot



2 undershot



3 vertical axle







4

watermills  
Kosovo  
Kefalonia  
Popovo Polje

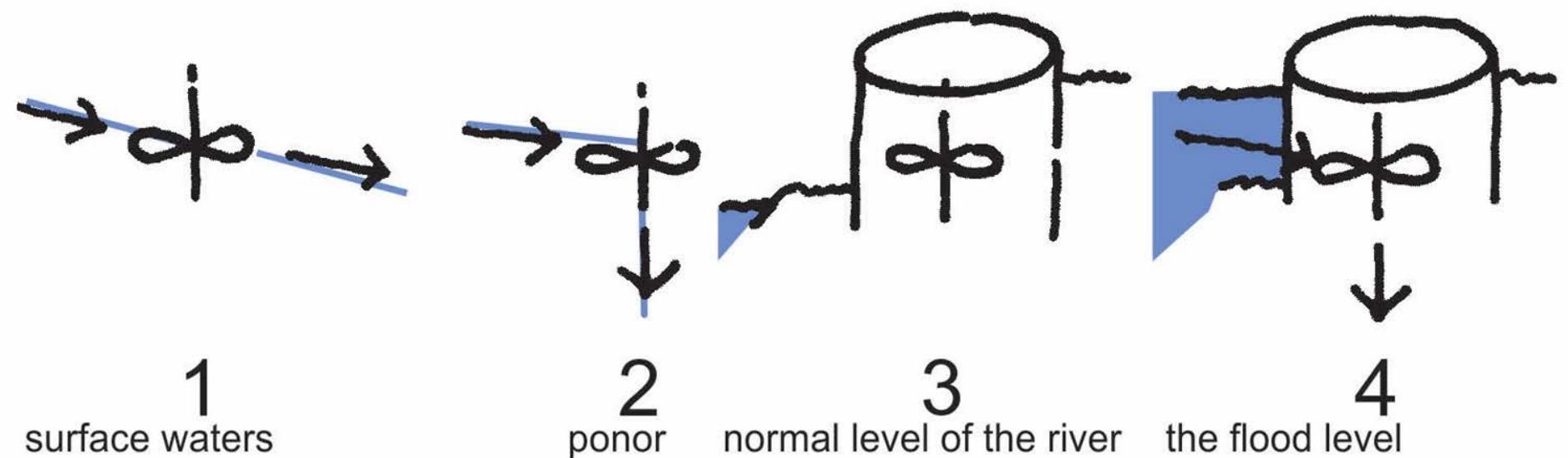
4

**Kosovo, Peć/Peja**













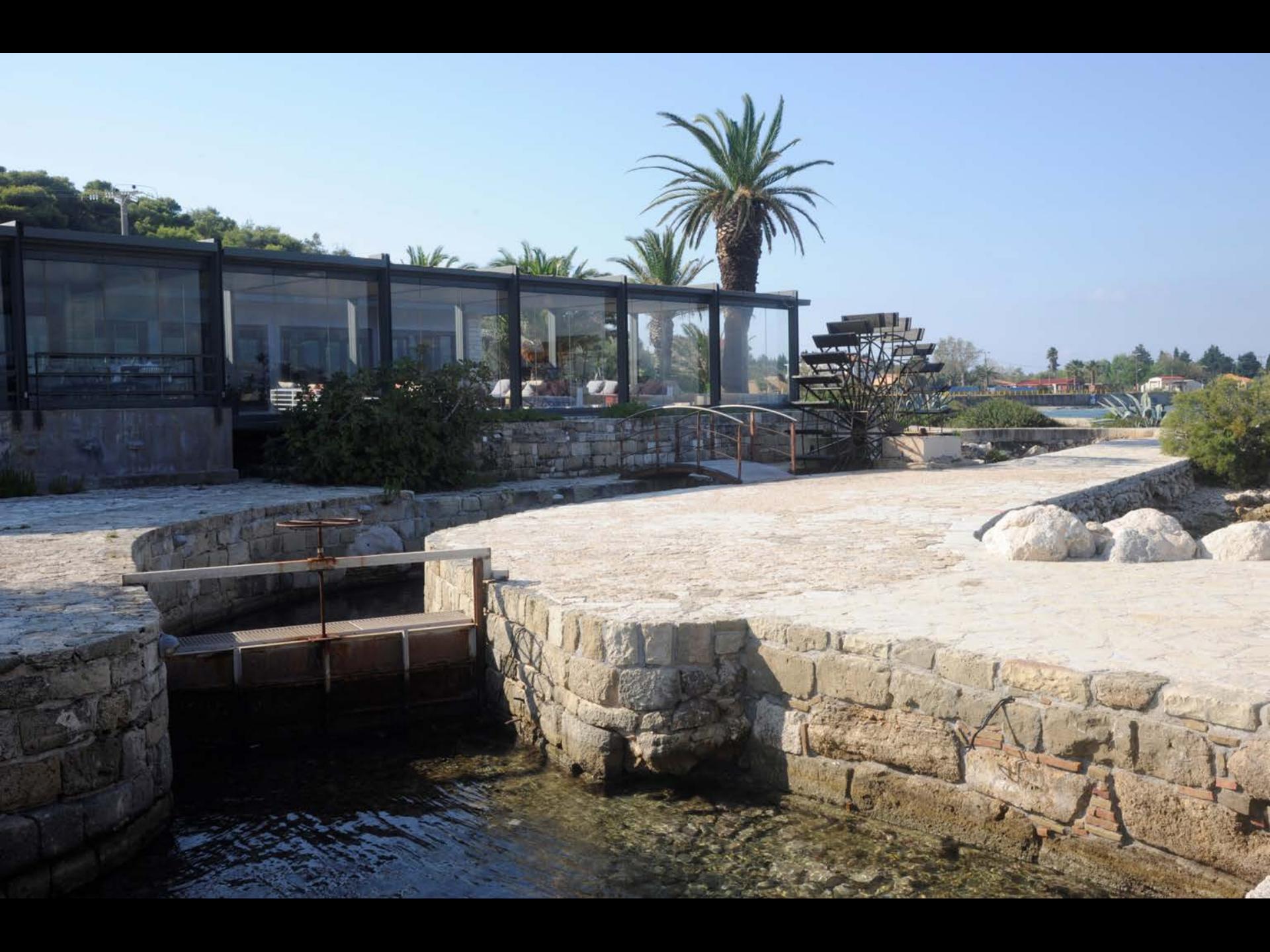


4

**Kefalonija, Grčka**

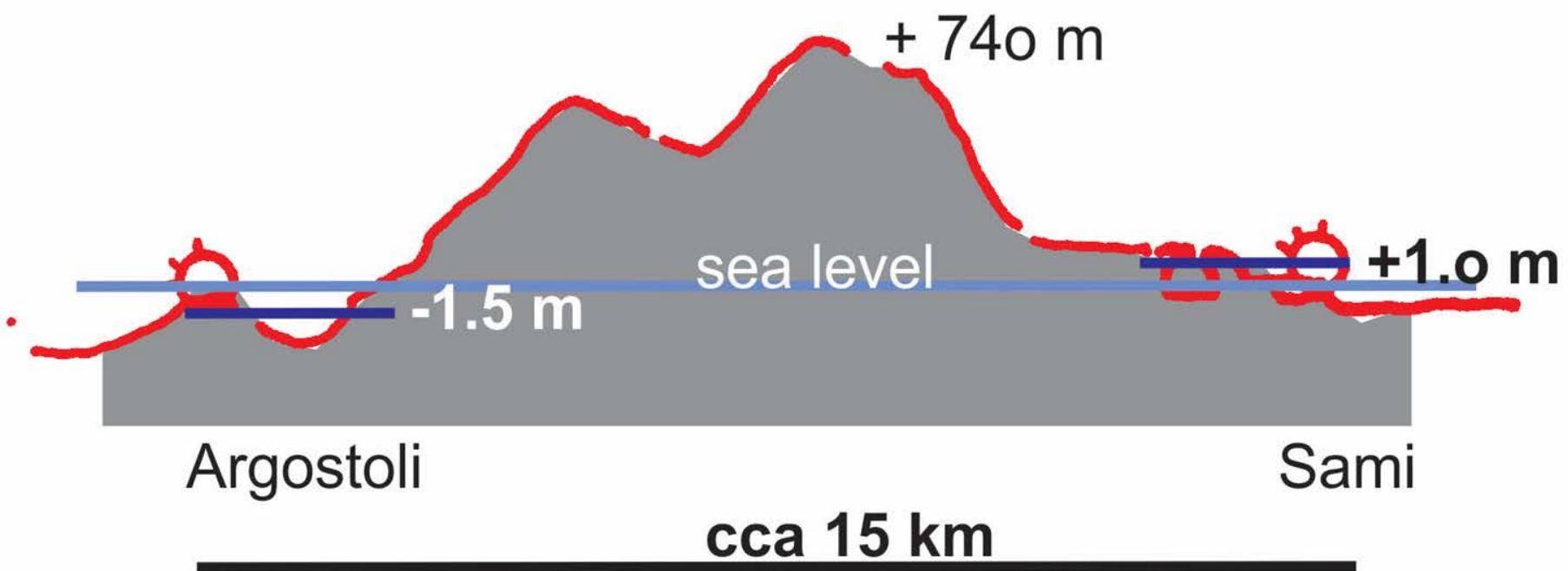
# Ithaca





# Ithaca







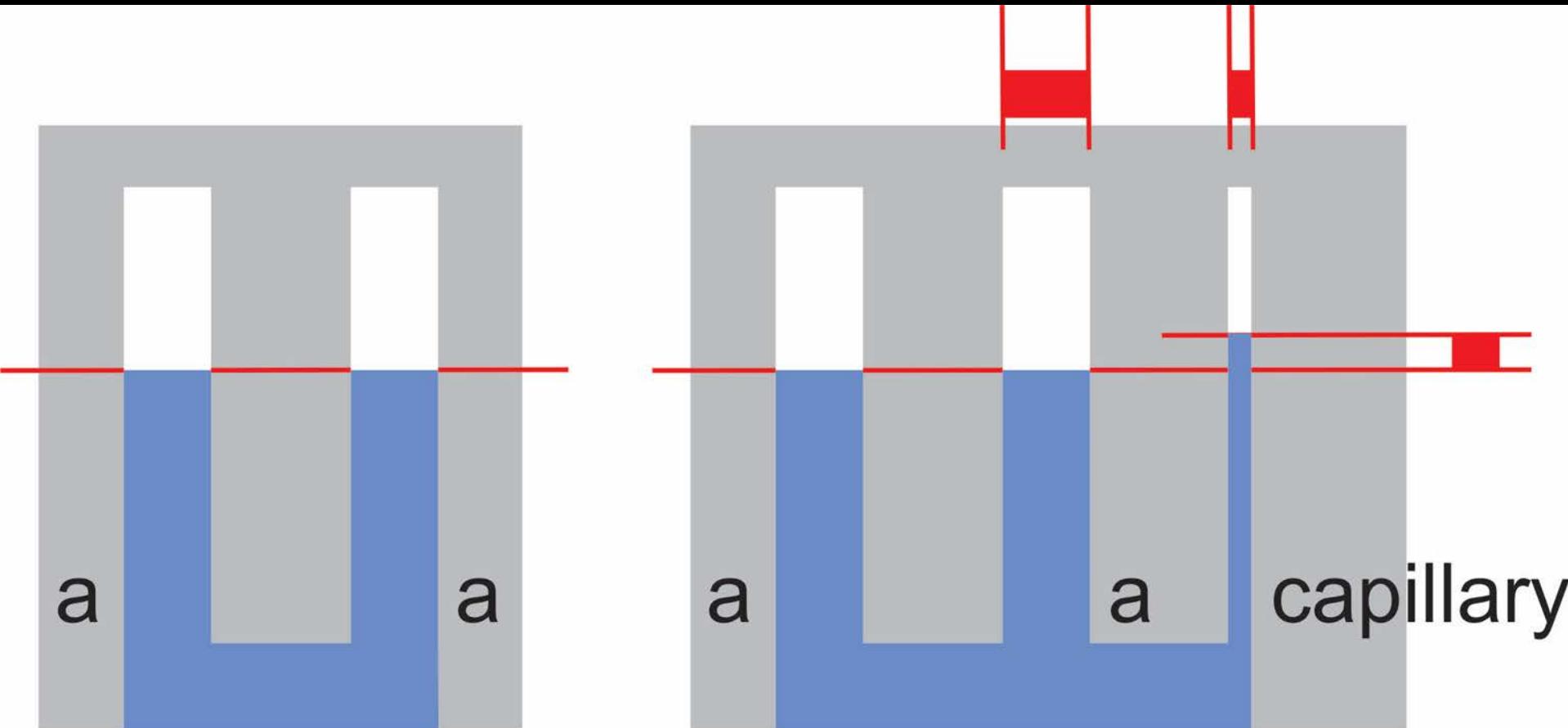
salt water

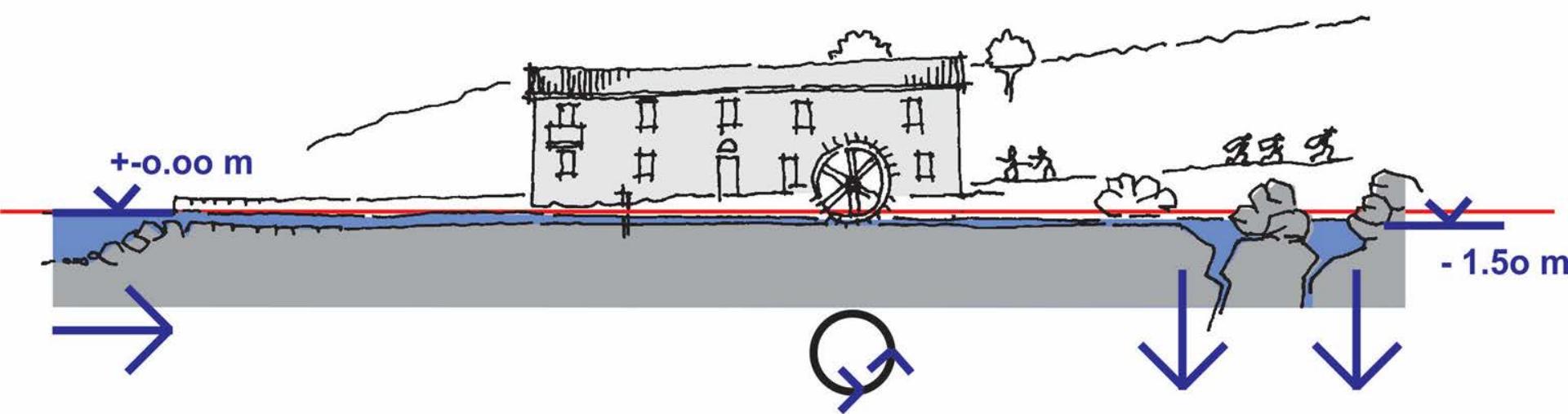
brackish water

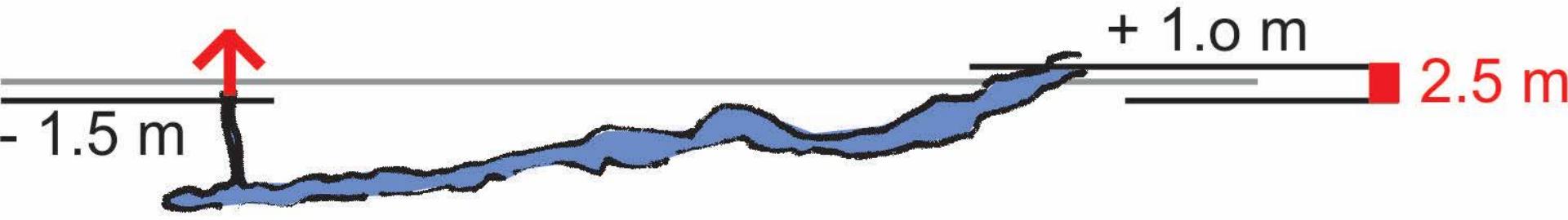
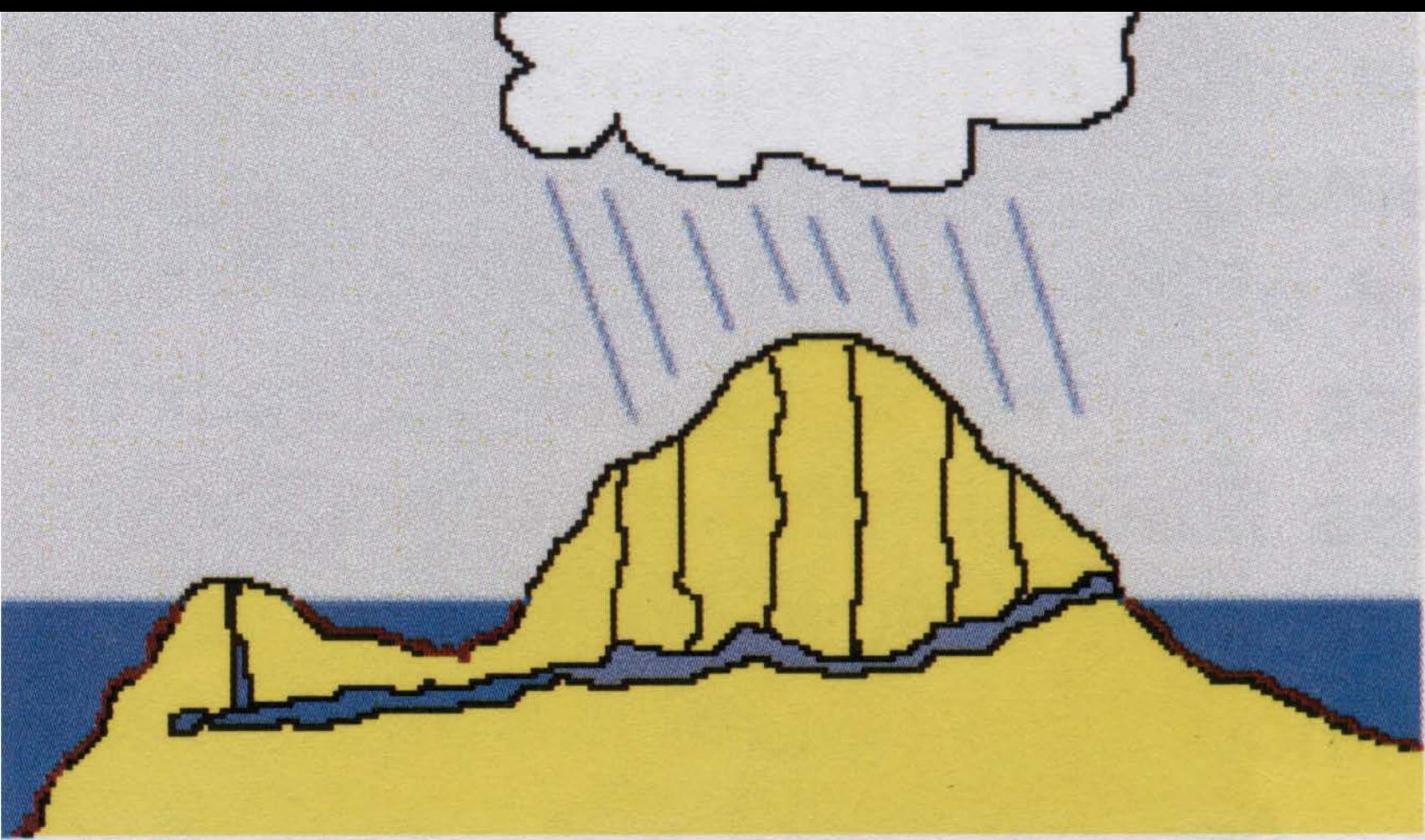
sweet water

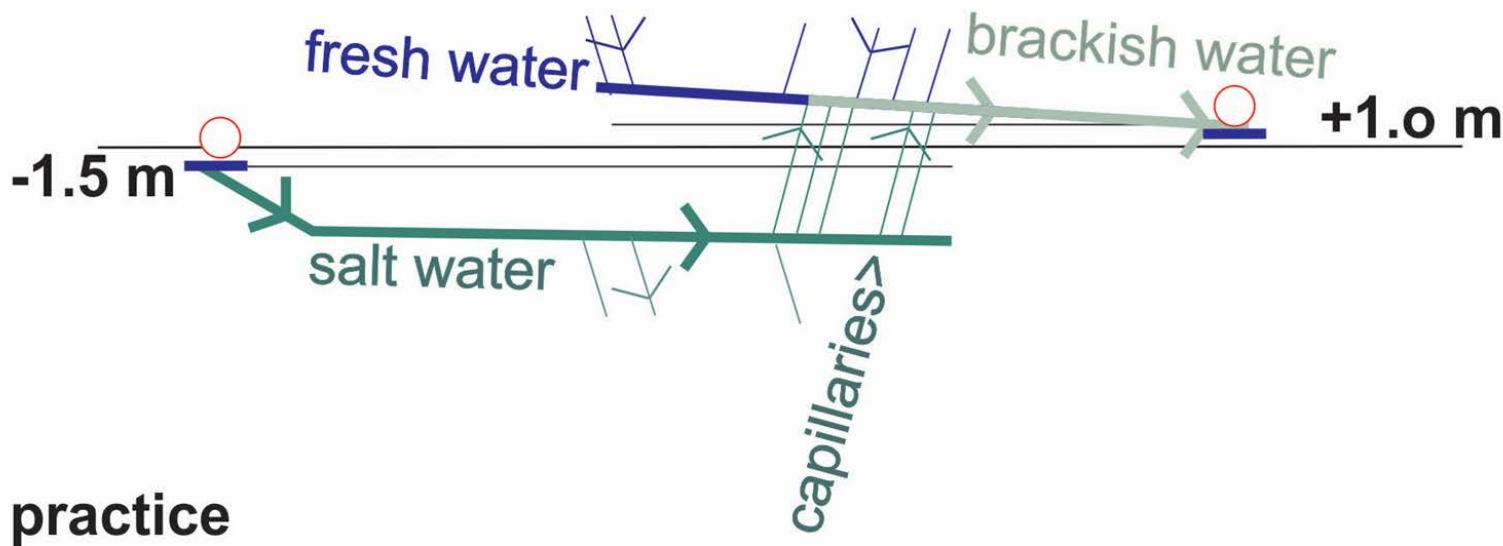
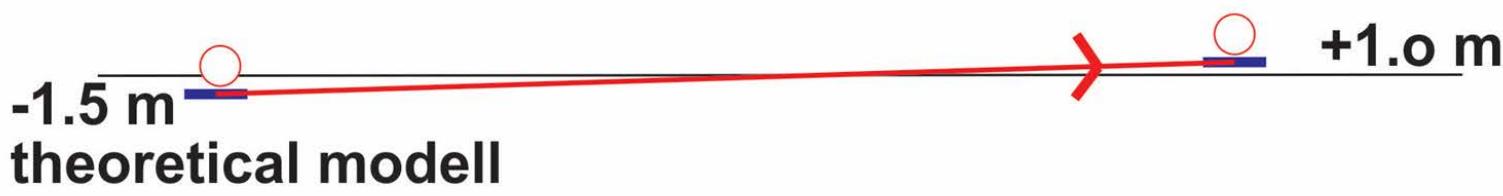
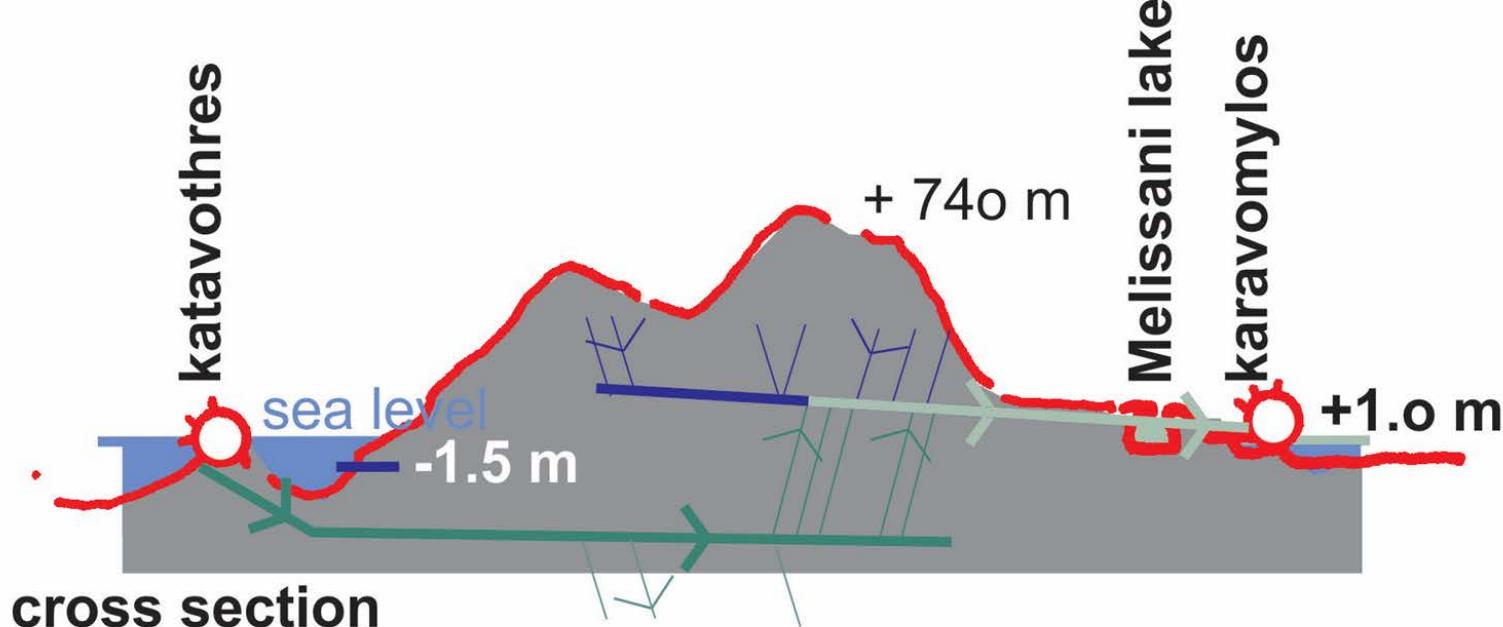
sweet water  
brackish water  
salt water

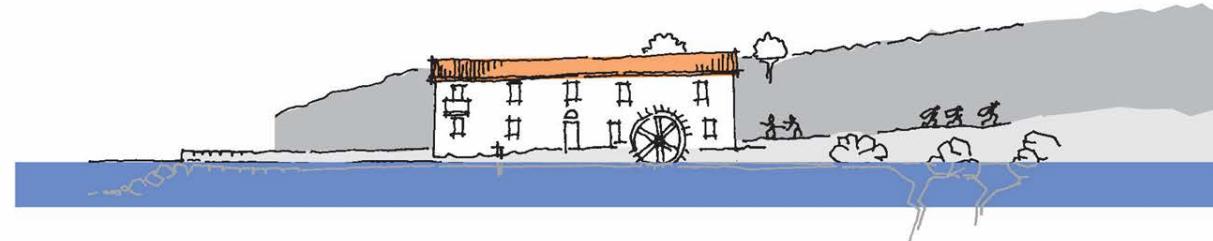
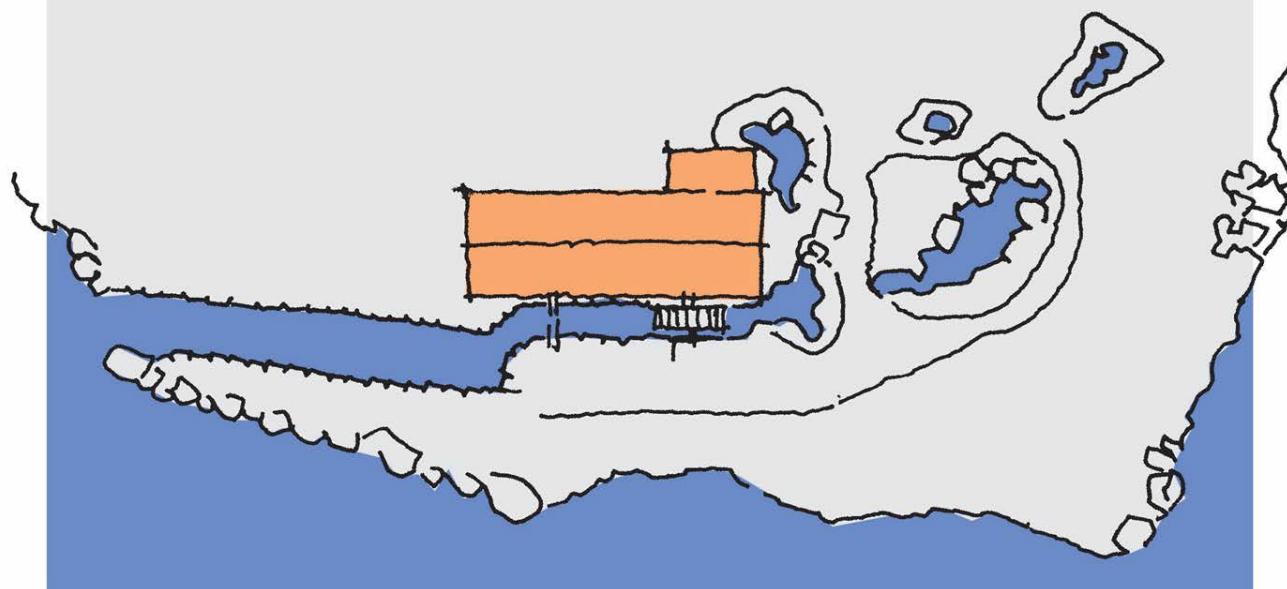
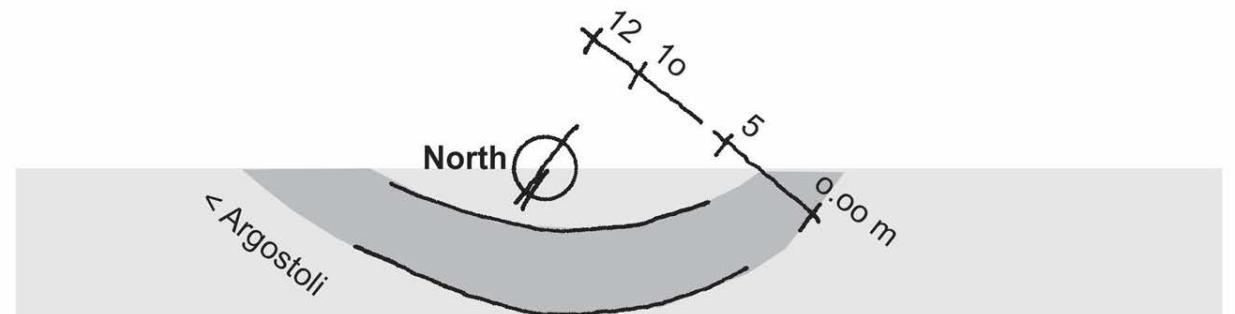
sea level







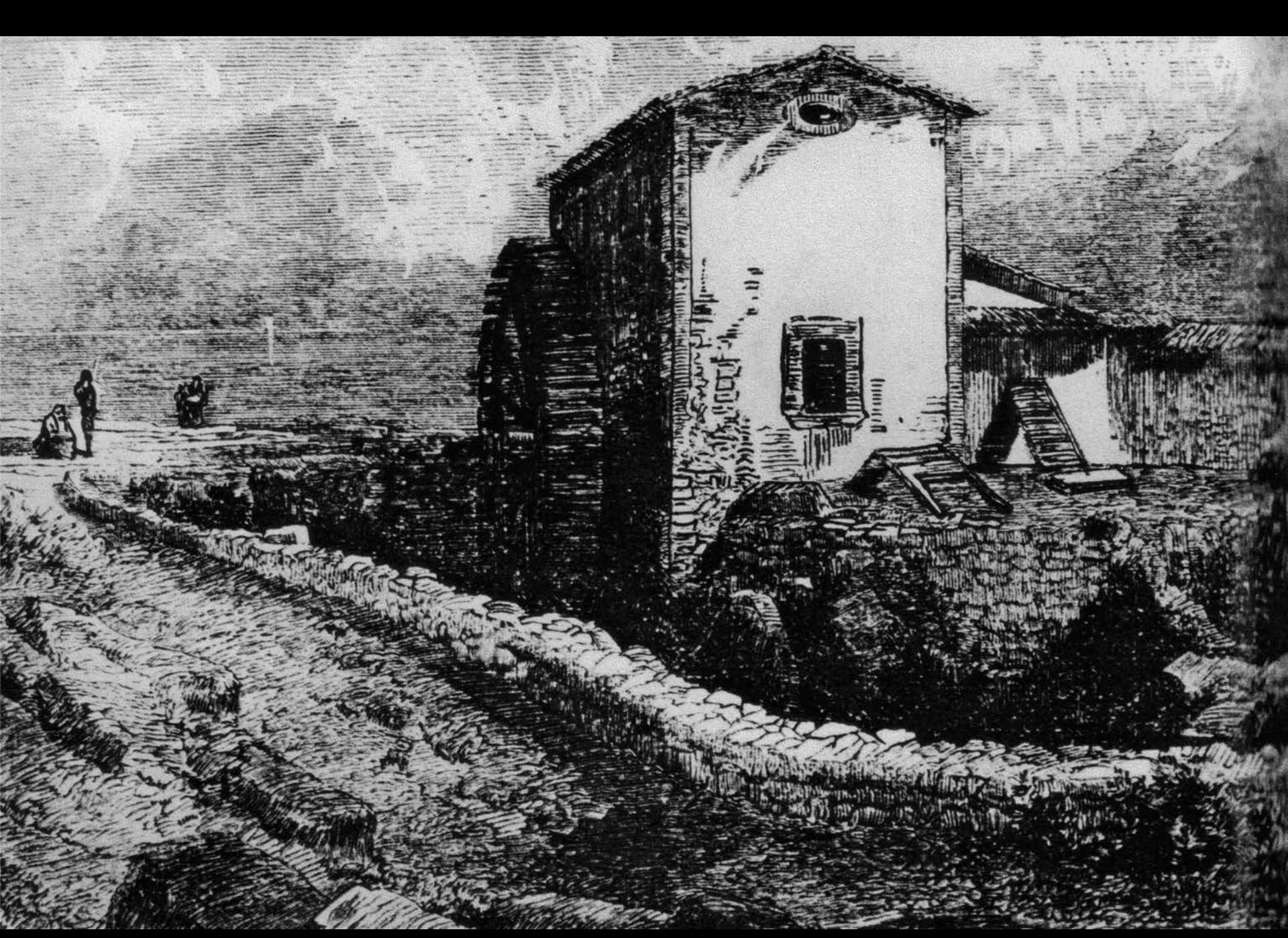


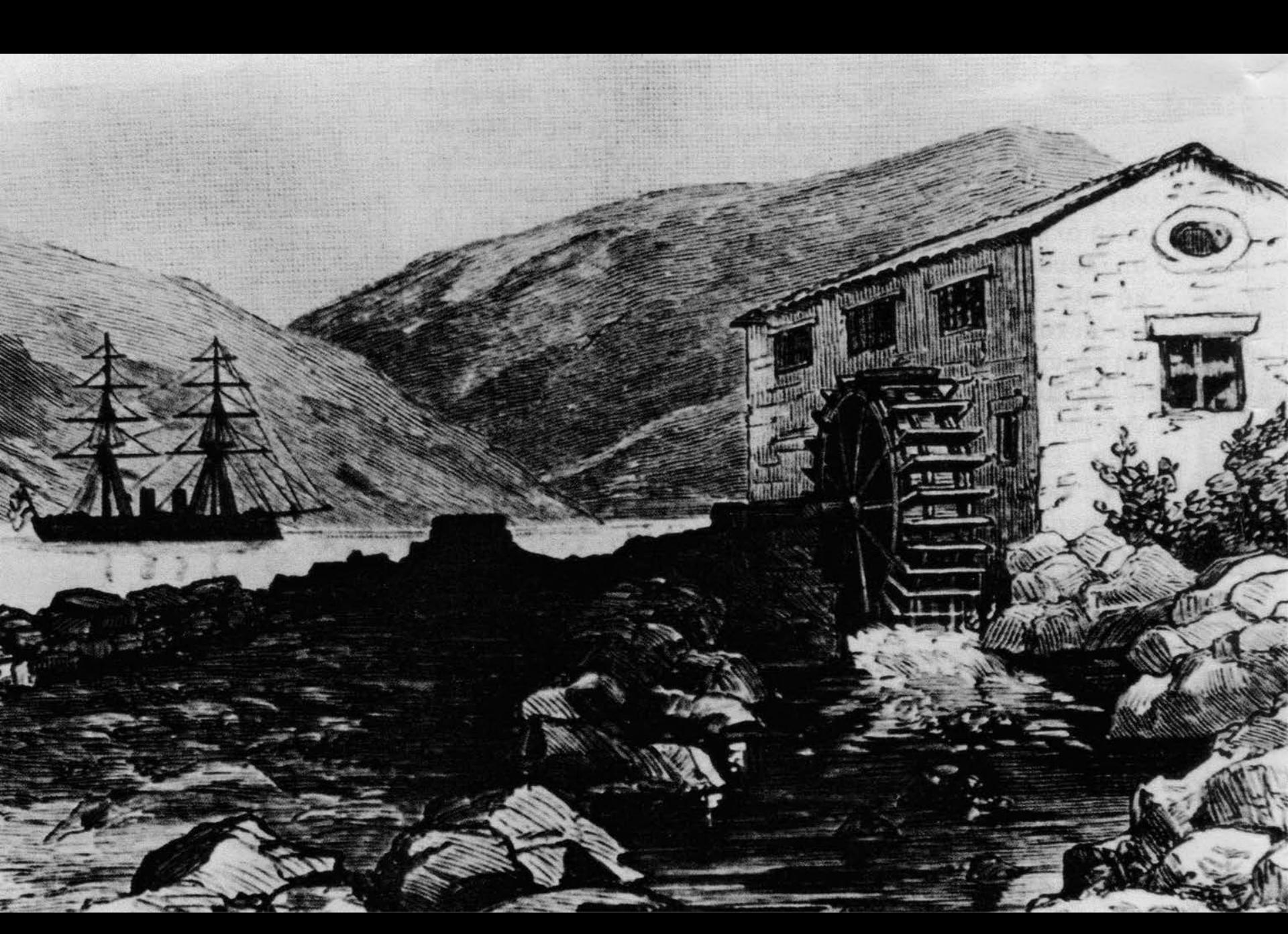


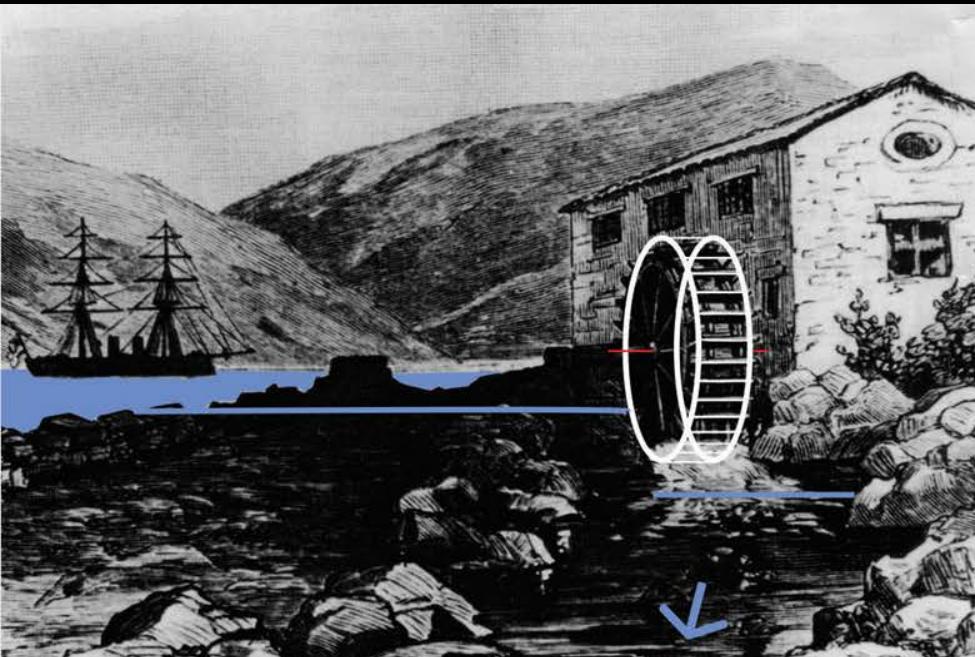


ΜΕΓΑ ΠΕΥΜΑ  
ΑΓΓΕΛΟΥ ΤΡΩΣΤΑ

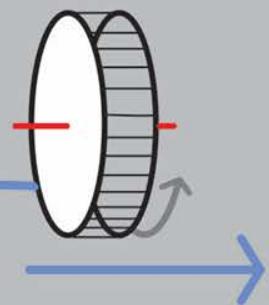








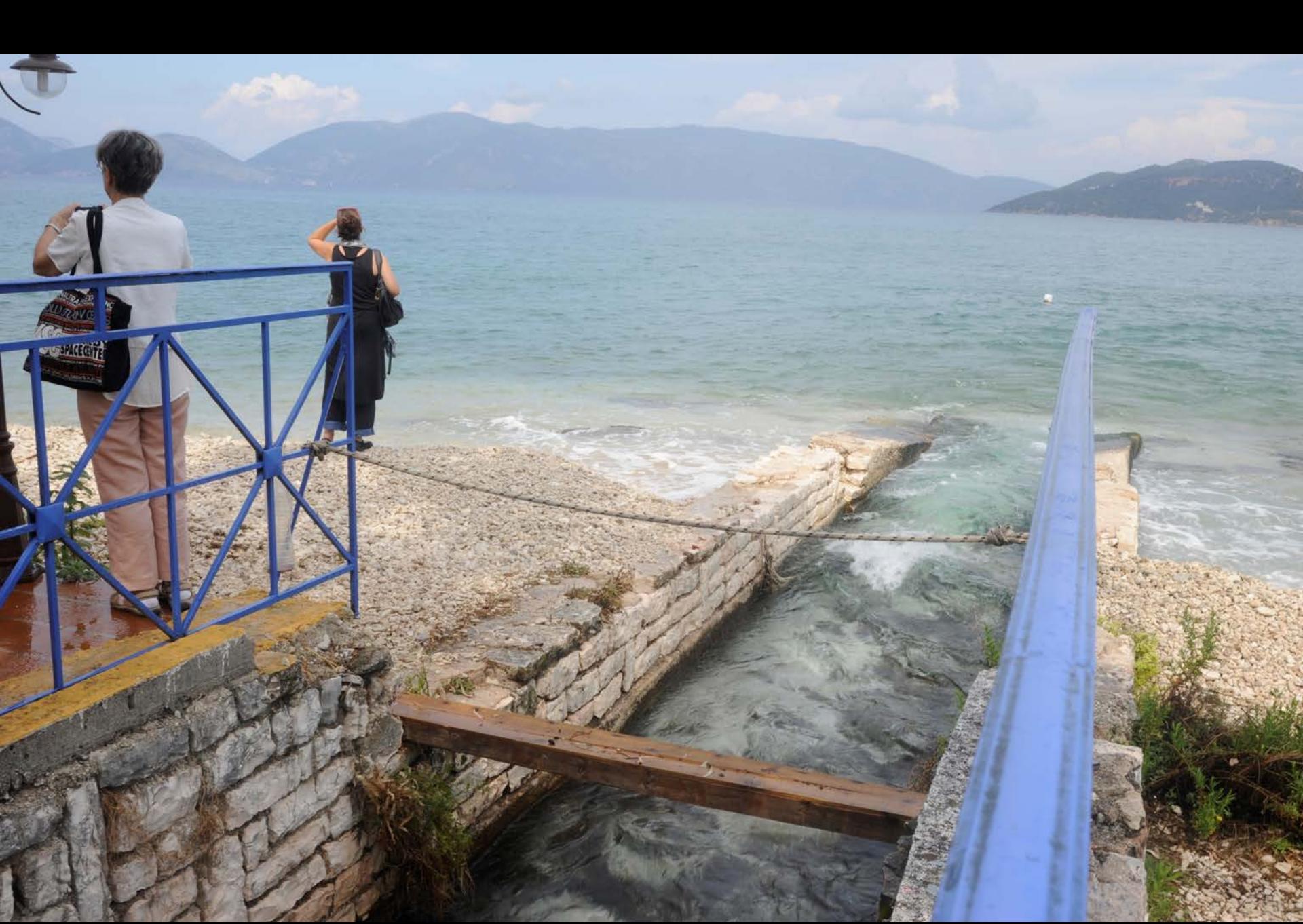
sea level



sink hole >









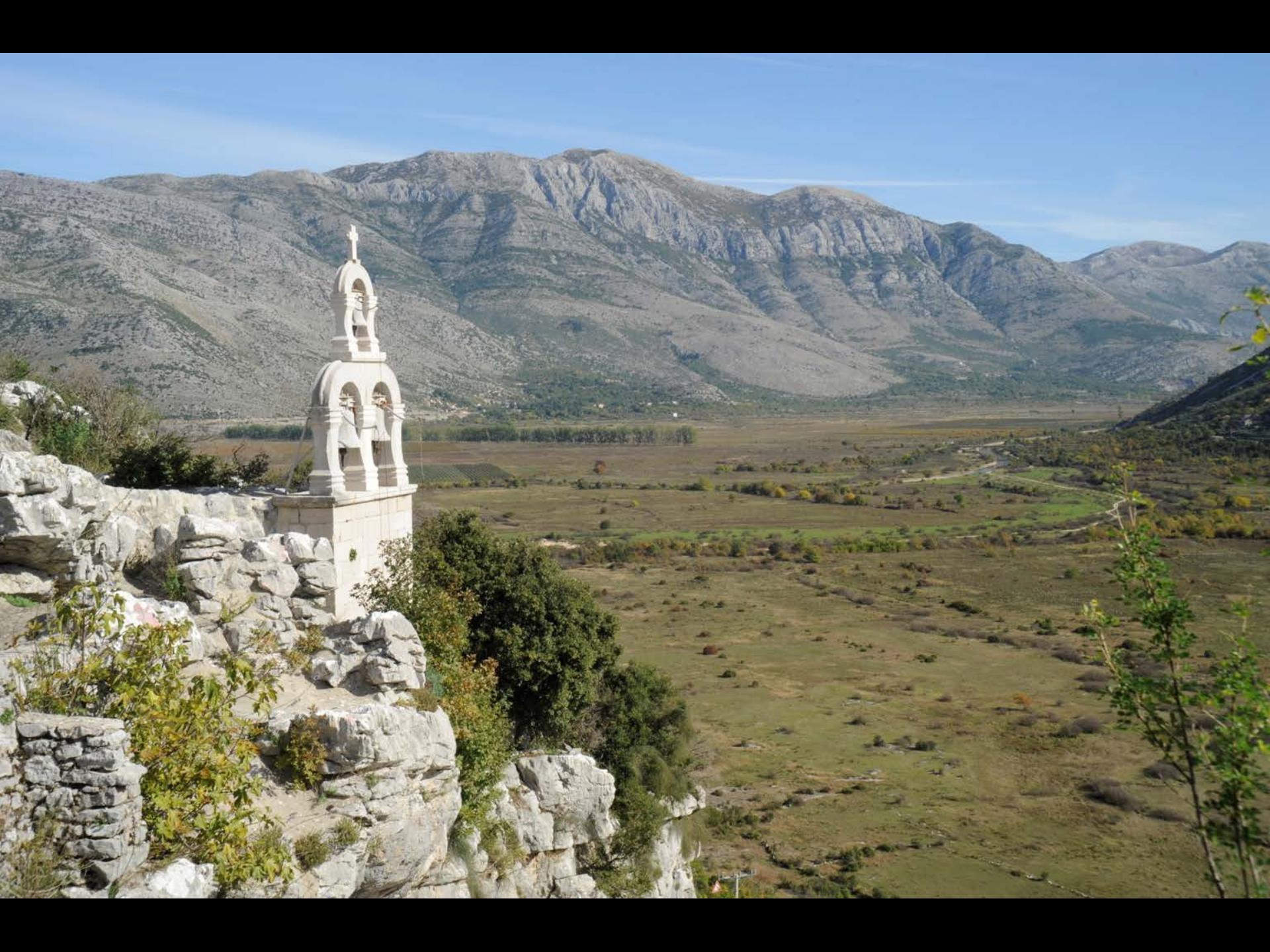
4

**Popovo Polje, BiH**



## Bosna i Hercegovina Bosnia and Herzegovina

- **salaš / corn drying shed**  
Salaš or corn drying shed is an object for drying and storing the corn. It has the stony basement (sometimes used as the cellar) and the gables in stone. Inbetween can be found the wooden construction of the roof, now covered by the clay tiles. Originally covering of the roof was thatched by the straw or reed - the 'guvno' or threshing floor behind the object in Ravno speaks about cereals, not in use today. The side walls are realized in wattle, which stop entrance to the rodents, but it is open to the wind, needed for drying the corn.
- **ponor mlinica**  
Ponor mlinica (mlin) or ponor waterwell, shaft waterwell is an unique system of use the flooding water of the Trebišnjica river. The river overflows all the walley Popovo polje twice a year. The watermill is situated in the stone cylinder, using the water strength on the wooden turbine. Water is then dissapearing into an underground hole (sink, shaft).
- **irrigation wheels**  
Irrigation wheel is the visible part of a pump system, where the system is driven by the river, and water is pumped about five metres higher over the fields. Preserved wheels are today in steel, with the age of approximately one hundred years. They are still in work.





**Bosna i Hercegovina  
Bosnia and Herzegovina**

# **popovo polje**

## **salaš**

1 corn drying shed, Ravno

GPS data:

N 42.53,2171 17.57,8614 on 379 metres above the sea

## **ponor mlinica**

**A** gradually mills on the occasionally stream

1 Ravno

N 42.55,7177 17.56,7086 / 243m

**B** ponor (shaft) mill

1 Melja Međa

N 42.55,7178 17.56,7054 / 241m

2 Poljice Popovo

N 42.49,4563 18.04,6729 / 251m

3 Poljice Popovo

N 42.49,4019 18.04,7528 / 253m

4 Poljice Popovo

N 42.49,3921 18.04,7682 / 253m

5 Poljice Popovo

N 42.49,3772 18.04,6086 / 253m

6 Poljice Popovo

N 42.49,2835 18.05,0816 / 254m

**7 Poljice Popovo, Kusaljevića mlinica**

**N 42.49,2721 18.05,0817**

8 Žakovo

N 42.48,4408 18.07,5614 / 258m

9 Dobromani Zapad / West (

N 42.47,5464 18.08,8988 / 270m

**C** Classical mills with vertical waterwheels

10 Pridvorci 1 and 2 (a complex)

N 42.41,7897 18.19,9641 / 276m

## **irrigation wheels**

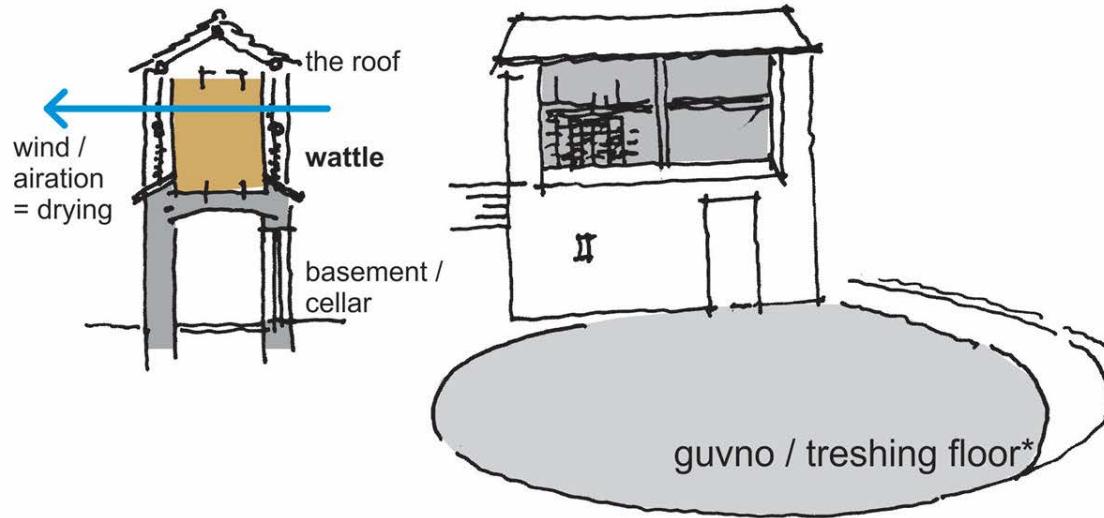
irrigation system for the fields near Trebinje

N 42.42,3084 18.19,2614 / 275m



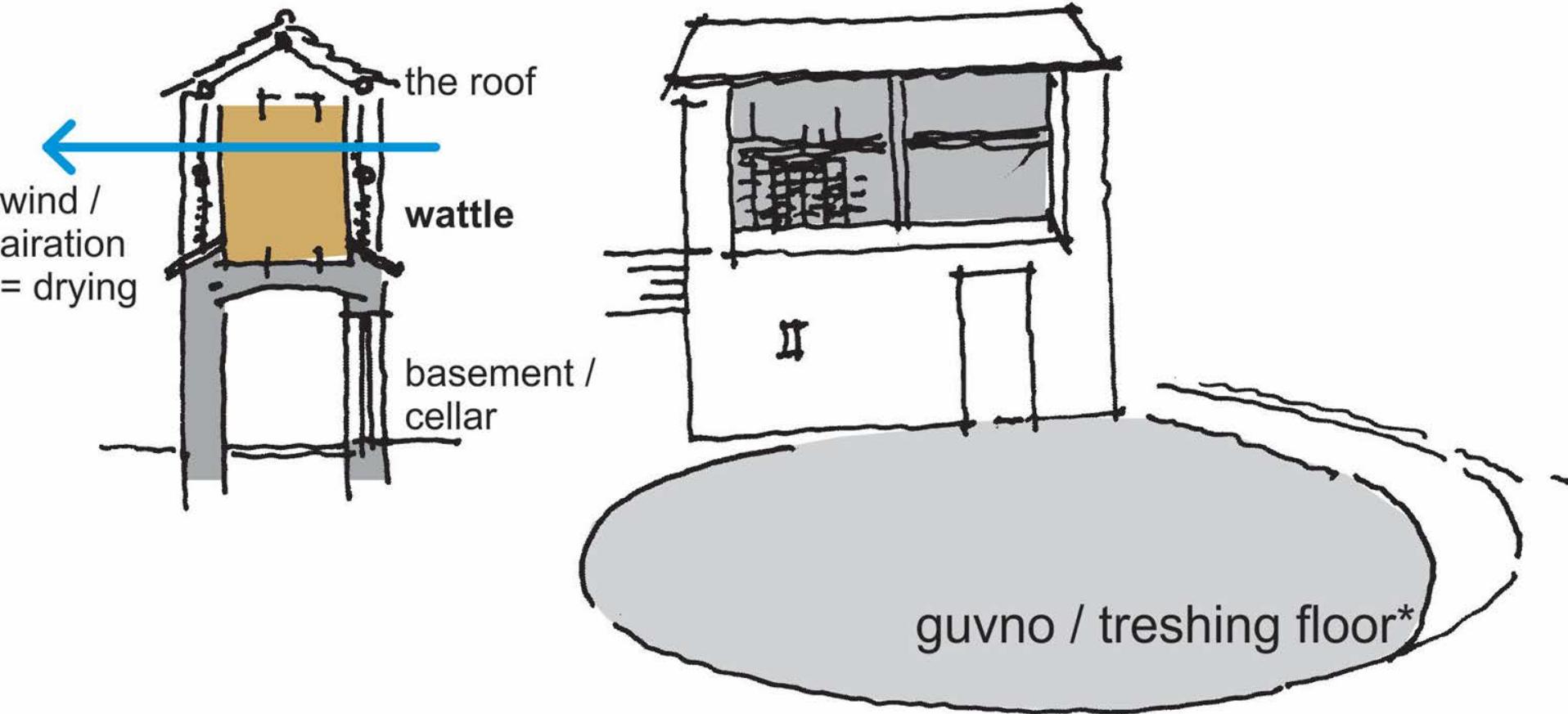
october 2015:

salaš, corn drying shed



cross section

south view

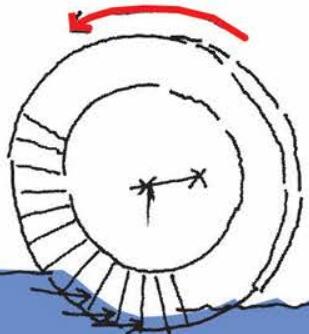


cross section

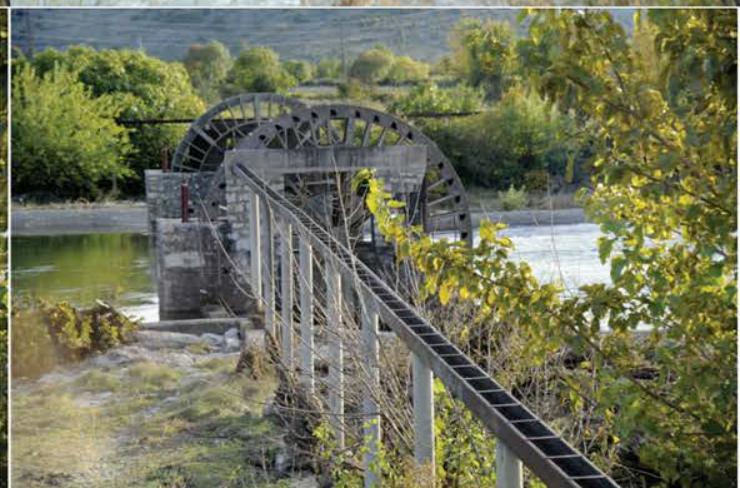
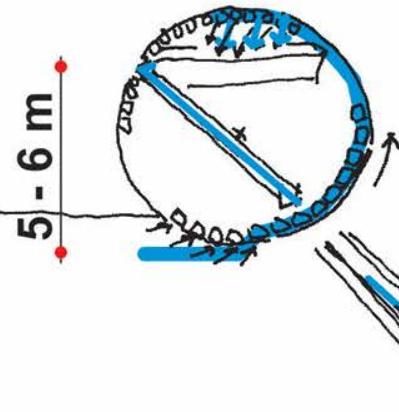
south view

results: **rotation** and **pumping**

using the water power



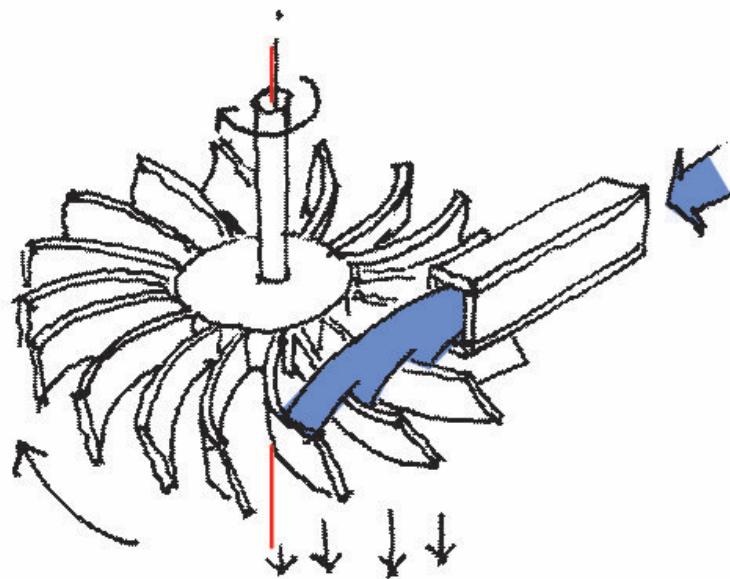
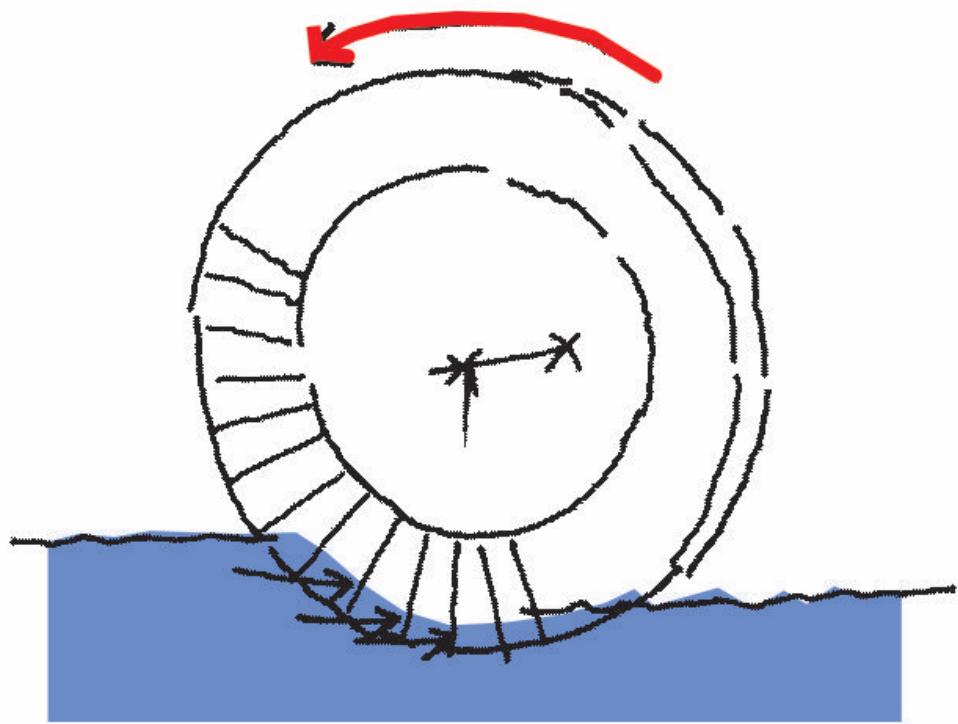
pumping the water



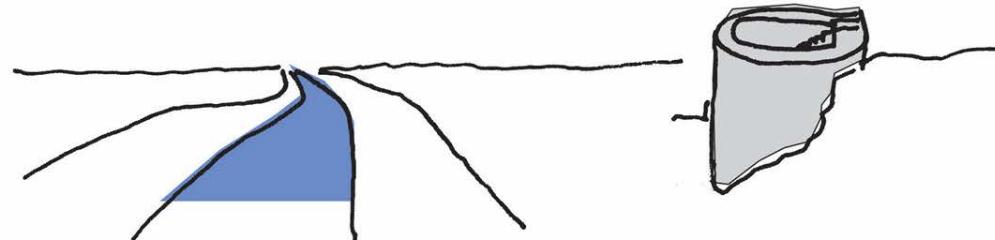




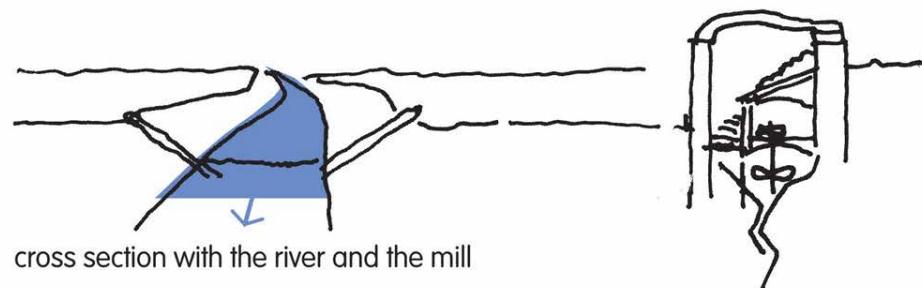




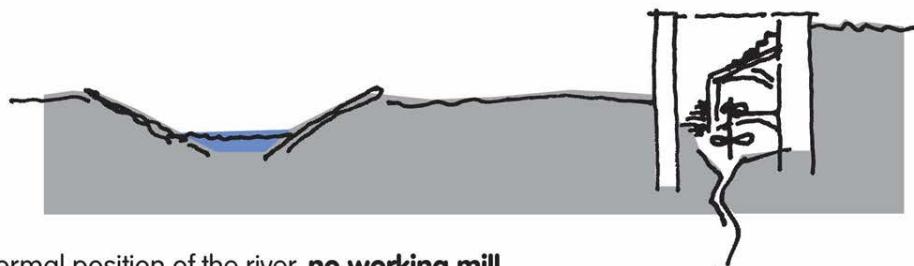




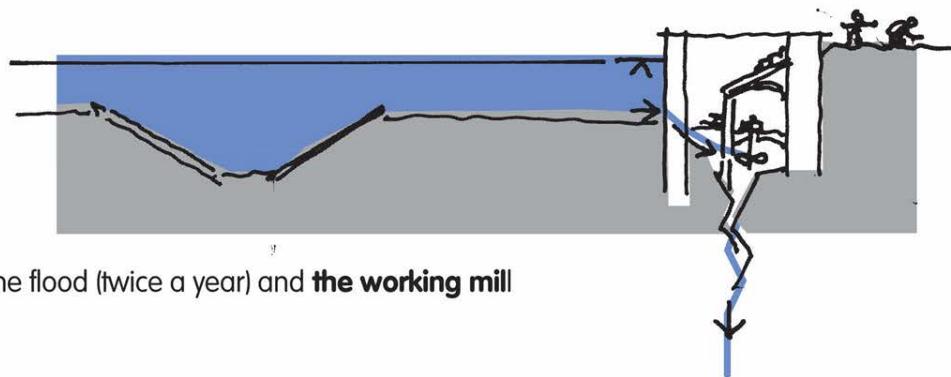
Popovo polje with Trebišnjica river



cross section with the river and the mill



normal position of the river, **no working mill**

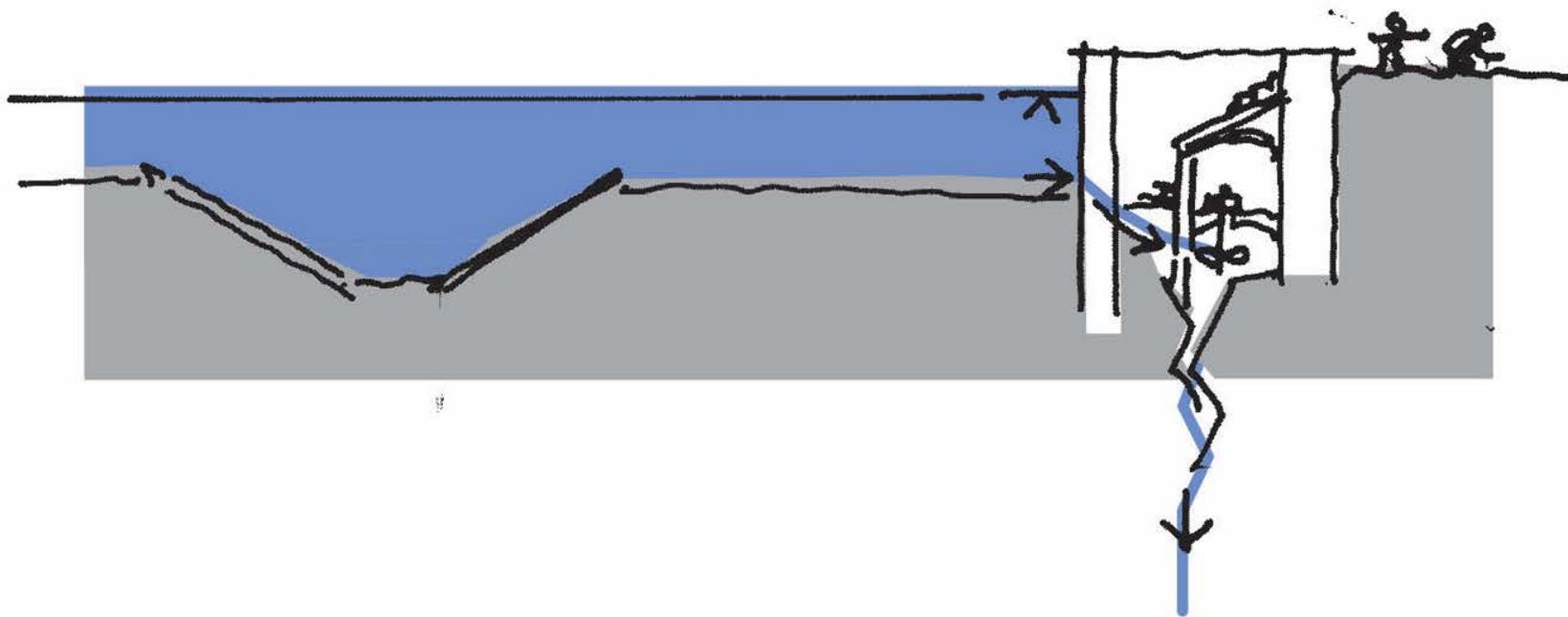


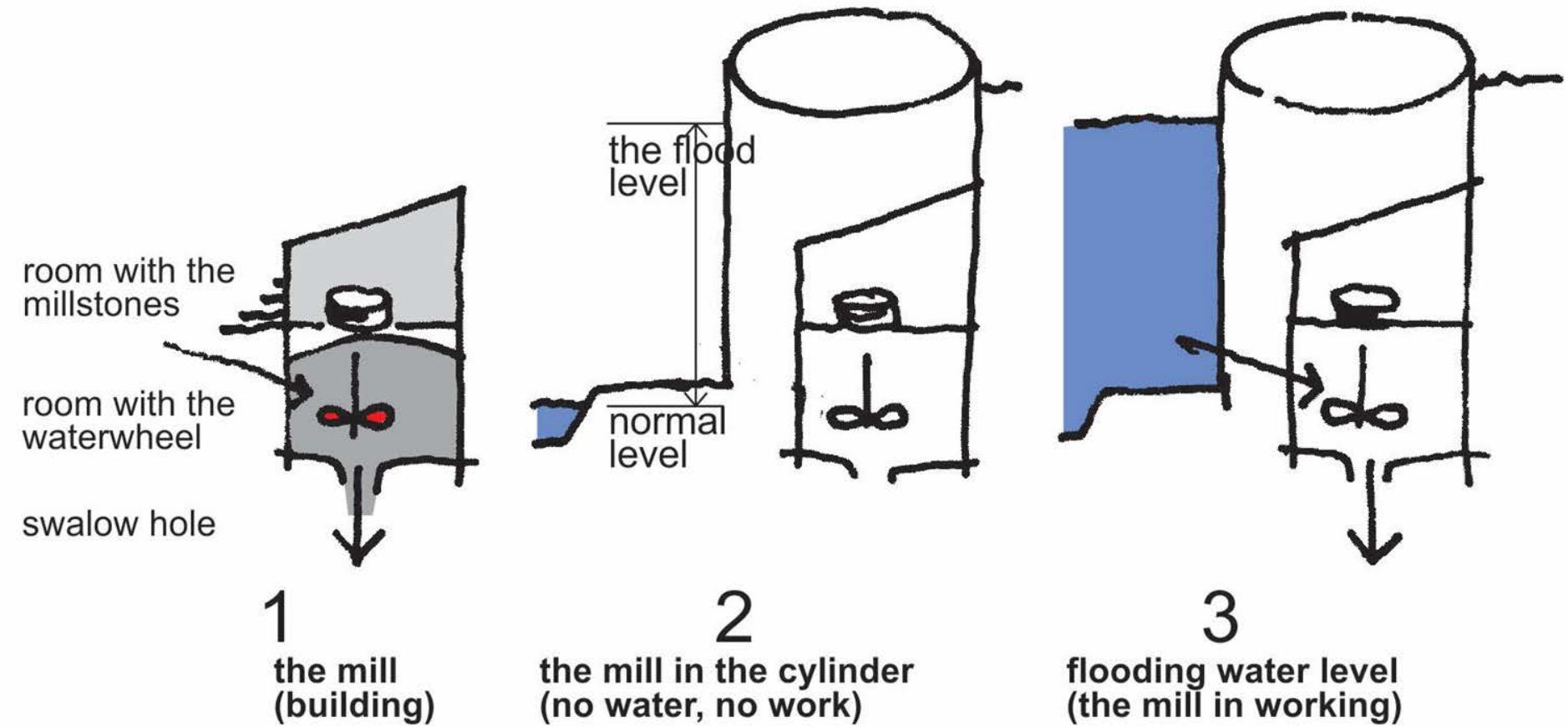
the flood (twice a year) and **the working mill**

1



2





# 1 kusalovića mlin, poljice popovo



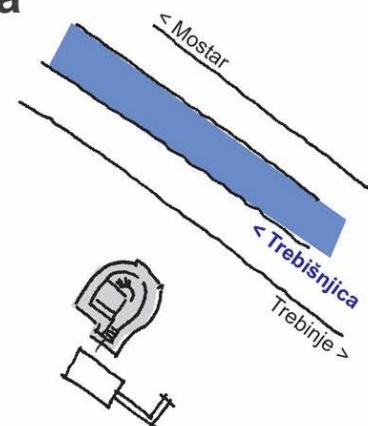
## Bosna i Hercegovina Bosnia and Herzegovina

- ponor mlinica  
Kusalovića mlin  
Poljice Popovo

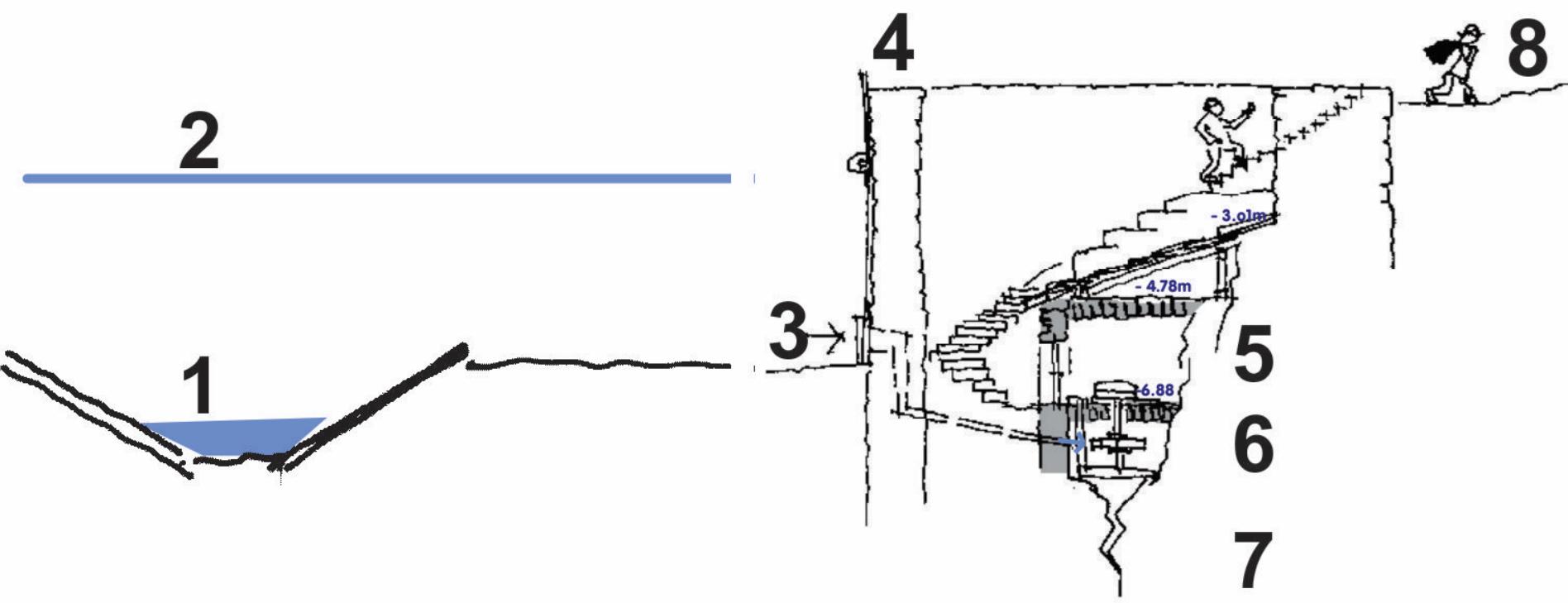
N 42.49,2721

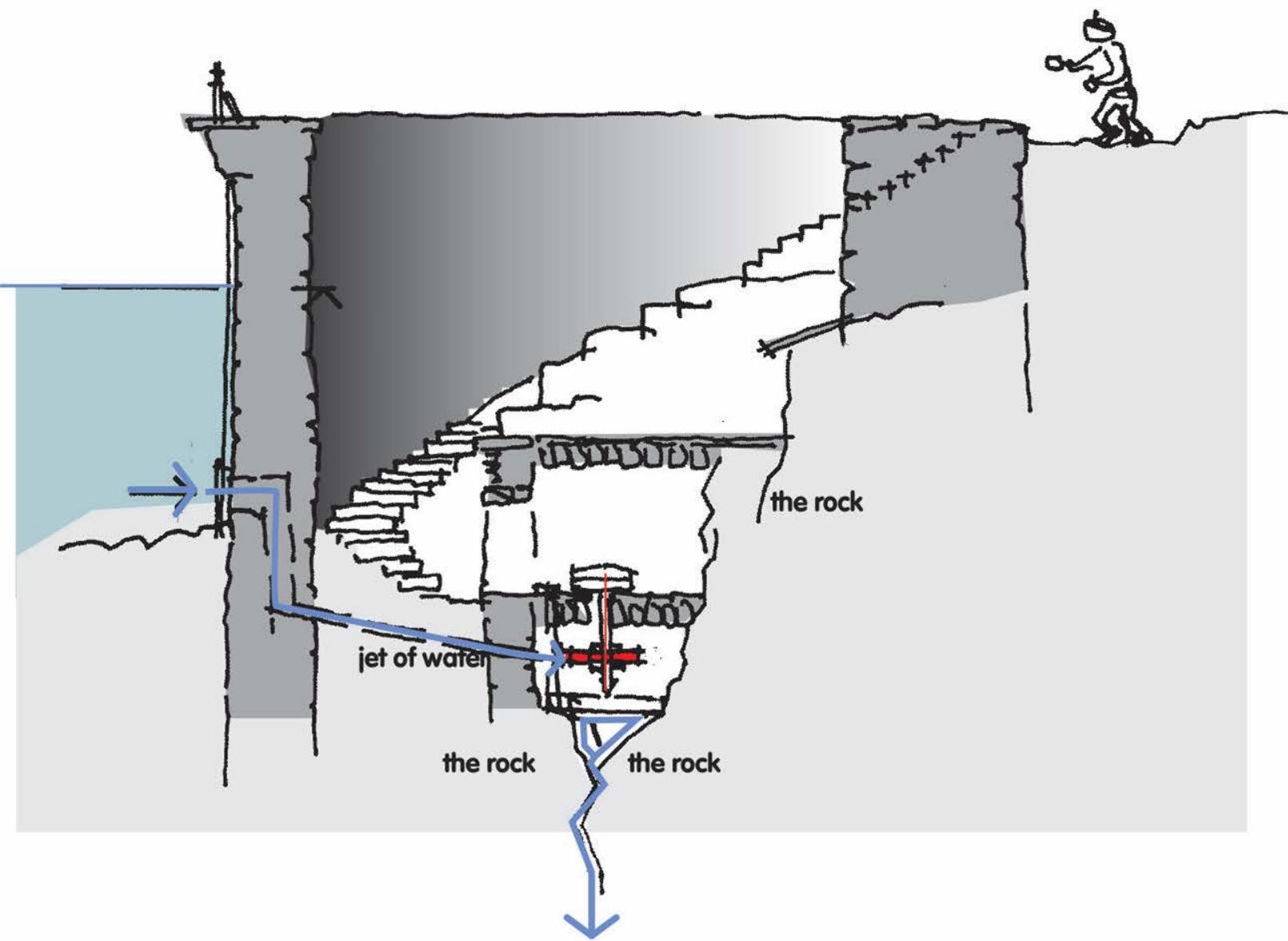
E 18.05,0817

255 m above the sea

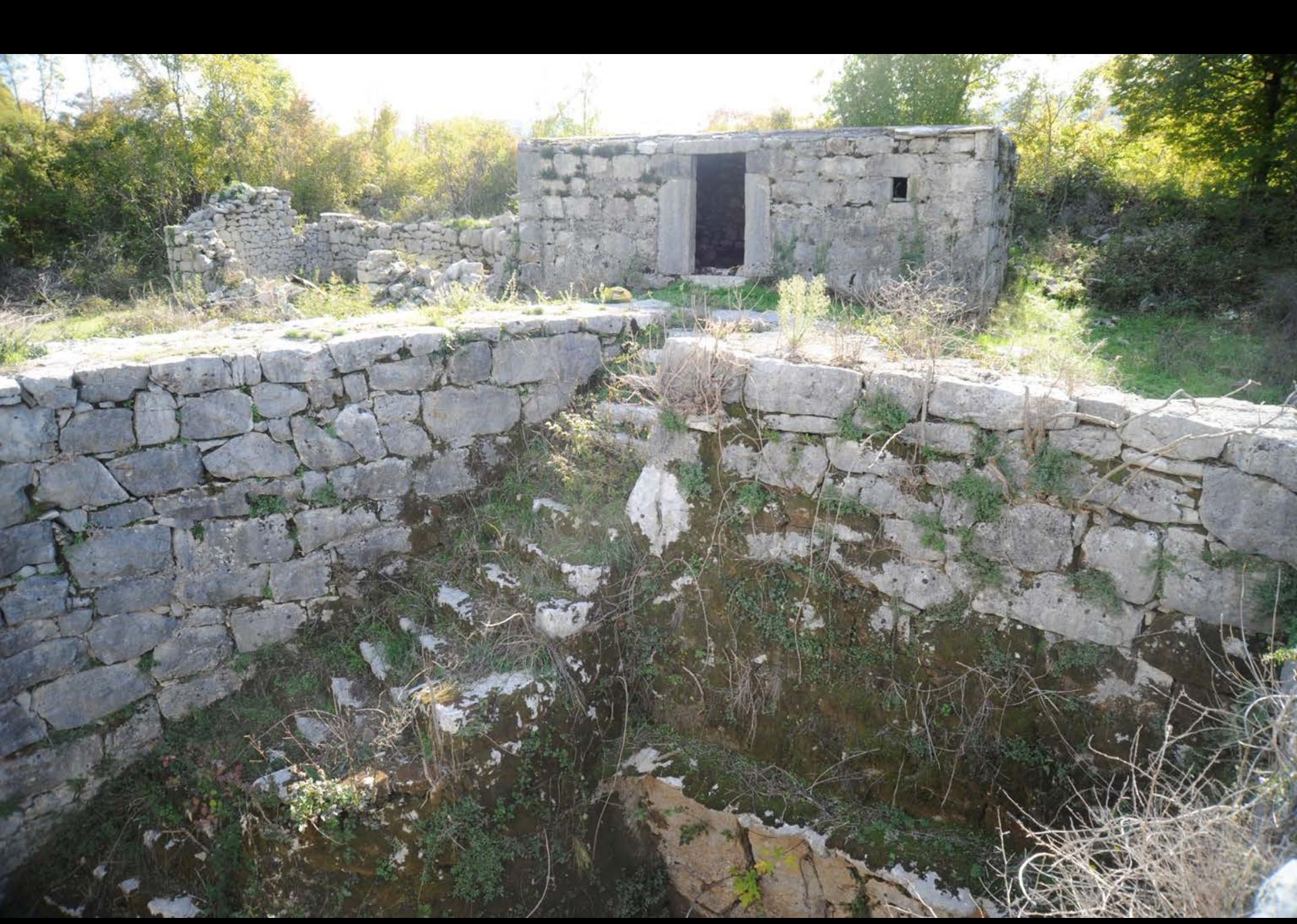










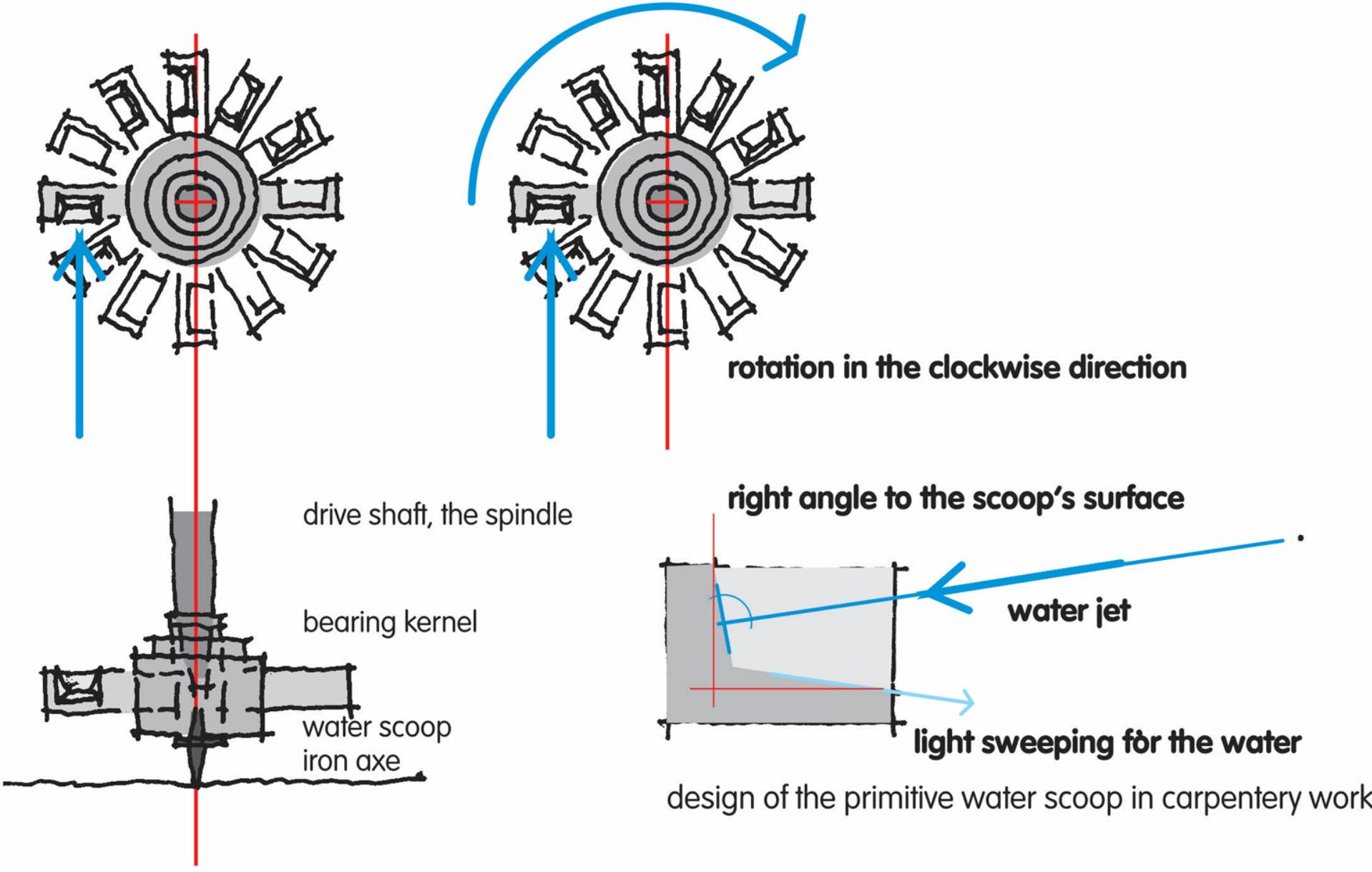






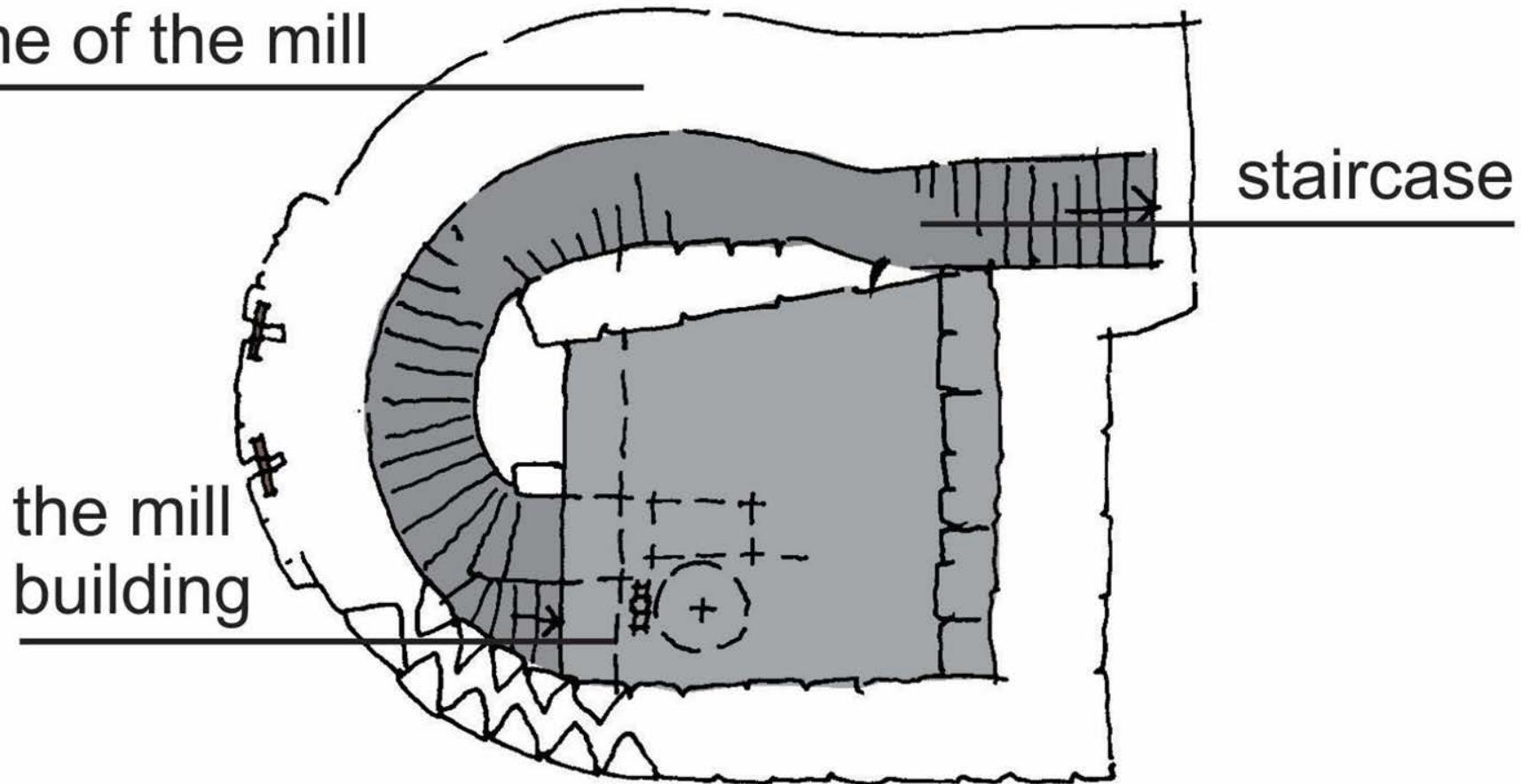


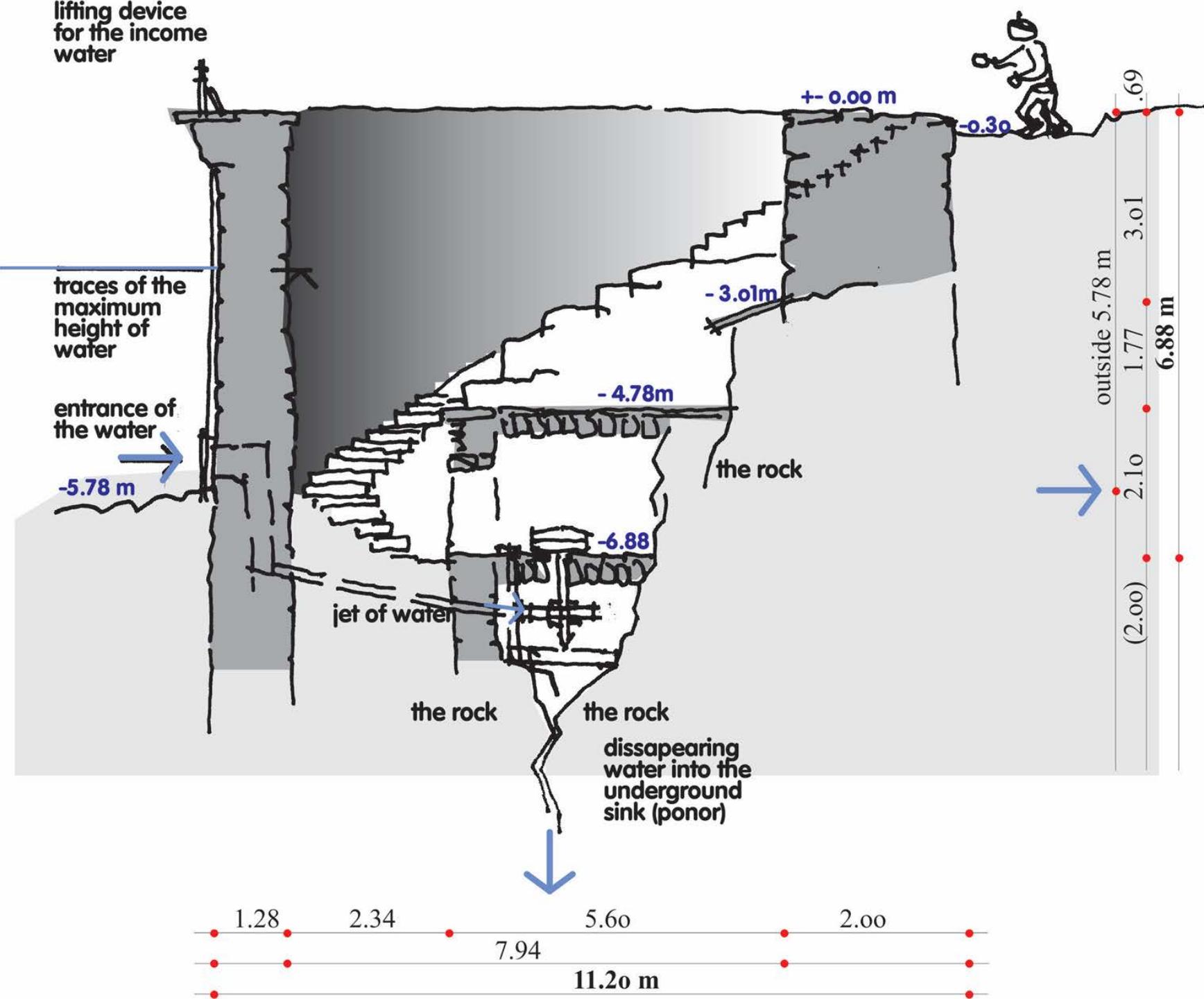
## Principle of the turbine work



somewhere can be found the iron hoop around the wooden scoops: at Žakovo did not exist or it dissapeared

cylinder  
frame of the mill





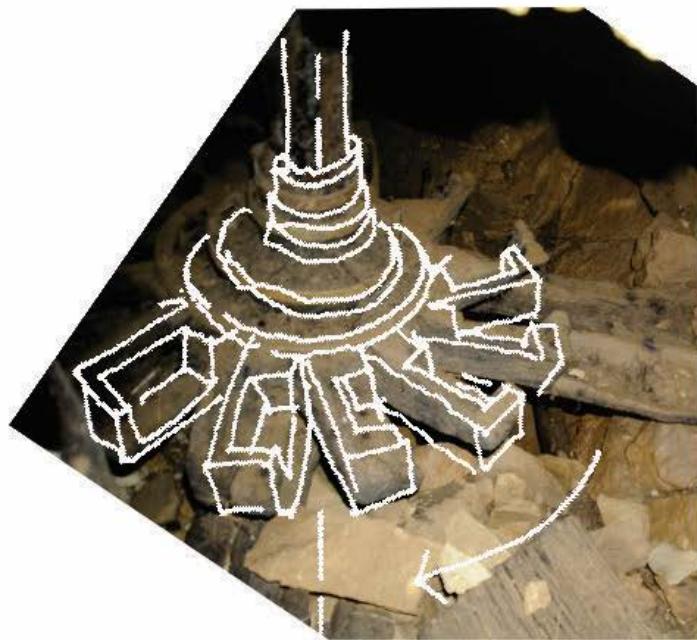
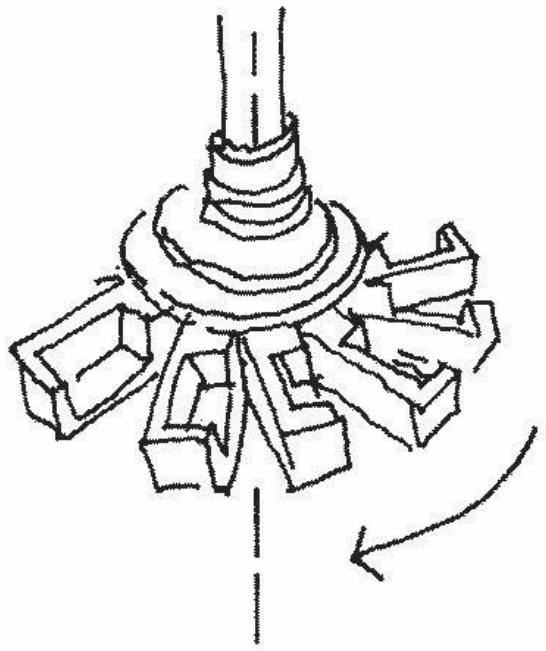
















5

današnja upotreba

## Marfa Ridge (Red Tower)

reconstructed inspection opening of the  
shaft,  
found in 2013



reconstructed water basin / reservoir  
into the covered object,  
found in 2013

photo 1996



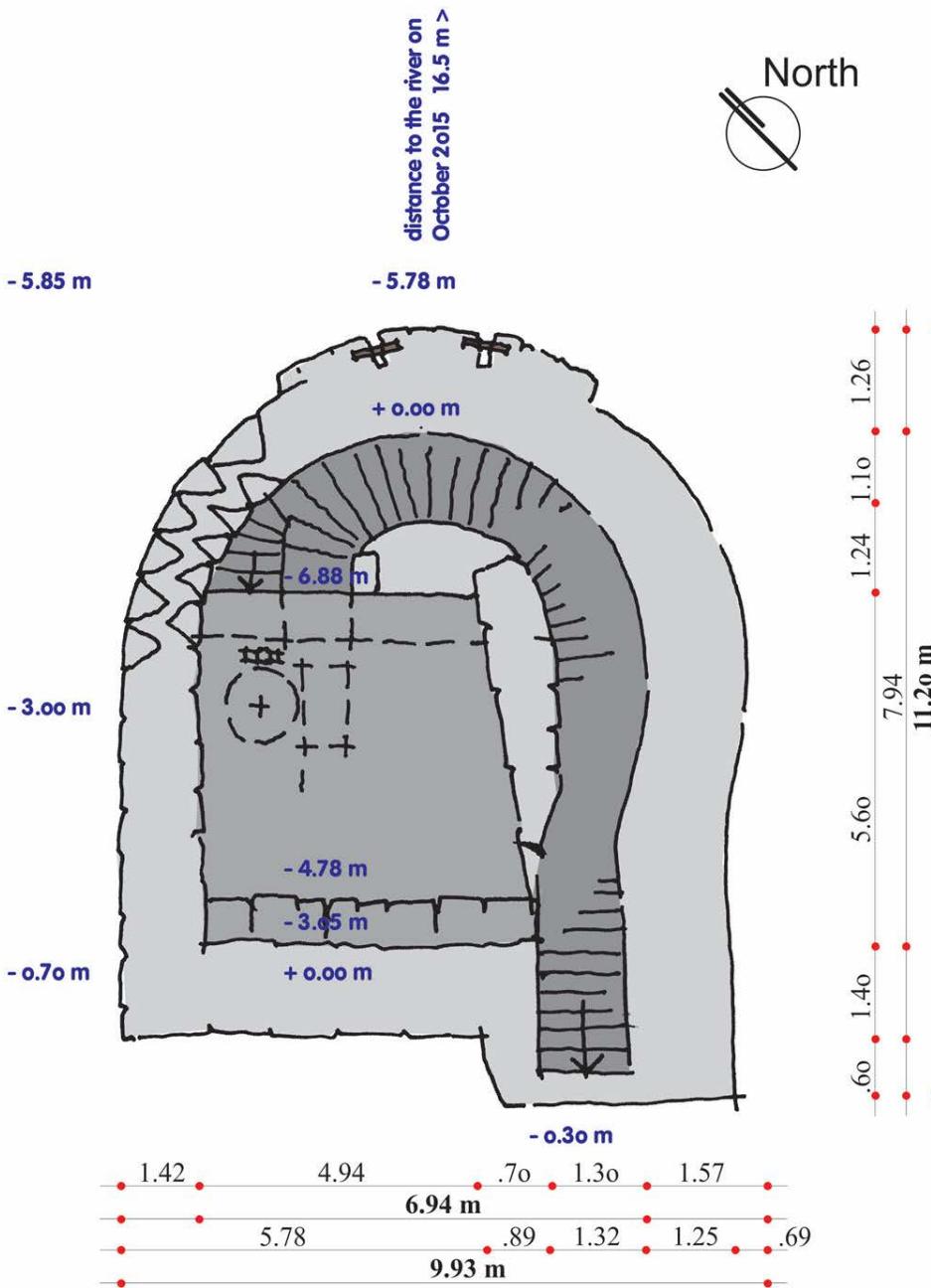
photo 1996



photo 1996

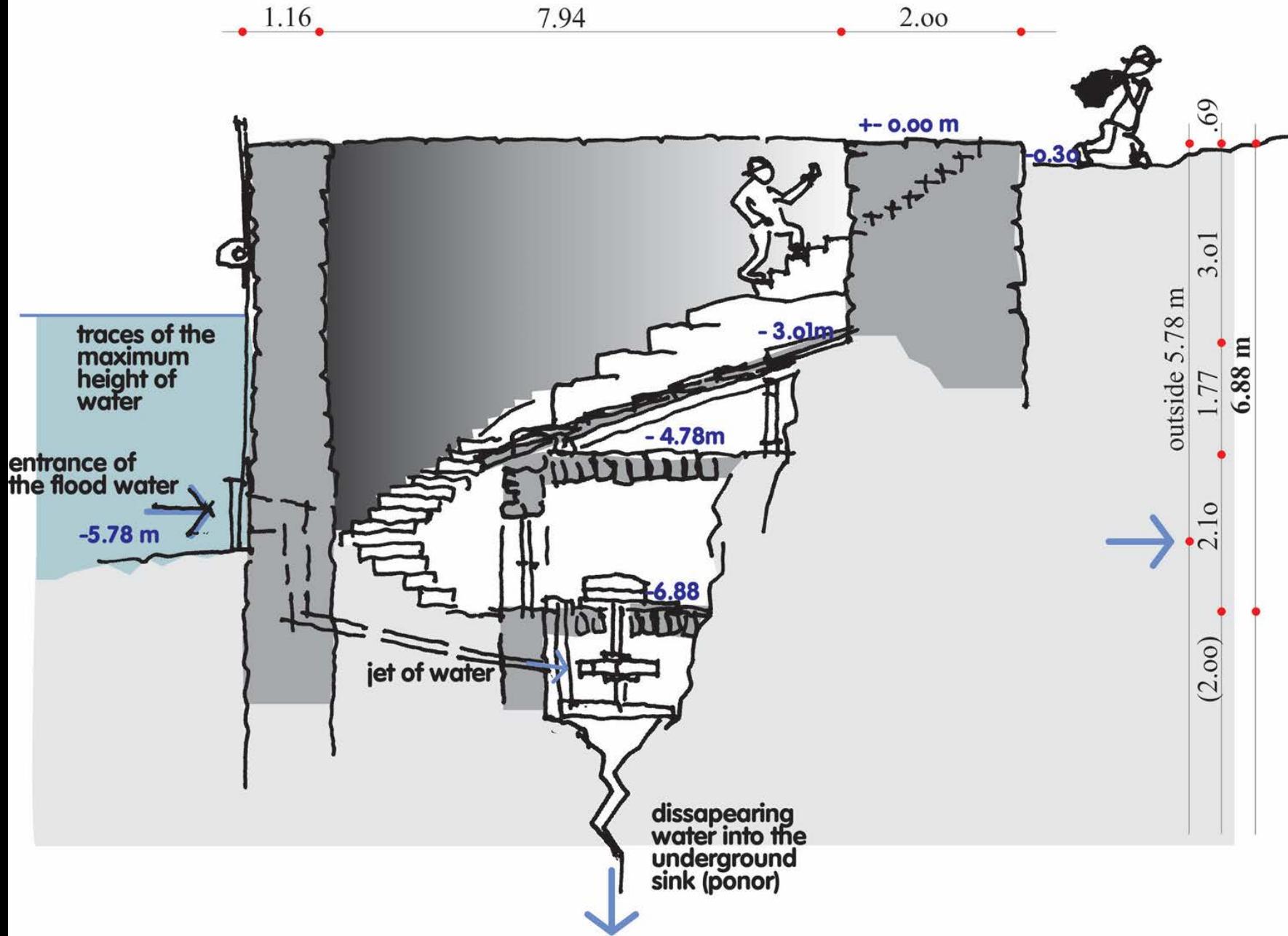
october 2015:  
groundplan

# 1 kusalovića mlin, poljice popovo



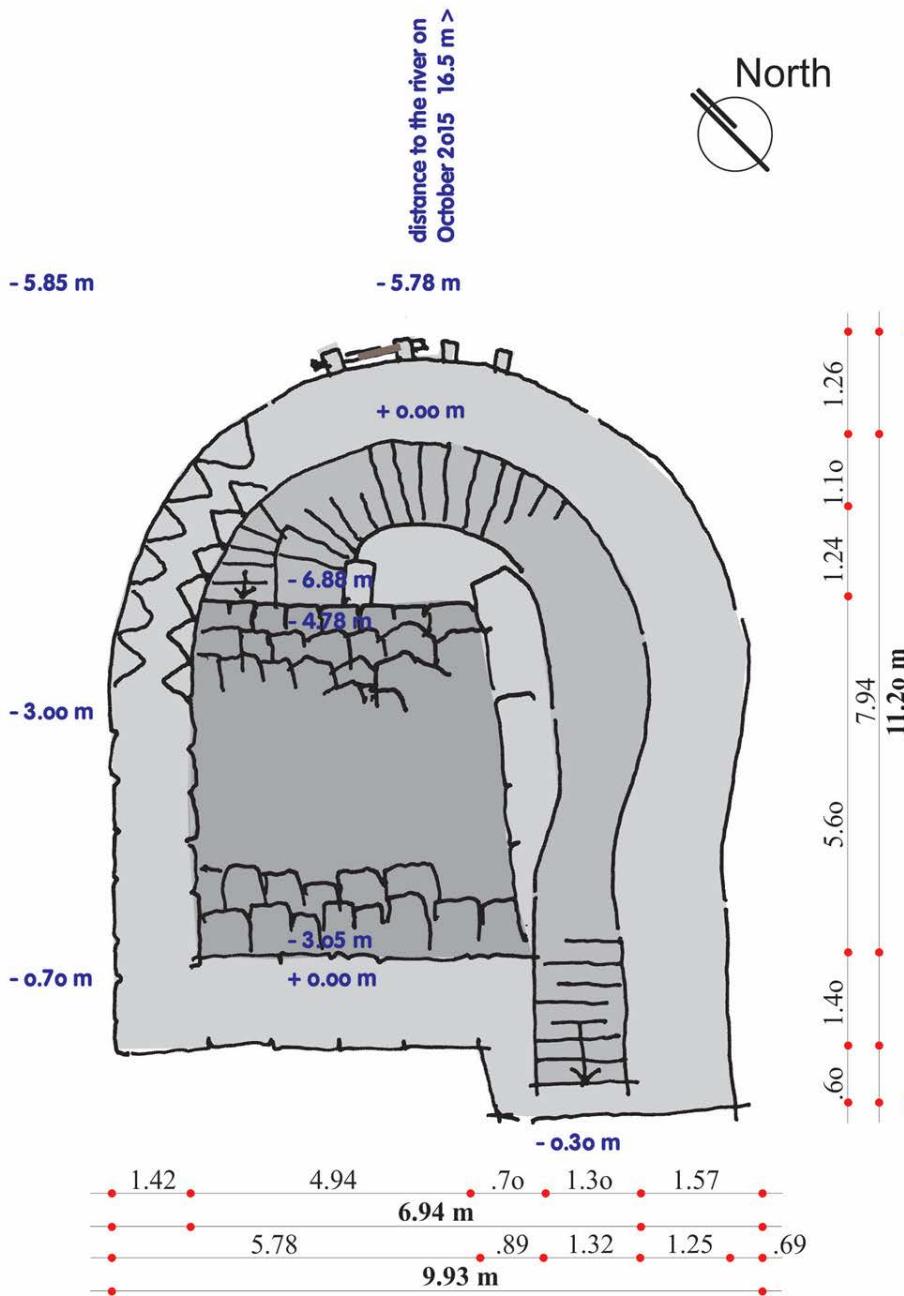
reconstruction:  
cross section

# 1 kusalovića mlin, poljice popovo



reconstruction:  
groundplan

# 1 kusalovića mlin, poljice popovo







6

mogučnosti



borut juvanec, ljubljana university SLOVENIA

### 1 kusalovića mlinica

ICOMOS Bosnia and Herzegovina

) waterwell is unique system of using water. Popovo polje is the  
ral, karst sinks, but the river Trebišnjica flows twice a year all the  
e water increases for five to six metres.  
e only solution, as told unique and brilliant invention of  
z 2015 abandoned, mostly ruined, hard to find, to see and to  
e deserve to be rescued from the silence, preserved, researched and

showed to the both professional and laic public, as the jewel of the heritage in Bosnia and Herzegovina.

supervised by: prof dr Maja Rado Popovac, Univerzitet u Mostaru, Mostar

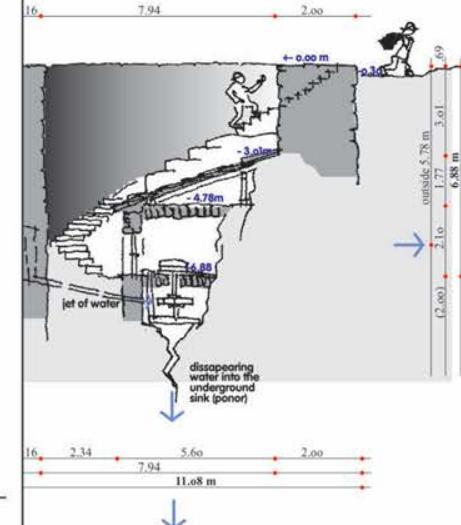
borut juvanec, ljubljana university SLOVENIA

4

### kusalovića mlinica, poljice popovo



### 1 kusalovića mlinica, poljice popovo

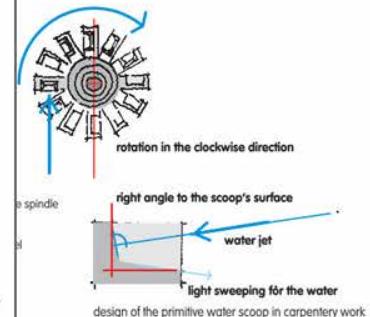


borut juvanec, ljubljana university SLOVENIA

### ponor mlinica, ponor (shaft) mill october 2015:



ight riverbank of the Trebišnjica river



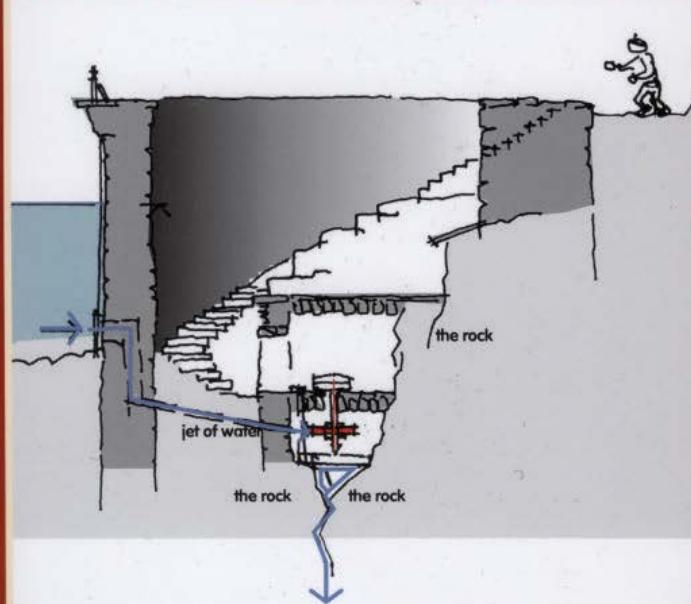
somewhere can be found the iron hoop around the wooden scoops: of Žakovo did not exist or it disapeared

photo October 2015

borut juvanec, ljubljana university SLOVENIA

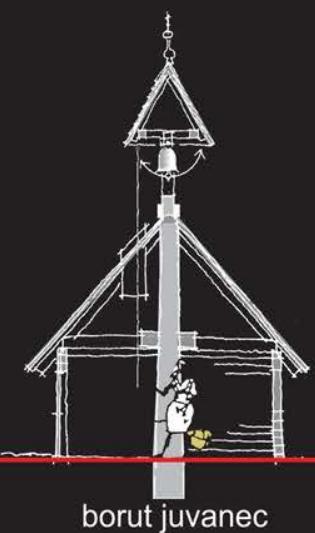
10

# ACTA CARSOLOGICA



45/3 • 2016





borut juvanec

# belfry

andreja benko

exhibition, razstava, kiállítás, ausstellung

Ljubljana University, Faculty of Architecture  
 Univerza v Ljubljani, Fakulteta za arhitekturo  
 Ljubljana

Institute of Vernacular Architecture  
 Institut vernakularne arhitekture  
 Ljubljana

the high patronage:  
 Her Excellency Ms Ksenija Škrlec, ambassador of Slovenia in Budapest  
 His excellency Mr Vladimir Gasparić, ambassador of Slovenia in Belgrade

Marking is one of the oldest visible records of the living world. Signs give stress to a space: marking, guiding, reminding or honouring. They are two-dimensional reminders and spatial constructions and a belfry inserts a new dimension: sound.

The original belfries were constructions of wooden pillars, which raise the bell and enable maximum efficiency, audibility. Wooden belfries are simple, the pillars are supported by stays and they thus open the possibility of closure, which brings a new quality: an enclosed space. And it is illogical that a simple foundation of beams defines an octagonal and a more demanding basic construction a square.

Belfries in the northeast of Slovenia, a part of Austria and central part of Hungary typify mostly the Evangelical culture, as is confirmed by their modest construction. These belfries are not church architecture; they are village property managed by the owners of the land on which they stand. They marked morning and the completion of work, noon and evening. The setting up of village belfries independent of the church and managed by the laity in Pannonia is a unique phenomenon of the development of the primary form of society and the common life of the village community in this part of Europe. This is also the most important element, which unify Slovenia, Austria and Hungary.



exhibition in Pécs 2016  
 exhibition in Budapest 2016



[borut.juvanec@fa.uni-lj.si](mailto:borut.juvanec@fa.uni-lj.si)

[andreja@ymail.com](mailto:andreja@ymail.com)

## belfry holzglockenturm zvoník

1	Pince / Pince SI	41	Nemesmedves HU	83	"Radmožanci SI
2	Genterovci / Gónlerháza	42	Csonkahegyhát 1 HU	84	"Mosiš / Hidegvölgy SI
3	Kamovci / Kámáháza SI	43	Csonkahegyhát 2 HU	85	Filovci SI
4	Nemesnép HU	44	Szilvág HU	86	"Brezovica SI
5	Pordašinci / Kisfalú SI	45	Pórszombat HU	87	Ižakovci SI
6	Selo SI	46	Kozmadombjai HU	88	Bratonič SI
7	Ratkovci / Rátkalak SI	47	Alsószentéterzsébet HU	89	Lipovci SI
8	Ivanjeveci / Jánosfa SI	48	Felsőszentéterzsébet HU	90	Donji Staveči SI
9	Domanjeveci /	49	Magyarfold HU	91	Bokráci kat. SI
10	Domonkosfa SI	50	Gödörháza HU	92	Baktúros HU
11	Szomoróci / Somorovci	51	Márokföld HU	93	Prosenjakovci /
12	Šalovci / Salls SI	52	Külsősárn HU	94	Pártosfalva SI
13	Bajánsenye HU	53	Lendvadedes HU	95	Bajánsenye HU
14	Pankasz HU	54	Łovászi HU	96	Felsőszentéterzsébet 2 HU
15	Farkasfa HU	55	Hohenbrugg AT	97	Lenti hegy HU
16	Orfalu / Andovci HU	56	Oberdrosen AT	98	Lenti Bárszentmihályfa HU
17	Kétvolgy / Dve dolini – (Verica – Ritkarovci) HU	57	Kőberreck AT	99	Lentiszombathely HU
18	Ociniye SI	58	Trdková SI	100	Hernýek HU
19	Zalabaksa HU	59	Sebeborci SI	101	Felső-hegy HU
20	Zalabaksa Cup HU	60	Lasztonya HU	102	Nova Zagorica HU
21	Ramocso HU	61	Lispesztendorján HU	103	Barlahtida HU
22	Kerkáspolna HU	62	Kányavár HU	104	Szentkozmadombja HU
23	Boreča SI	63	Páka – Dörmefölde HU	105	Lickovadamos HU
24	Sotinics breg (Kugla) SI	64	Kerkateskánd HU	106	Oroklán HU
25	Dolina SI	65	Kissziget HU	107	Vakola HU
26	Dolič SI	66	Banuta	108	Barszentmihály 2 HU
27	Mala Subotica CRO	67	Neumarkt an der Raab AT	109	Salomfa HU
28	Gerersdorf (museum) AT	68	Dürnbach AT	110	Felsőjanosfa HU
29	Schallendorf bei St. M. AT	69	Ženavljie SI	111	Orimagyarođ HU
30	Etzersdorf – Rollsdorf	70	Magyarsombatta HU	112	Zalaszentjakab HU
31	Szentpéterfölde HU	71	Dolga vas / Hosszuvala SI	113	Bohonye HU
32	Lenti – Mumre HU	72	Budinci SI	114	Antalszalas HU
33	Daraboshegy HU	73	Panovci SI	115	Somogypáti HU
34	Gutorföde HU	74	Kančevci SI	116	Kacsota HU
35	Mikekarácsónya 1 HU	75	Mačkovci SI	117	Cserdi HU
36	Mikekarácsónya 2 HU	76	Prosečka vas SI	118	Manfa HU
37	Rónók / Radling 1E HU	77	Kovačevci SI	119	Bodolyáber
38	Rónók / Radling 2W HU	78	Vidonci SI	120	Kapováros iskola HU
39	Jakabháza HU	79	Szajártóháza HU	121	Szenia HU
40	Baglad HU	80	Bokráci SI	122	Csode HU
41	Cseszreg HU	81	Lentikápolna HU	123	Felsőjanosfa HU
42	"Ivanci SI	82	"Ivanci SI		

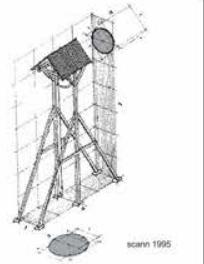
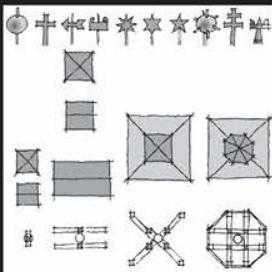
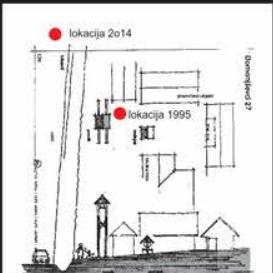
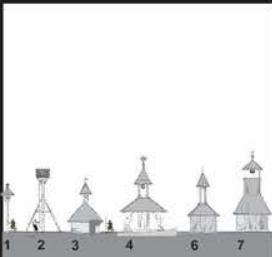
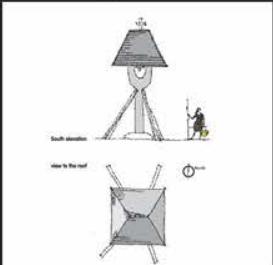
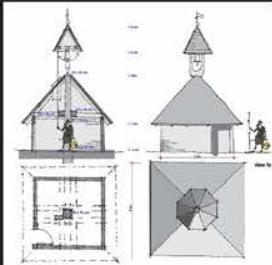
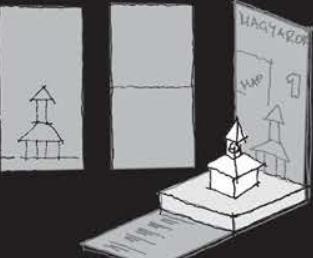


# EXHIBITION

contents:

8 models 1:50  
15 techn. plans 50x50  
50 photos 50x50  
in total 65 plates 50x100  
and 16 plates 30x60  
15 photos details 1ox10  
text in :

HU / SLO / GER / ENG



the bell in Szentpéterföld HU, working  
Felsőszenterzsébet HU



### Borut Juvanec

Professor, PhD, architect on Ljubljana University. His main fields are theory of architecture, origins, and vernacular architecture. Author of 15 books on vernacular architecture, and scientific articles wide the world. Member of ISIS – Symmetry Melbourne, CIAV Paris, ARTE Caceres, Pedra seca Barcelona, ICOMOS (expert member of International scientific Committee for Vernacular Architecture) Paris.

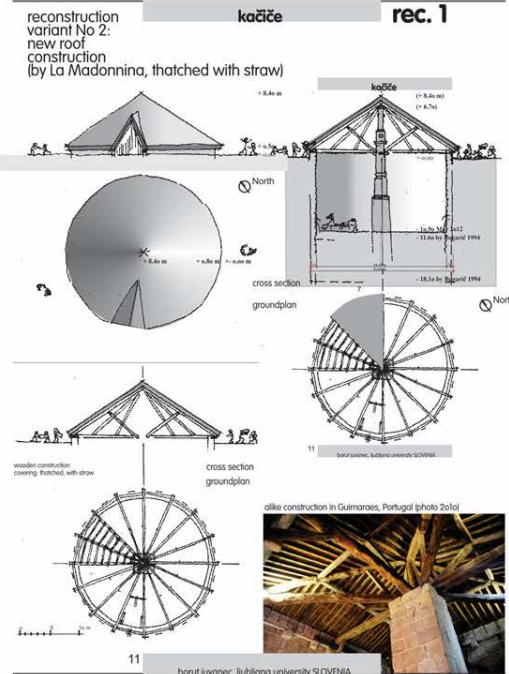
### Andreja Benko

PhD, architect, she studied at Faculty of Architecture in Ljubljana (2001-2008). In the years 2005, 2006 and 2010 she studied at with a scholarship of Dr. Otto and Karla Likar Foundation. Between 2011 and 2015 she was young researcher in University of Ljubljana. In 2013 she visited the University of Technology and Economics of Budapest. Since 2008 she works, with focus on single-family houses and hotel design. As researcher, she is mainly dealing with the responsibility during the whole construction process and with the architectural heritage. Her work was published in several scientific and professional magazines in Europe.

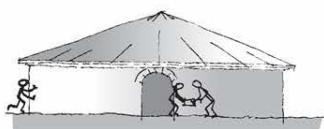
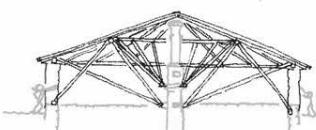
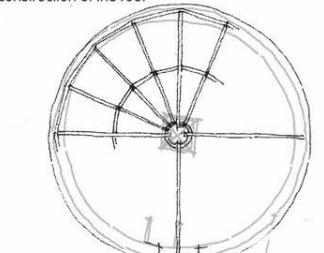




reconstruction  
variant No 2:  
new roof  
construction  
(by La Madonnina, thatched with straw)



reconstruction of the roof



rec. 1

existing object  
on april 2012

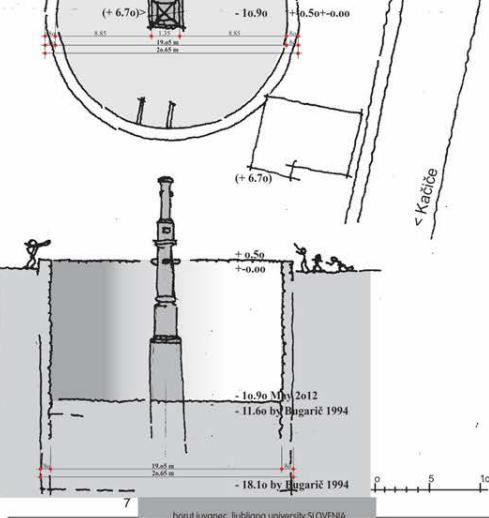
kačice

North

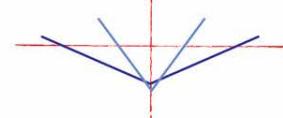
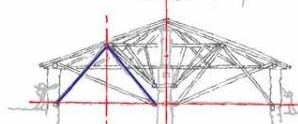
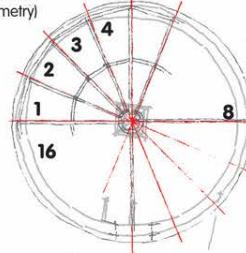
Dívčíka

Diváčka

Kačice



reconstruction  
of the roof  
(symmetry)













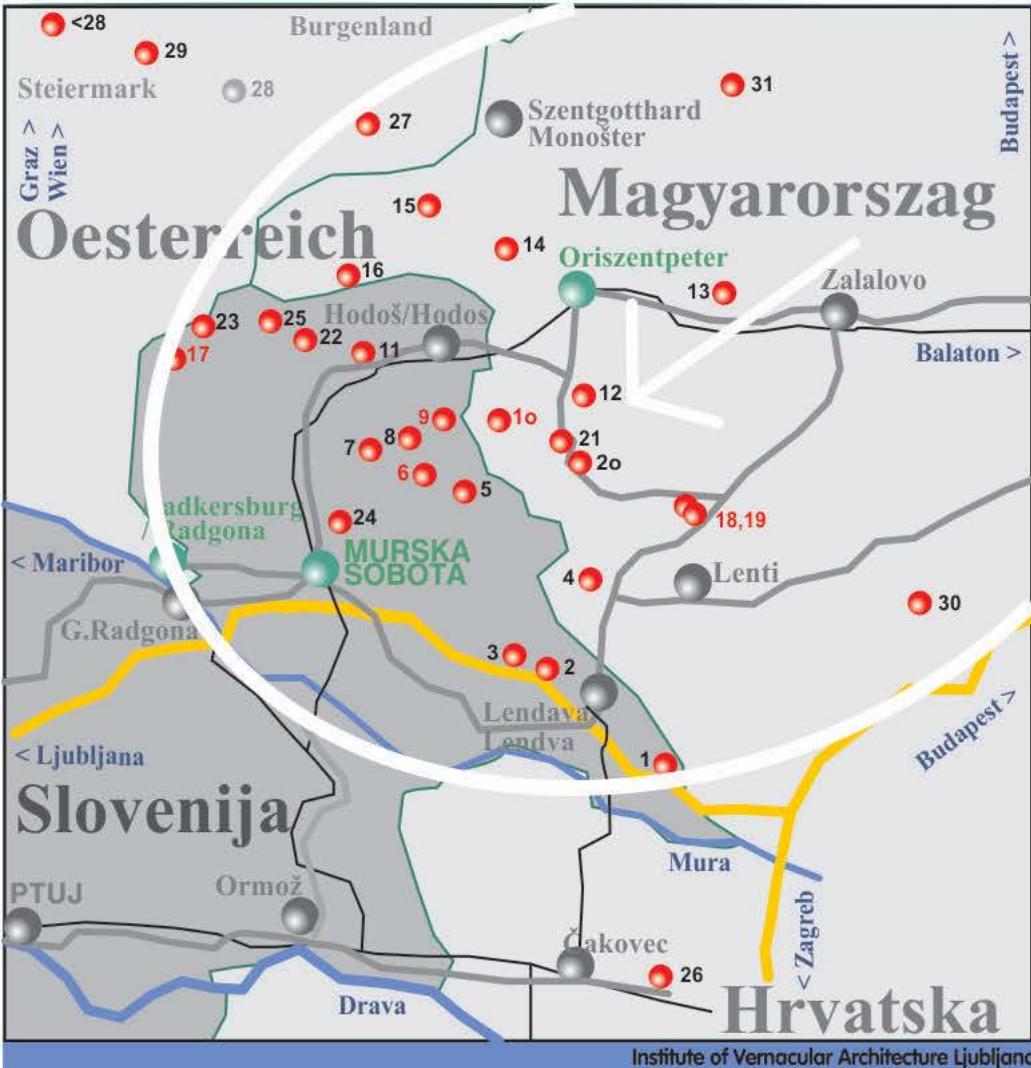






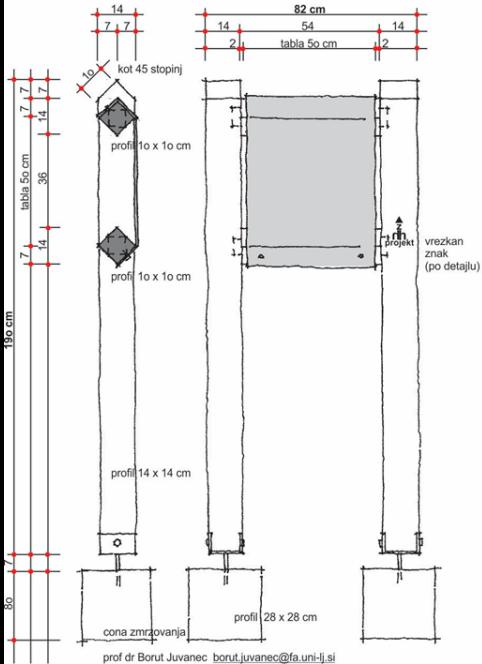


**NAKVI Budapest**



**Borut Juvanec**  
Ljubljana University  
Institute of Vernacular Architecture

**informacijska tabla ZVONIK**  
projekt zhh



# Kamovci / Kámaháza

Najzahtevnejša kostrukcija  
zvonika ima štiri stebre in  
zaprto telo. Strohi telesa in  
zgornjega dela sta  
simetrični, kvadratnega

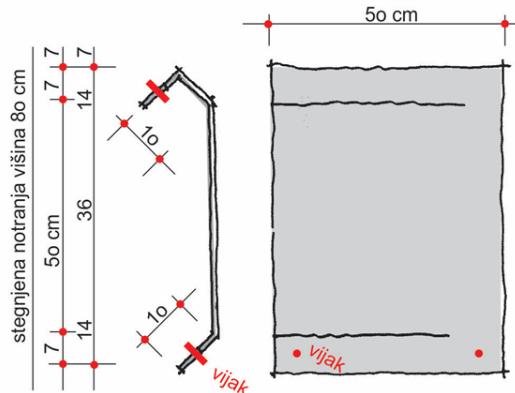
sprednji del table 50 x 50 cm

Kamovci / Kam 100 pik, bold

ARIAL

tekst 48 pik, normal

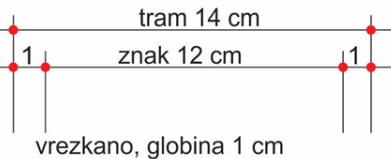
**informacijska tabla ZVONIK**  
projekt zhh



prof dr Borut Juvanec [borut.juvanec@fa.uni-lj.si](mailto:borut.juvanec@fa.uni-lj.si)

merilo 1 : 1

**z  
dh  
projekt**



**BELFRY location:** \_\_\_\_\_

- beverage (bars)
- food (restaurants, inns)
- shops (souvenirs, books, food)
- crafts (carpenters, carvers)
- children (playgr., workshops)
- sports (playgrounds, tennis)
- rent-a- cycle, motorbike, boat
- books (bookshops, libraries)
- religion activities
- hotel (hostel, hotel, hostel, bb)



**BELFRY location**



- 1 goat cheese
- 2 bread, wine, spirits

**BELFRY location:** \_\_\_\_\_

- guide:
- text
- graphic
- voice: professional guide
- voice: local guide (dialect)
- view from location

**language:**

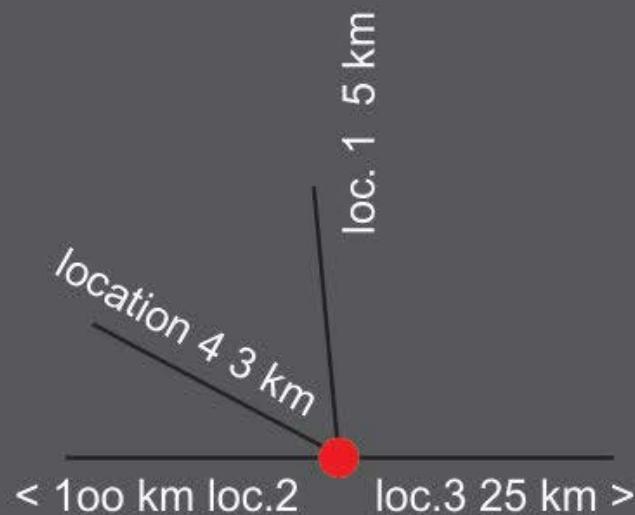
- dictionary

**security services:**

- police
- fire brigade
- paramedics



**BELFRY location:** \_\_\_\_\_





Borut Juvanec

Ljubljana University

Institute of Vernacular Architecture

objects  
●

info centres  
●

Magyarorszag:

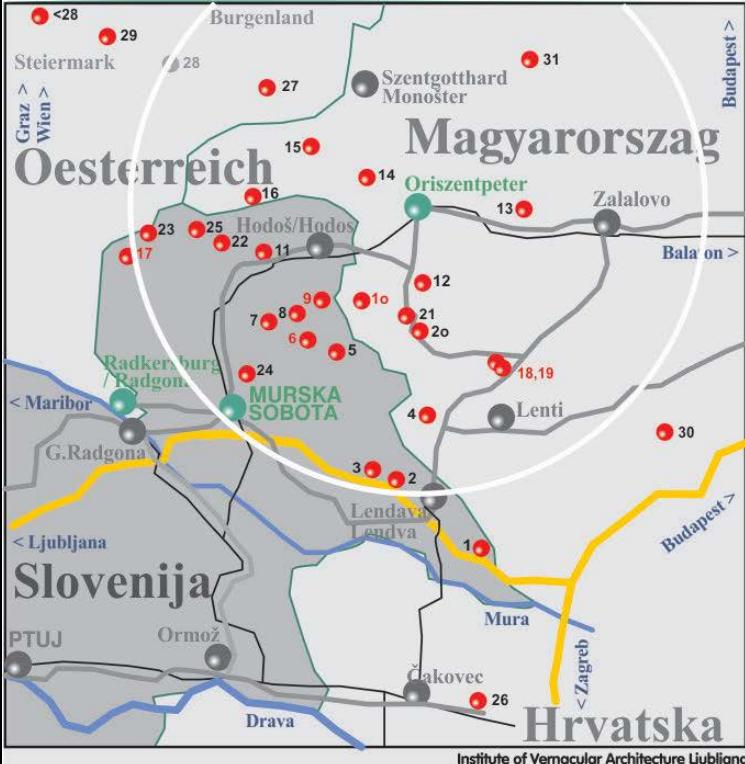
Oriszentpeter

Oesterreich:

Radkersburg / Radgona

Slovenija

Murska Sobota



BELFRY location: \_\_\_\_\_

- guide:
- text
- graphic
- voice: professional guide
- voice: local guide (dialect)

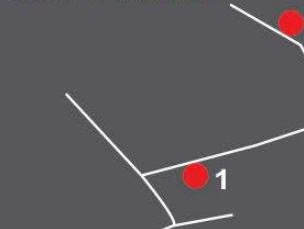
language:

- dictionary

security services:

- police
- fire brigade
- paramedics

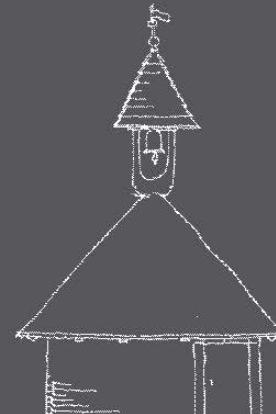
BELFRY location



● you are here: 100 and 150 m

- 1 goat cheese
- 2 bread, wine, spirits

BELFRY location: \_\_\_\_\_

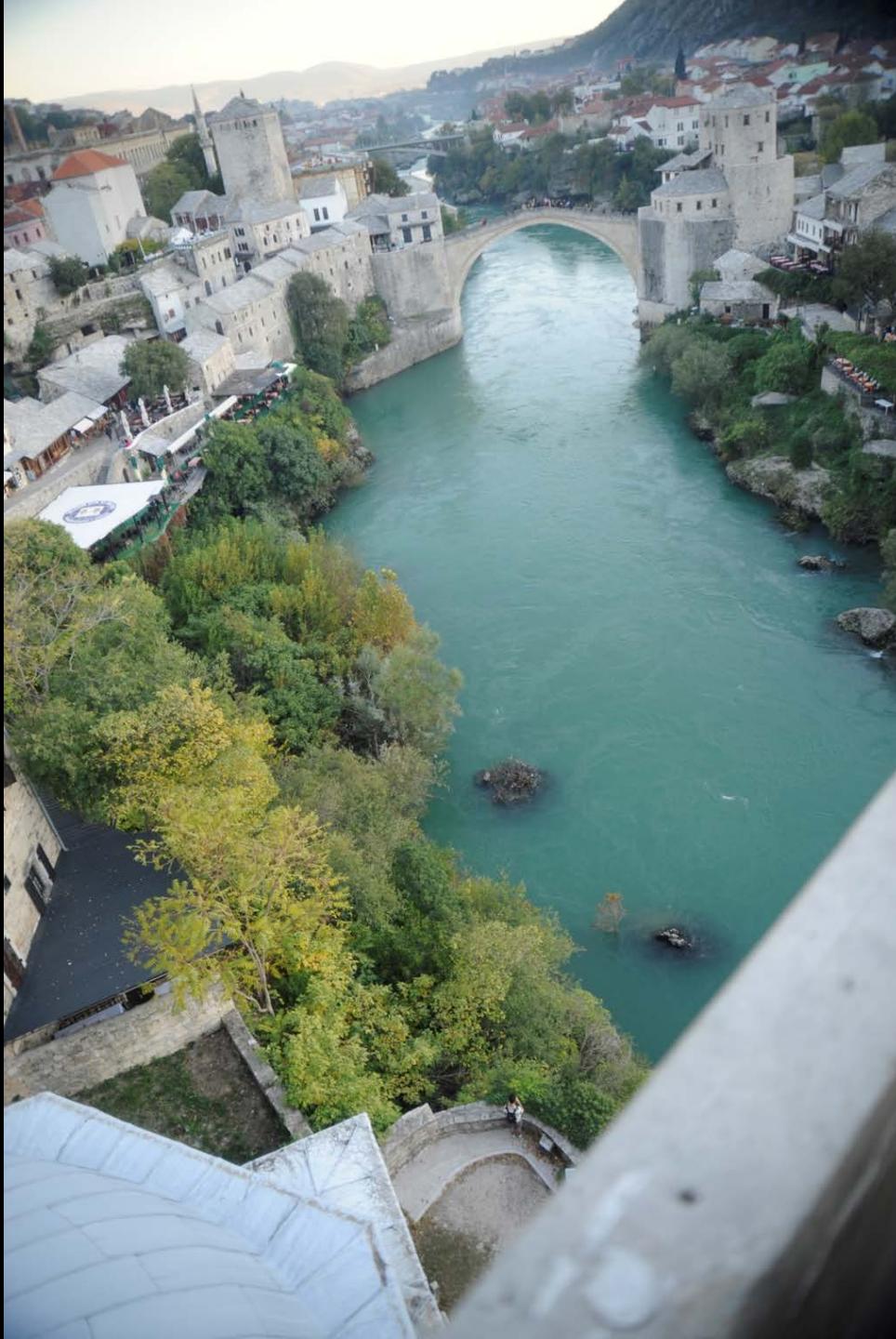












# **3 zemlje, 3 mlinice, 3 tipi, 3 x 3 problema: Popovo Polje**



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Institut vernakularne arhitekture, Ljubljana

ICOMOS BiH  
2018

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